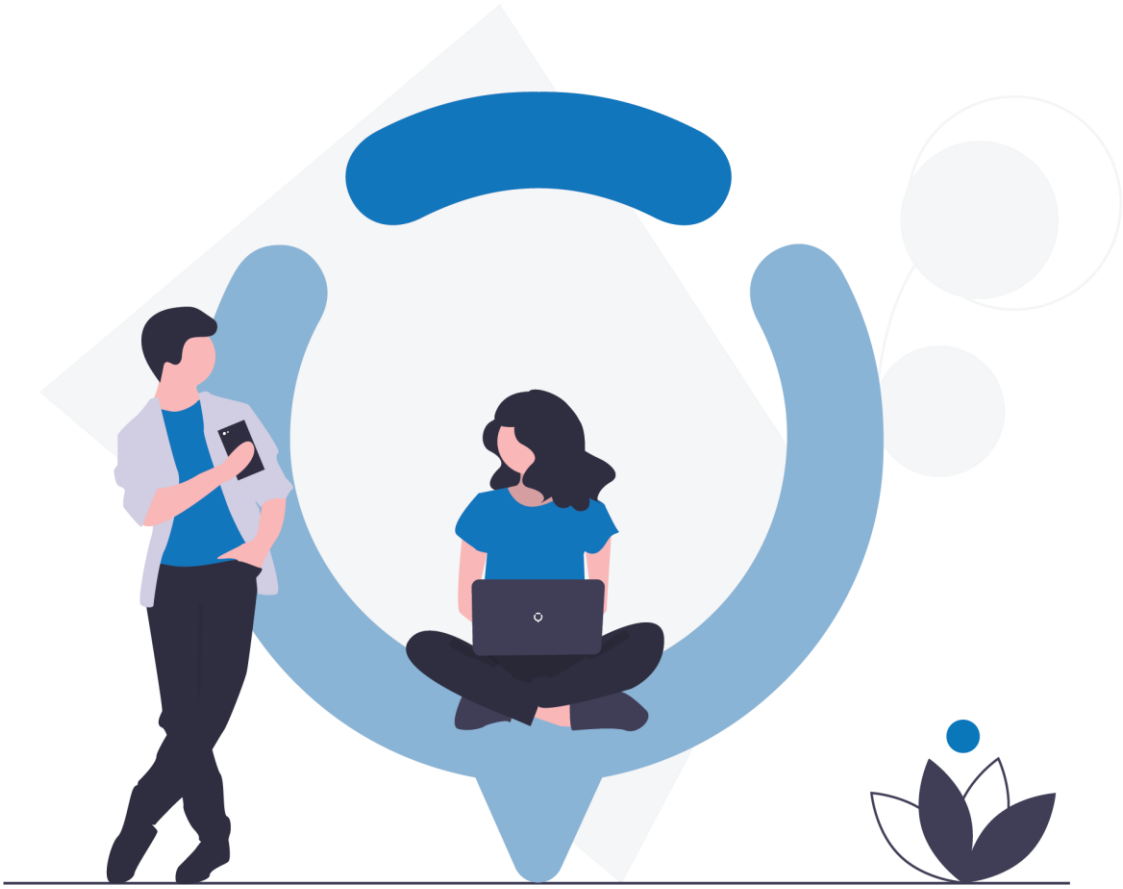
European Review Report

Issues faced by SME Managers when considering the introduction of robots/AI into their organisation

April 2020



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Introduction

According to the European Union (EU) 2020 Robotics Strategy (Comission, 2010), «robotics technology will become dominant in the next decade. It will influence all aspects of work and home. Robotics has the ability to transform lives and work practices, increase efficiency and safety levels, provide enhanced levels of service and create jobs. Its impact will increase over time, as will the interaction between robots and people».

The aforementioned article is the inspiration to bridge the path EU is taking regarding the implementation of industry 4.0 and the purpose of the EU Funded **Robots & SMEs** project of developing a series of training and support tools for Small and medium-sized enterprises (SME) managers to enable them to assess the value of robots to their business development and sustainability and then effectively introduce them.

As an introductory step to the project a study was undertaken to determine the issues faced by SME Managers when considering the introduction of robots/AI into their organisation and make recommendations as to what strategies they need to adopt to gain the best advantage from their introduction. Therefore, activities such as a desk research work to cover the introduction of robotics/AI in SMEs in Europe and a Europe-wide survey to both determine the issues faced by SME managers when considering the introduction of such innovative tools into their organisation and make recommendations as to what strategies they need to adopt to obtain the best advantage from their adoption are the issues covered by the present document.

Although the outcomes of the ROB-SME project will be targeted at SME Managers in Europe, the 'desk based analysis' intends to present the current status of Robotics and Artificial Intelligence worldwide, as it is vital that activities in this field are viewed in the context of a worldwide setting. Together with the European Perceptual Survey that has been undertaken by individual SME Managers throughout Europe this analysis intends to be helpful in informing and shaping the outputs of the project.

Given the pace of development in the robot/AI sector SME Managers need to have the 'evaluation and implementation' tools to make sure they are making the best use of these new technologies to ensure their competitive edge – there are no such tools available for SME Managers that will assist them to make informed choices – making this project both unique and innovative.

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Literature Review – Robotics and Artificial Intelligence: Impact on Economies

According to Servoz,M. (2019) since the genesis of industry 4.0 at the beginning of the decade of 2010, the various European governments and organisations have outlined a socioeconomic profile different from the previous, based on Artificial Intelligence (AI), Robotics, 3D Printing, Nanotechnology and the Internet of Things, which will have a major impact on companies and on how the economy affects people, societies and countries. The first activity developed by the Robots and SMEs partnership was a desk-based work with the aim of looking at the sectors that have already adopted robots in their production processes and its impact; the existing training offers for the introduction of Robotics in companies; legislation and National initiatives to promote the adoption of Robots/AI in SMEs. The answer to all these questions will underline the urgency of assessing the value of robots and AI in order to support the development of SMEs.

1.1. Definition of Robotics and Artificial Intelligence

Before analysing the impact of Robotics and Artificial Intelligence at world level, it is pertinent to define both concepts to avoid any ambiguity and to clarify the spectrum of this research. As stated by Policy@Manchester (2018), *although the challenges that companies and policymakers are facing with respect to AI and robotic systems are similar in many ways, these are two entirely separate technologies*.

Even though they can be merged in advanced systems, SME managers should be careful not to mix up them when developing policies for the future.

1.1.1. Robotics - definition

As maintained by MarketsandMarkets (2019), robots are programmable machines that perform physical processes and/or tasks and may be controlled by human action or by an Artificial Intelligence system (or by both). Robots are extensions to traditional machines with the capability to execute potentially complex processes, often equipped with sensing devices to identify aspects of their surroundings.

Robotic systems can be programmed to carry out several processes/tasks, such as:

- Performing repetitive industrial tasks such as moving materials, assembling parts, welding and painting, or loading other machines in factory environments.
- Collaborating with people in the workplace. Collaborative robots operate alongside humans in a shared workspace to jointly complete tasks (often by moving and handling heavy loads).
- Autonomously performing useful basic tasks for end-users, such as vacuum or pool cleaning.

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- Carrying out difficult procedures with human control and supervision. Professional service robots that can be human-operated, semi-autonomous or fully autonomous with human supervision are used in complex applications, such as in surgery.
- Intelligent robots and autonomous devices are sometimes referred to as artificially intelligent robots. Combining advanced environmental sensing capabilities with AI analysis and decision-making, such systems can perform difficult processes for extended periods without human oversight. A prominent example in this category is an autonomous driving car.

1.1.2. Artificial Intelligence - definition

According to MarketsandMarkets (2019), AI could be perceived as the collection of programming and computing techniques carried out to simulate, and, in many cases, exceed, aspects of human-level perception, learning and analysis. It is often considered a part of computer science and implicates techniques that cover a range of different areas, such as:

- **Visual perception** – identification of specific objects or patterns from unprocessed image data (e.g. facial recognition systems).
- **Neural networks** – models of brain function, with applications in learning and analysis.
- **Speech and natural language processing (NLP)** – discerning meaning from written or spoken text (e.g. some translation *apps*).
- **Machine learning (ML) and deep learning** – training computer systems to improve their capacity to perform certain tasks based on examples. Learning systems are used in simple settings such as in recommendation algorithms that refine results based on user behaviour (e.g. Google and Netflix).
- **Expert systems** – tools that provide specialist information, in context, from existing databases and repositories for use by human operators (e.g. decision-support systems in healthcare).

Although these examples cover a diverse range of areas, state-of-the-art technology today is often referred to as *weak* or *narrow AI* as it is only tailored for small and specific tasks. A longer-term goal of some in the field is to create *strong AI*, also known as *artificial general intelligence (AGI)*, which would have much wider applicability and is the form of AI that appears most often in popular culture.

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1.2. Robotics and Artificial Intelligence impact in the global economy

1.2.1. The impact of Robotics/Artificial Intelligence on the three economic sectors

1.2.1.1. Primary Sector

Agricultural Robotics is the logical proliferation of automation and cost-effective technology into biosystems such as agriculture, horticulture, and livestock. As stated by Mordor Intelligence (2019), the market is valued at USD 3.42 billion in 2017 and is expected to register a compound annual growth rate of 21.1%.

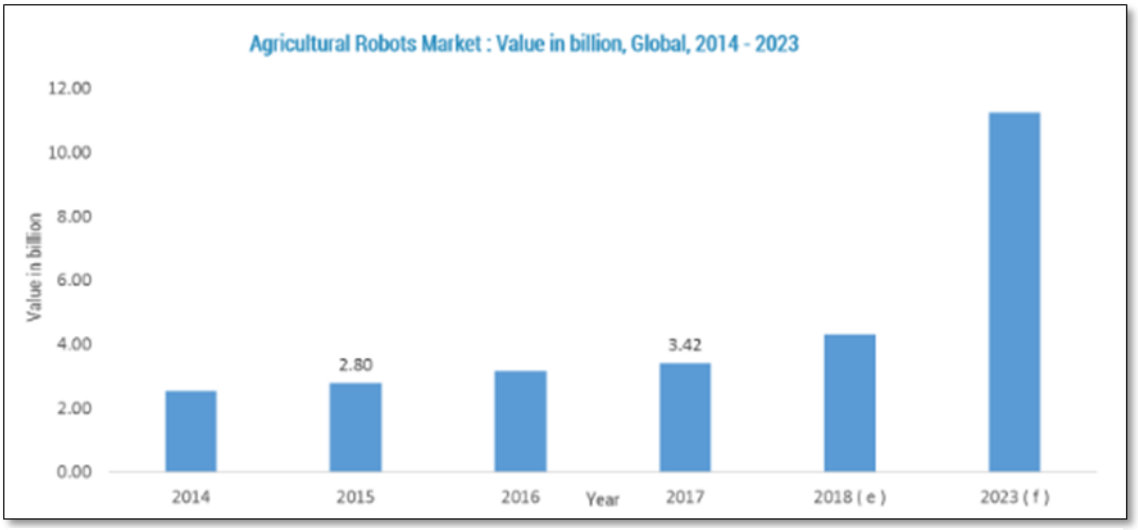

Image 1 *- Agricultural Robots Market: Value in US$ billion, Global, 2014-2023. Source: Mordor Intelligence*

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Robotics and automation are gradually becoming stronger in the agricultural industry. The most common applications of robots in agricultural fields include aerial data collection, filed mapping, seeding, and planting, fertilizing and irrigation, intercultural operations, picking, and harvesting, while others including dairy farming activities like milking, and shepherding. According to the International Federation of Robotics (2017), China, Republic of Korea, Japan, Western Europe and Germany, accounting for 74% of the total supply, mainly occupy most of the market.

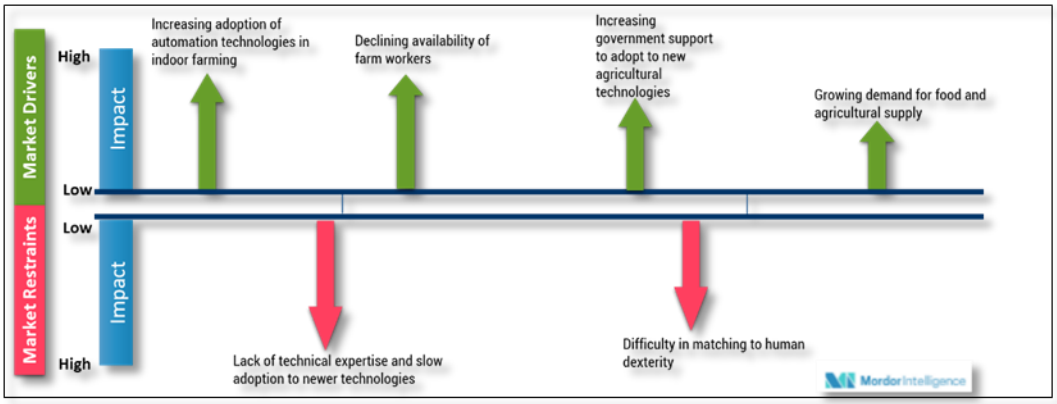

Image 2 *- Agricultural Robots Market Drivers and Restraints. Source: Mordor Intelligence*

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Agricultural Robots Market Report Summary

Metrics	Details
Industry	Agricultural Robots Market
Study Period	**(2014 – 2023)**
Market revenue in 2017	USD 2.8 billion
Market revenue in 2023	USD 11.2 billion
Growth Rate	21.1%

Table 1 *- Agricultural Robots Market: Report Summary. Source: Mordor Intelligence*

Across the world, farmers are becoming older and older. According to the International Labor Organization (2014), agricultural workers as a percentage of the workforce went down from 81.0% to 48.2% in developing countries and 35.0% to 4.2% in developed ones by 2014. The shortage of people working on farms is growing globally. In the Asia Pacific region, especially in Japan, the number of people working in farms dropped from 2.2 million in 2004 to 1.7 million in 2014. Such a significant decline in the workforce of about 12.8% is also observed in the European agriculture sector, mainly due to lack of young farmers, due to the unattractiveness of such area. Thus, skill shortages are encouraging farming automation technologies.

1.2.1.2. Secondary Sector

Industrial environments are constantly changing as new business priorities and innovation opportunities arise. The current period is often called the fourth industrial revolution or Industry 4.0, referring to the potentially disruptive effects of several emerging and maturing technologies. As stated by Tarver (2018), the leading ones among such technologies are AI and robotic automation, which have the potential to revolutionise many aspects of industrial environments whether deployed separately or together. According to the International Federation of Robotics (2018), the global market for industrial robots has been estimated at over $40 billion in 2017, and is predicted to grow to over $70 billion by 2023.

Industrial robots play a key role in manufacturing industrial automation, with many core operations in several industries being performed by robots. With economic growth across regions, the growth of e-commerce, electronics, and the automotive industry, among others has been on the rise. Increased demand across economies, product manufacturers are adopting robots to automate some of the repetitive processes. According to the US National Institute of Standards and Technology (2016), more than 250,000 industrial robots had been installed in the United States alone, which gives an estimate of the penetration of industrial robots. The same source refers that the industrial robots market has been witnessing an impacting demand over the past decade, owing to the rising adoption of smart factory systems, of which these robots play a vital part.

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Due to industrial robots becoming smaller and cheaper without compromising on the quality, the market is becoming more attractive for key players in the end-user industry. Therefore, and according to Image 3 and 4 below, the worldwide supply of industrial robots is rising. European countries, as Image 4 shows, are above the world average, while the Australia/Asia region is the fastest-growing market (Image 5).

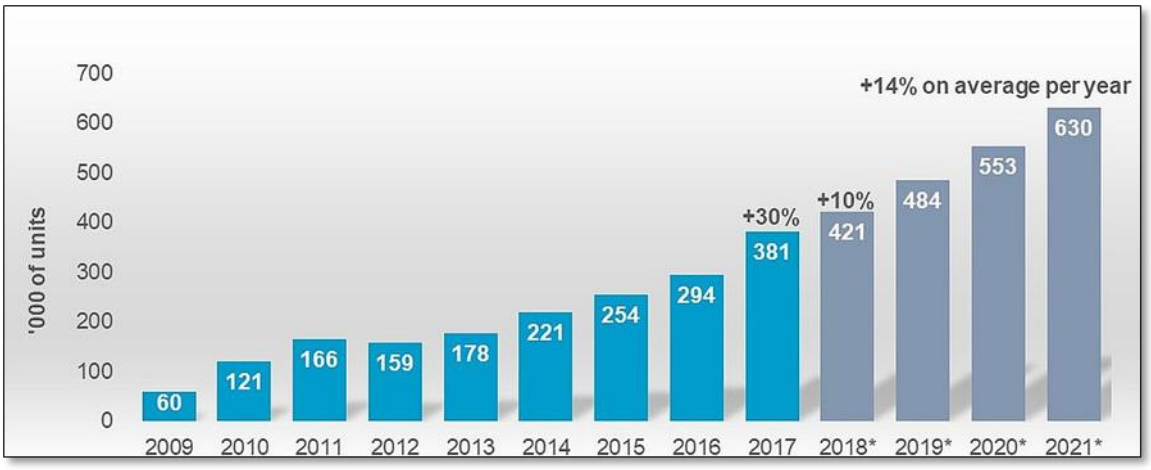

Image 3 *- Estimated annual worldwide supply of industrial robots, 2018. Source: IFR*

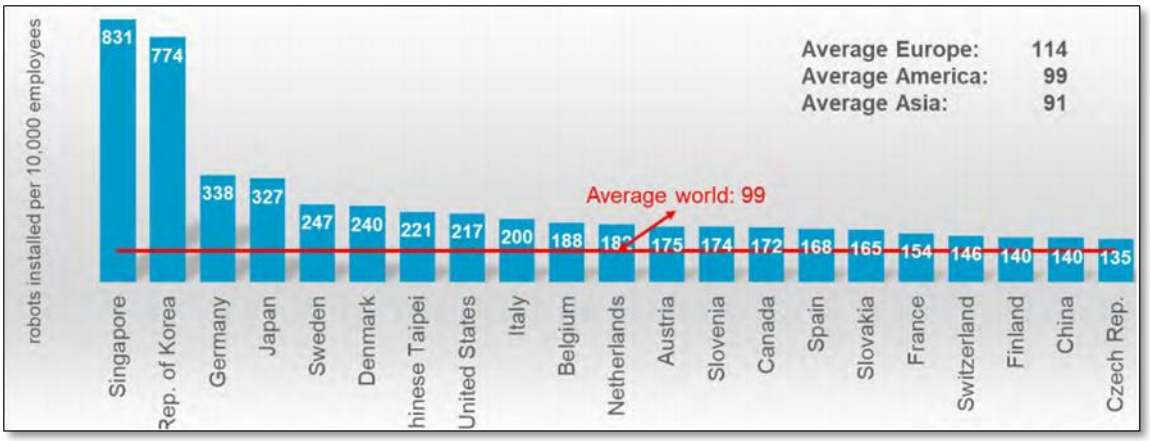

Image 4 *– Robot density in the manufacturing industry by country, 2018. Source: IFR*

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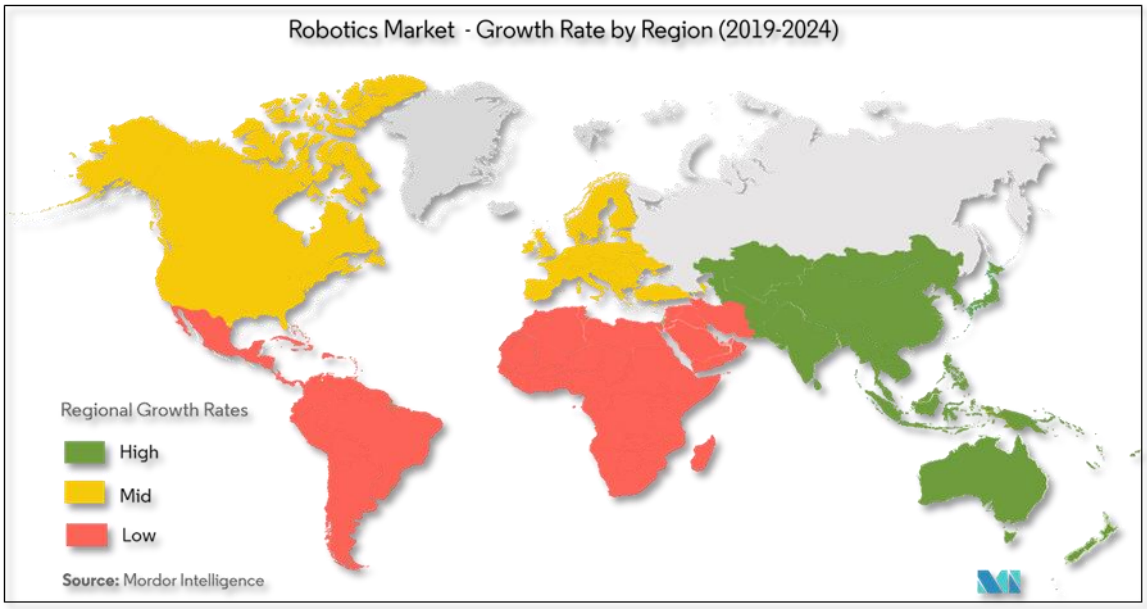

Image 5 *– Robotics Market – Growth Rate by Region (2019-2024). Source: Mordor Intelligence*

1.2.1.3. Tertiary Sector

International Federation of Robotics (2018) forecasts that sales of service robots will grow between 20 and 25 per cent by 2020. Having already significantly impacted the agriculture, surgery and logistics sectors, service robots are expected to offer greater assistive capability and value in the future.

By sales value, however, medical robots take second place after logistics robots, accounting for 30% of the value of total new sales of professional robots in 2018. Given ageing populations in developed economies, strong sales growth of 47% in units sold and 45% in sales value annually on average between 2019 and 2022 is forecasted for this category of robot (International Federation of Robotics, 2019).

Another fast-growing category of professional service robots with a promising future is public relations robots, which are used to provide information in shops and public spaces. The sales value of public relations robots increased by 28% in 2018 to just over US$ 158 million, with 40% growth forecast for 2019. The category personal / domestic robots covers robots used in the home for domestic tasks, entertainment and assistance. Sales of cleaning robots reached over US$ 2.4 billion, accounting for 67% of personal / domestic service robot sales value – a growth of 24% over 2017 (International Federation of Robotics, 2016).

The market for robots for elderly and handicap assistance is currently small, accounting for only 1.3% of sales value of personal / domestic service robots in 2018. However, this market is expected to increase by an average of 29% per year from 2019 to a value of around US$ 126 million in 2022. As in the professional service robot sectors, technology advancements in robot mobility, end effectors and vision technologies are driving adoption of robots in this sector

Different from the industrial robot sector, which is dominated by Japanese, Korean and German manufacturers, the US and Europe drive service robot development. In 2018, 44% of all service robot manufacturers are European companies, 35% are American firms, and 21% are Asian manufacturers. Around half of all logistic system

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manufacturers are European companies, while US manufacturers have a strong presence in medical and defence robots. Asian manufacturers are the dominant producers of robots for domestic tasks and entertainment.

The dynamism of the service robot sector, illustrated by strong growth in 2018, is set to continue. The sales value of professional service robots is estimated to increase by 45% on average per year between 2019 and 2022, reaching a total of about US$ 38 billion in 2022. Meanwhile, the sales value of personal /domestic robots will increase by an annual average of 35% in the same period to just over US$ 11.5 billion in 2022 (International Federation of Robotics, 2019).

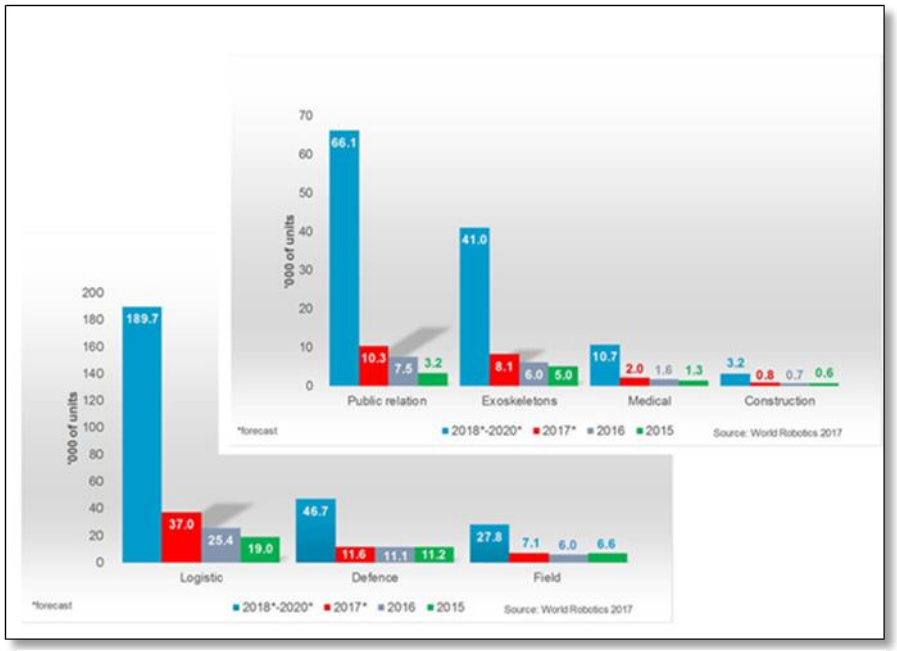

Image 6 *– Professional service robots main applications unit sales 2015-2017 and forecast for 2018-2020; Source: World Robotics Report 2017*

1.3. Global legislation, initiative and training policy regarding Robotics/Artificial Intelligence

1.3.1. A global overview

The role of governments, policymakers and regulators in dealing with the changes that AI and automation will bring is many-sided. Existing laws, standards and regulations for these emerging technologies will differ significantly across countries and territories, and approaches to supporting innovation while protecting workers and consumers will require the insights of experts from several fields (Policy at Manchester, 2018).

The wide-ranging applications of the technologies demand comprehensive sets of policies that cover, amongst other things:

- Industrial strategies and productivity;
- Human safety, legal liability and risk;
- Data use, privacy and security;

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- Intellectual property development and protection.

Countries may have separate policy programmes for Robotics and Artificial Intelligence or may combine them in large-scale industrial and research strategies, and existing laws will be challenged as new problems and opportunities come.

To provide context in this area, this section gives an overview of some of the prominent international approaches to developing effective policies for AI and automation:

United States of America (USA)

The USA was the first country to develop a genuinely comprehensive AI strategy.

Launched in 2016, the **National Artificial Intelligence Research and Development Strategic Plan** envelops AI, Robotics and related technologies, and was designed as a high-level framework to direct effort and investment in research and development.

Germany

Industrial manufacturing plays a major role in the German economy, and this has been reflected in government strategies for exploiting AI and robotics.

In 2013 an initiative to boost participation and capabilities in Industry 4.0 applications was launched, known as **German Plattform Industrie 4.0**.

In 2017 the German government built on this with a strategy specifically for the autonomous vehicle sector, advancing the country's position as a global leader in car manufacturing.

The United Arab Emirates (UAE)

In 2017 the UAE Government launched the **UAE Strategy for Artificial Intelligence**.

This strategic plan is a pioneering initiative in the Middle East region and includes a major focus on public sector services.

China

The Chinese economy has been boosted by manufacturing and exports for many years.

In order to follow this trend and ensure that country's infrastructure and businesses are on track to be competitive in the future, the **Made in China 2025** strategy was launched in 2015.

This is a comprehensive plan to upgrade Chinese industry, involving the development of new standards, capabilities and capacity for autonomous manufacturing processes.

Following this, in 2017 China released its **New Generation AI Development Plan** that detailed an approach to become the world leader in the field by 2030.

Japan

The Japanese government enacted the **5th Science and Technology Basic Plan** in 2016.

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This wide-ranging strategy covered aspects of innovation and internationalisation critical to the Japanese economy.

Part of the plan included approaches for developing a smart, technologically advanced and highly connected society known as **Society 5.0**, involving emerging innovation such as the Internet of Things (IoT), AI and robotics.

This plan was followed in 2017 with an **Industrialization Roadmap** that detailed Japan's approaches to developing and commercialising AI (Ministry of Internal Affairs and Communications (MIC), Japan, 2017).

The European Union (EU)

The European Commission (EC) is leading a number of research, funding and regulatory programmes that aim to position the EU as a global leader in robotics and AI.

The EC has developed a public-private partnership for robotics in Europe known as **SPARC**.

SPARC has €700M in funding for 2014–2020 from the EC, and three times as much from European industry, making it the largest civilian-funded robotics innovation programme in the world.

United Kingdom (UK)

The UK Government has been developing a modern industrial strategy, involving investments in robotics and other Industry 4.0 technologies, suitable for a post-Brexit country. Industry 4.0 is expected to shape the UK supply chain and force firms to adjust to a new operating environment. Suppliers will have to employ systems and machines compatible with next-generation systems required by their clients.

In 2017 the UK also revised its existing **Industrial Strategy** in order to boost the AI sector and capitalise on its existing competitive advantages.

To grow the AI industry, four priorities were identified:

1. *Improve access to data by leading the world in the safe and ethical use of data and AI,*
2. *Maximise AI research to make the UK a global centre for AI and data-driven innovation,*
3. *Improve the supply of skills needed for jobs of the future*
4. *Support the uptake of AI to boost productivity.*

In 2017, UK R&D expenditure as a percentage of GDP stood at 1.66%, lagging behind both the EU 28 and G7 averages, and government funding is set to remain important. With the UK government aiming for this figure to reach 2.4% of GDP by 2027, the manufacturing sector will play a highly important role. Specially designed automated processes have been available to manufacturers for decades.

According to Allinson (2019), artificial intelligence and automation are the fastest growing components of Industry 4.0. Automation can be found in nearly every UK sector from manufacturing to logistics, with machines required to undertake repetitive tasks and control processes. The next stage of these processes will involve interconnected machines able to communicate and make decisions to optimise processes. According to the Made Smarter Review by BEIS, the adoption of Industry 4.0 will require a balance between productivity and job creation. For example, a 30% adoption rate between 2015 and 2025 is expected to create 475,000 jobs. However, a 50% adoption rate would be

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expected to generate 380,000 jobs over the same period. Approximately one-third of new jobs created are expected to be in IT, analytics and R&D.

UK businesses can benefit from a number of sources of government funding, including the Industrial Strategy Challenge Fund, and the National Productivity Investment Fund. Moreover, through Innovate UK, the Department for Business, Energy and Industrial Strategy provides funding and support for SMEs in particular, after identifying that smaller companies are key to realising the I4.0. This is important as SMEs often lack funding, and many are uncertain where to begin the process of upgrading to Industry 4.0. The uptake among SMEs has been slow because it has been difficult for innovators to demonstrate value to small businesses with limited budgets. SMEs are challenged to disrupt and bring innovative ideas to the forefront of manufacturing, aided by funding provided by Innovate UK.

As a result, more efforts have been focused on making digitalisation more accessible to SMEs without excessive cost and risk. In addition, Industry 4.0 could lead to opportunities relating to R&D tax credits aimed at encouraging more SMEs. Robotics is the fastest growing technology for Industry 4.0 in the United Kingdom, which is currently home to the strongest artificial intelligence and machine learning in Europe, involving over 200 SMEs. UK manufacturers are already actively adapting mechanical and electrical designs to ensure they are capable of future industry standards. Although Industry 4.0 is slow to gain traction among UK sectors, full implementation in the coming years is expected to lead to sustainable economic growth.

Slovakia

As stated by (Berger, 2014), who has mapped the extent of progress with implementing Industry 4.0 in different EU Member States in terms of "*industrial excellence*" (production/ process sophistication, degree of automation, workforce readiness and innovation) and "*value networks*" (high value added, industry openness, innovation networks and internet sophistication) Slovakia is part of *The Traditionalists*, countries judged to have a sound industrial base but few have launched initiatives to take them into the new industrial era.

In 2015, Slovakian companies installed 79 robots per 10,000 workers. However, these figures have doubled in two years, since 151 robots per 10,000 workers were registered in 2017, according to the data produced by the International Federation of Robotics (IFR).According to Jesný (2017), robots are mostly implemented in production, as in painting or welding, even though the IFR data stated that the metal industry marked the highest increase in setting up robots in 2016.A rapid growth in robotic automation has furthermore been observed in logistics and in the sector of service robots.

In many respects, Slovakia, as an industrial country, easily adapts to the Industry 4.0 concept. According to the (The Slovak Spectator, 2019) in an interview with Boris Duľa, CEO of the CEIT technology company, many Slovak-based branches are leaders in introducing technological innovations within their concerns, which focuses on Industry 4.0. He added that some of them even resemble pioneers in the implementation of innovative solutions, gaining the trust of the parent company in pilot projects.

The need for new technologies is reflected in the direction the country has embarked on. After the concept and action plan for smart industry was approved in previous years, the Economy Ministry now promotes and financially supports the area.

Bulgaria

According to Berger (2014), Bulgaria was considered "*A Hesitator*", in other words, a country considered not to have a reliable industrial base and suffer from severe fiscal problems that inhibit it from a future-orientation. The country has been at one of the last places in terms of introduction of digital technologies in economy and society according to the 2019 DESI (European Commission, 2019). In accordance with Jovanovski, Seykova, Boshnyaku & Fischer (2019),

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in order to promote the growth in Bulgarian SMEs, a national strategy "*The transformation of Bulgarian Industry – Industry 4.0*" is being introduced. Although the good ICT structure with high speed access; the grounded tradition in the ICT sector; the access to EU-funded programmes and the wide usage of Internet are considered as an advantage of the country and a sufficient basis for the implementation of I.4.0, Bulgaria still has a long way to go. One of the biggest obstacles before the country are the non-working ecosystem of innovations (science – education – innovations) and the lack of impact of R&D on the competitiveness of SMEs. A great opportunity is recognized in the ICT sector as it is defined to be the most powerful driver for growth in the industry as well as creating ICT clusters for industrial application in the country could accelerate the adoption of Industry 4.0 elements in SMEs. Another opportunity lies in the expansion of the networks for access of next generation (NGA) and the adoption of future internet applications based on e-services of high quality.

Portugal

According to the Portuguese Society of Robotics (2011), robotics has been present in Portuguese universities and R&D centres since the beginning of the 2000's, with excellent results, leading to the development of prototypes operating mainly as piloting projects in the agricultural sector and in the services sector. These two sectors have a plan to adopt them in the short term, although this entails some costs and scepticism from some leaders. As for the presence of robots in the industrial sector, Portugal is 24th in the world with 58 robots per 10,000 workers. However, considering the use of robots in the automotive industry (the leading industry in the country), Portugal reaches 767 robots per 10,000 workers in the sector, placing in the 7th place in the European Union. The country has more robots dealers than producers, which shows that Portugal is still in a phase of take-off and piloting. However, there is a large number of R&D centres, which shows that there is a lot of work in the area of Robotics research, with more and more projects in the pilot phases.

On the authority of the Innovation Finance Advisory within EIB Advisory Services (2019), historically, Portuguese companies have experienced lower levels of productivity, lower levels of investment (namely in innovation), and higher levels of indebtedness than other European countries. As in other markets, Portuguese SMEs largely depend on bank debt given their limited access to capital markets and limited alternatives (e.g. well-developed venture/angel investors, peer-to-peer lenders), as well as the historical preference of Portuguese SMEs for debt financing. Portugal has emerged from a crisis period with severe credit contraction that particularly hit SMEs, where total lending volumes shrunk, NPL (non-performing loan) volumes peaked, and funding costs increased. This likely postponed many investment projects, including digitalisation. While difficulties from the economic crisis persist (e.g. some SMEs still restructuring and with high or non-performing debt), recent economic growth has enabled these trends to reverse. In the past two years, investment levels and overall bank lending to the economy have started to recover. However, these new trends have not yet translated into improvements in productivity, which is a historical challenge for Portuguese companies' competitiveness, particularly in traditional sectors – and one where digitalisation can have a significant impact. Effectively, digitalisation and innovation are high on the Portuguese government's agenda. This is fuelled by recent public actions and incentives, and economic growth. Numerous and diverse business associations and clusters play an important role in SME collaboration and integration, amongst others, to promote digitalisation (for instance, by disseminating best practices and use cases, promoting networking and the matching of buyers and sellers, offering training and advice). A small, but growing start-up ecosystem is also promoted via flagship events such as WebSummit, incubators and associations, and some venture capital finance (albeit with significant public support). Despite this, the overall level of digital adoption by the economy seems lower than the EU average as measured by aggregate rankings such as Digital Economy and Society Index (DESI), internet adoption and COTEC's recent I4.0 scoreboard. Demand for digital solutions from traditional SMEs seems more focused on digital technologies which improve sales channels (e-commerce being a growing area in the country) and efficiency gains (in production and administrative processes). The appetite of small businesses for bigger innovation programmes or R&D investments that are transformative for business models or geared towards new products and new markets is still limited compared to larger firms.

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Ireland

McKinsey (2017) estimates that new digitally-enabled automation and artificial intelligence have the potential to bring a boost in GDP of €550 billion from 2016 to 2030 in nine European "digital front runner" economies, in which Ireland is included. According to a rigorous analysis of the digitalisation of the Irish economy (Innovation Finance Advisory at EIB Advisory, 2019) a two-speed digital economy was unveiled. While Ireland is already in a strong position, being among the most digitalised countries in the world (6th in the EU digital index DESI) for many years, the digital economy appears to run at two different speeds, with a small number of foreign-owned multinationals with high digitalisation levels and productivity, and traditional local SMEs, which are slower in supporting digital solutions to reduce costs, drive innovation and expand market presence. The DESI reveals the relatively high relevance of Ireland to Europe's digital performance and its high level of digital competitiveness.

The Irish government has unveiled a five-year Industry 4.0 strategy to help manufacturing firms to respond to technological change, available on the recently produced Ireland's Industry 4.0 Strategy 2020-2025, prepared by the Irish Government Department of Business, Enterprise and Innovation (December 2019). The plan includes €23.5 million of funding for the Irish Manufacturing Research (IMR) Centre, a joint initiative between Enterprise Ireland and the IDA, the government departments responsible, respectively, for economic development and inward investment in the country. According to the Irish government, strategy is geared towards the development of new digital skills and technologies in the country's manufacturing sector, and to drive collaboration between small, medium and large-sized enterprises.

The IMR funding, a 57 % increase on its previous round of funding, covers the period to the start of 2025. It will see the centre leverage further funding in the region of €43 million from industry and competitive sources by 2024. The centre will split funding across some research tracks, including digitisation of manufacturing, automation and advanced control, design for manufacturing, and sustainable manufacturing. Its goal is to "triple the number of training days and to increase the number of intellectual property commercialisations by 467%". The IMR Centre has several specialist production capabilities, including in additive manufacturing equipment, augmented and virtual reality (AR/VR), cobotics and "Industry 4.0 demonstration lines".

The manufacturing sector supports 227,000 jobs in Ireland, with 80% of those based outside of Dublin.

The government has also established a new group, Future Manufacturing Ireland, to coordinate with government-funded research centres in this space, and make it easier for companies to access expertise. A new Industry 4.0 stakeholder forum, with representatives from the manufacturing sector as well as Industry 4.0 expert has also (IE Department of Business, Enterprise and Innovation, 2019) (Allinson, 2019) been convened to oversee implementation of the strategy.

The new strategy is part of Future Jobs Ireland, a cross-sector government framework launched in 2019 to address the skills gap in the country, and notably the increasing demand for science, technology, engineering and maths (STEM) related skills.

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1.4. Training policies for the use of robotics in business in European countries

The true digital transformation requires companies and their leaders to be sufficiently open to innovation and entrepreneurship, challenging the established rules, retaining talent and anticipating trends. Therefore, companies must start by rethinking processes from the business model to the relationship with the customer (passing, of course, through internal processes). In addition to these challenges, there are others to consider, namely the investment in the qualification of human resources for new technologies and processes and, of course, in the capitalization of the business - to implement the necessary changes. To leverage this process of change and ensure a harmonious assimilation of Industry 4.0 equipment and practices, managers must be guided in this direction. In this way, bad investment of funds, inadequate resources and ineffective processes will be avoided. When purchasing, for example, a robot to be included in an assembly line, the manager will have to know how to deal with the technical part of its installation, repair and maintenance; with the purchase process of the machine, often of high cost and associated with credit requests and with all aspects related to the human resources that the arrival of a robot entails (changing schedules, possible dismissals, changing functions, changing procedures and routines, etc.). This whole process, to be successful, will have to be well implemented and sustained.

Several EU countries have already taken steps to leverage their companies through training for the new era of Industry 4.0, which could serve as inspiration in the design of the Robots & SMEs project manual. The two following approaches are considered two good examples of practical and simple approaches to inspire *Robots & SMEs* materials (SME United, 2018):

MKB: Dutch SME Employer Organisation

For the majority of entrepreneurs, innovation takes place by modifying certain processes on a step by step basis. MKB put in place services for its members especially in the areas of digitalisation that are most confusing for entrepreneurs and perceived as disruptive technologies: data economy, platform economy, robotisation and cybersecurity.

Data Economy

The first step in digitalisation is organising your own data. Every entrepreneur has access to information but it is often not usable, or it is unknown what it can be used for. This is why MKB-Nederland is cooperating with JADS (Jheronimus Academy of Data Science), which gives entrepreneurs knowhow in the area of big data. Students and entrepreneurs can find common ground in the creation of value with data science and business analytics. The collaboration focusses on an SME Datahub (a data platform at branch level, which is focussed on competitiveness supported by data and the insights extracted from it) and an SME Datalab, a so-called 'data carwash' for SMEs, with which entrepreneurs can undertake business based on internal and external data in smarter and more efficient ways.

Platform Economy

Entrepreneurs respond through branch or regional association to the opportunities platforms offer. For example, the Dutch association of real estate agents (NVM) has built the platform Funda on which all houses for sale in the Netherlands can be found. Another example comes from the Dutch association of automobile repair shops (BOVAG), which developed its own platform for garage companies that is called Viabovag.

Robotisation

The Dutch metal producer association (Koninklijke Metaalunie) developed the programme Teqnow. The acceleration of production processes through the use of robots is important in this sector. In order to test how this would work out in practice, SMEs can borrow a robot from a pool, hence giving the opportunity to test advantages of working with a robot, and easing the step to invest in one.

Cybersecurity

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In 2016 MKB-Nederland started a campaign in cooperation with the Ministries for Security and Justice as well as Economic Affairs, to support individual entrepreneurs as well as branch associations in combating cybercrime. With the project 'Safely doing business on the internet' (Veilig Zakelijk Internetten) entrepreneurs are able to test, among other things, the security of their digital environment. On top of that, it offers branch organisations the ability to inform their constituency about all aspects related to cybersecurity.

Confartigianato Imprese: Italian association representing SMEs and crafts

Following the decision of the Italian government to launch the programme "Industry 4.0" to invest in digital development, Confartigianato Imprese also decided to develop a programme of information, education and service for their members. The programme could take advantage of the right momentum as the incentives scheme set out in "Enterprise 4.0" has convinced even those SMEs that were more reluctant to start the process of digitalisation. A newly appointed delegate of the President for Digital Affairs and a newly created Steering Committee composed by artisans and Confartigianato staff members oversee the whole programme. Within the framework of this new programme, Confartigianato created an online portal aimed at regrouping all the information and initiatives. One of the initiatives within this programme is the setting up of a nationwide network of Digital Innovation Hubs (DIH) that act as a first contact point for SMEs that want to acquire new skills, information, and advice on how to digitalise their business and that need to obtain evidence on the incentives offered by "Enterprise 4.0". DIHs are run at local level by experts able to give advice on where to find the most suited competences and solutions. The most noteworthy example is Confartigianato Varese - ASARVA, that three years ago opened "Faberlab" within the premises of the association. Faberlab has performed a crucial role in providing education to schools and companies in all the aspects of digital transformation, with a particular focus on digital fabrication. In addition to local and regional hubs, local offices of Confartigianato also give direct assistance on e-commerce, organise tailor-made courses on digital transformation, provide specific services and develop educational material. Moreover, Confartigianato has contributed to the production of ad hoc guides to be distributed to local associations and members, for example the two editions of the "Practical guide to Industry 4.0 for artisans and SMEs" in collaboration with the University of Brescia and a "Practical guide for Industry 4.0 compliance" in collaboration with Conforma (The Italian Association of Certification Bodies). In addition, a national road show with more than 50 public events at local level with the aim to discuss the benefits of Enterprise 4.0 and of digital transformation is still in place since last year. Finally, Confartigianato Imprese continues to collaborate with institutional actors and bodies to ensure that the needs of SMEs are correctly met in shaping digitalisation policies and in addressing public resources.

1.5. The 2018 International Federation of Robotics Report main conclusions regarding the Impact of Robots on Productivity, Employment and Jobs around the world

The International Federation of Robotics connects the world of robotics around the globe. Their statistical department is the primary global resource for data on robotics, as members come from the robotics industry, national or international industry associations and research & development institutes. Therefore, it would be unthinkable not to consult the most recent report developed by IFR in 2018, so to conduct part of this research, as it is quite enlightening as to the impact of robots on productivity, employment and jobs around the world. The following are the main findings from the report:

Robots increase productivity and competitiveness.

Robots enable companies to become or remain competitive. This is particularly important for SMEs, the backbone of both developed and developing country economies.

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- Investment in robots contributed 10% of growth in GDP per capita in OECD countries from 1993 to 2016.
- A one-unit increase in robotics density (which the study defines as the number of robots per million hours worked) is associated with a 0.04% increase in labour productivity.
- The McKinsey Global Institute predicts that up to half of the total productivity growth needed to ensure a 2.8% growth in GDP over the next 50 years will be driven by automation.

Overall, the greatest threat to employment is not automation but an inability to remain competitive.

- Companies that employ technology innovations effectively are between 2 and 10 times more productive than those that do not, according to research by the OECD.

Automation has created jobs and increased wages

- Automation has driven a net increase of over 10 million jobs in the EU 27 between 1999 and 2010.
- Robots have increased wages without reducing hours worked.
- Jobs have grown faster in occupations using automation.
- Countries that invested more in robots lost fewer manufacturing jobs than those that did not.
- Countries with the highest robot density, mainly Germany and South Korea, have among the lowest unemployment rates.

Robots complement and increase labour: The future will be robots and humans working together

Robots replace labour but not jobs:

- Less than 10% of jobs are fully automatable;
- Automation of tasks within a job do not lead to a decrease in workers with that job: e.g. the introduction of ATM machines in the US did not lead to a decrease in bank tellers.

Governments and companies must focus on providing the right skills to current and future workers to continue positive impact of robots on employment, job quality and wages.

- Governments must invest in robotics research and development to gather the employment benefits of this rapidly growing sector. They must also provide the policy incentives and education systems to support the acquirement of skills needed to secure and thrive in jobs that are created or changed by the operationalisation of robots and automation.
- Companies must engage actively in appropriate retraining programmes for employees to equip them with appropriate skills.

These goals will not be easy to achieve and require **coordinated public-private sector collaboration**.

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1.6. Desk Research conclusions

The growing expansion of industry 4.0, a concept that emerged in Germany in the early 2010s, was a key factor in increasing the density of robotic and AI instruments in various economic sectors around the world. In the primary sector, it is an industry that has moved from a valuation of $ 2.8 billion in 2014 to a forecast of more than $ 10 billion by 2023 and is mostly present in countries such as South Korea, Japan and Western Europe; In regard of the secondary sector, the global market for industrial robots has been estimated at over $ 40 billion in 2017, and is predicted to grow to over $ 70 billion by 2023, as industrial robots play a key role in manufacturing industrial automation, with many core operations in several industries being performed by them; the tertiary sector will also grow, as IFR forecasts that sales of service robots will grow between 20 and 25 per cent by 2020, having already influencing the, surgery and logistics sectors, service robots are expected to offer greater assistive capability and value in the future.

The role of governments, policymakers and regulators in dealing with the changes that AI and automation will bring is many-sided. Existing laws, standards and regulations for these emerging technologies will differ significantly across countries and territories, and approaches to supporting innovation while protecting workers and consumers will require the insights of experts from several fields. Countries may have separate policy programmes for Robotics and Artificial Intelligence, or may combine them in large-scale industrial and research strategies, and existing laws will be challenged as new problems and opportunities come.

The 2018 International Federation of Robotics Report main conclusions regarding the Impact of Robots on Productivity, Employment and Jobs around the world were that robots enable companies to become or remain competitive (this is particularly important for SMEs, the backbone of both developed and developing country economies); since the last decade of the 20th century until now, automation has created jobs and increased wages; robots complement and increase labour, as the future will be robots and humans working together and governments and companies must focus on providing the right skills to current and future workers to continue the positive impact of robots on employment, job quality and wages.

Regarding training for business, this investigation has retrieved useful good practices which may be an inspiration for the product we will work on for the next two years. Since many EU countries are striving to take the train of Industry 4.0 due to SMEs lack of investment and know-how, many programs were created from public and private initiatives around EU countries, giving the feeling that leverage for industry 4.0 is a common will. In this way, the initiatives carried out by Dutch SME Employer Organization MKB are particularly noteworthy, since it puts in place services for its members, especially in areas that may raise more doubts in the process of modernizing a company (data economy, robotization, cybersecurity). With the support of think tanks like JADS, SME managers created SME Datahub and SME Datalab, to accomplish these challenges through the exchange of good practices and retrieving knowledge from well-known universities and research centres. However, it is in robotization that greater emphasis should be given, as the practice of SMEs borrowing a robot from a pool, hence allowing testing advantages of working with a robot and easing the step to invest in one is something that the ROB-SME partnership should think about. Another case study to consider is Italy. Within the framework of the "Enterprise 4.0" governmental new program, Confartigianato (the most representative Italian organization of micro and small businesses) created an online portal aimed at regrouping all the information and initiatives. One of the initiatives within this program is the setting up of a nationwide network of Digital Innovation Hubs (IHL) that act as a first contact point for SMEs that want to acquire new skills, information, and advice on how to digitize their business and that need to obtain evidence on the incentives

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offered by "Enterprise 4.0". In addition to this joint effort, the research and review work carried out by the partnership between Confartigianato and the University of Brescia is added, underlining, again, the idea that having an academic / research centre working together with businessmen is important to successfully implement an SME modernization process.

All other initiatives described in the Best Practices in Assisting SMEs with the Digital Transformation (SME United, 2018) report should be given special attention by the project team, all of which include good practices that can be inspiring when designing the best possible plan so that SME managers from across Europe can count on an organized, effective and reliable plan to catapult your business into this new era of modernity, the era of Industry 4.0.

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2. European Survey Analysis - Issues faced by SME Managers when considering the introduction of robots/Artificial Intelligence into their organisation

Introduction

The Robots & SMEs project will be developing (to be launched in August 2021) a series of training and support tools for SME Managers to enable them to assess the value of robots for their business development and sustainability and then effectively introduce them.

The first phase of the project has been to study and determine the issues faced by SME managers when considering the introduction of robots/AI into their organisation and make recommendations as to what strategies they need to adopt to gain the best advantage from their introduction.

To identify the issues an on-line question comprising 26 questions, intended for SME Managers that aimed to analyze and contextualize the introduction of robots and AI in their business, assessing their current state and the opinion of SME Managers in this regard. They were asked to respond according to their direct experience or specific knowledge regarding the topics addressed. The method for collecting answers was Google Forms.

As a companion to this Survey Report the project undertook a desk research exercise that was carried out in order to ascertain the state of the art of robots/AI introduction in Partner countries (which can be downloaded from www.robsme.com).

Summary Conclusions

The total of 137 responses were received from 12 countries – the questions and detailed analysis of the answers can be found in the **OVERALL RESULTS** Section.

The first conclusion that can be drawn from the Survey results is that in general, in all the countries surveyed there is an opinion that the introduction of robots and AI technology will affect the 'human' workforce in respondent's organizations. The most verified answer in four out of the five countries was Somewhat Agree (even though Ireland's most chosen option was Strongly Agree), which allows one to conclude that, although there is a notion that the robotization of all economic devices understudy is inevitable, there is not a very high degree of certainty on behalf of SME Managers. This may be due to the type of business of each one (which may require a more '' traditional'' or manual modus operandi, which cannot be replaced by a machine) or some uncertainty regarding the difficulties of companies in each country in gather all the conditions to implement robotic and AI systems.

The second conclusion that can be drawn is that SME managers, in general, believe that robotic and AI systems will have a significant impact on the efficiency of their companies, with several countries surpassing 30% in Agree and Strongly Agree responses and not many negative responses (none has exceeded 20%). This means that SME managers are aware that technology can make their productive and operational process more effective, making room for beneficial investments in other areas, more linked to customer support, human relations, creativity, advertising, etc.

The third conclusion is that most SME Managers are not fully aware of the potential impact of robots and AI on their workforce, since most of the respondents in all countries agreed with such statement and negative responses had

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very little expression. Prevailing opinion that SMEs' knowledge concerning robots and AI is still in a rudimentary stage may lead to some skepticism regarding the adoption of these instruments.

The fourth conclusion that can be drawn is that most respondents think they have staff within their organization with the knowledge and insights they need to help to implement innovative technologies in the workplace, which is proven by the considerable amount of Agree and Somewhat Agree responses. This indicates that the difficulties in implementing robots and AI in the respondents' organizations may be related to factors other than the lack of knowledge on the part of the human workforce (possibly financial).

The fifth conclusion is that in all countries there was an agreement regarding the receptivity of SME managers to be provided with an online mentoring service to help them understand the issues surrounding robotics and artificial intelligence (as well as in which way they could influence their business), including a best practices guide with real examples from other companies, which ends up validating the purpose of the project itself. The maximum percentage of the sum of negative responses did not exceed 36% in the worst-case scenario.
The sixth conclusion. When asked if human impact factors must be considered when making decisions about the implementation of technology, as the efficiency gains provided by robots and AI cannot be compared to employee experience, skills and other people factors, most SME managers were clear, being Agree the most answer in three out of the five countries.

The seventh point to underline is that most of the surveyed SME managers feel that robotization and AI will affect their business in the next 5 years. The most voted answer in the five countries was "Somewhat Agree", which reckons some doubts (they probably feel divided between financial conditions to implement such technologies, government support and the business's own propensity to adopt them).

The eighth conclusion, given that negative responses were quite expressive (68% in Portugal, 85% in Bulgaria, 73% in the UK, 88% in Slovakia and 79% in Ireland), shows that most of the SME managers do not consider Robotization and AI as a future threat for their business.

In this sense, it would be interesting to find out the reasons why, since it may go through several factors: tasks that can only be done by humans, due to its specific way of production, which can be handcrafted, creativity-based, etc.; lack of financial power to invest, so, if there are no funds to invest, no one will ever get to adopt these innovative futures, thus it will not affect no one's business; dissenting government policy, which may lead to lack of funding, absence of pro-innovative approaches and law, etc. When SME Managers were asked if their business is suitable for introducing robots/AI to replace humans in certain processes, the percentages of positive responses exceeded the negative ones in just 3 out of 5 countries. It must be stated that there are organisations that will never be able to adopt new technologies, given their human/handcrafted nature.

Then, when asked if the introduction of robots/AI could give your company a competitive advantage over other companies in its sector, apart from Portugal, the majority of respondents believe that the introduction of robots/AI could give their company a competitive advantage over other companies in its sector. In regard to SME managers opinion when asked if they believe that the associated consequences to the labour forces make the introduction of robots/AI troubling, the majority of the respondents agree that there are other factors that could compromise the arrival of technologies to their companies apart from workforce issues. Finally, when asked if this survey was worth their time and attention, SME managers agreed that it was.

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The third section of this questionnaire (open-ended questions), requires broader reflection by SME managers, was created in order to analyze their opinion in more detail regarding some other aspects in regard to the adoption of robots/AI by SMEs.

The first conclusion was that most of the respondents think that there are opportunities offered by emerging technologies to both evolve their business model and to improve the relationship with their employees. Among the examples given, computerized machinery, robotization of production processes, medical robots, co-bots, chatbots and AI in decision-making processes were the most referred examples of opportunities offered by this newly arrived emerging technologies. It should be noted that these technologies across several sectors of the economy and different branches of business, which proves that all sectors can benefit from these technologies, according to the respondents.

When asked if respondents' companies already started implementing steps towards digitalization, robotization and/or AI, it can be observed that most of their SME managers have not yet started implementing steps towards digitalization, robotization and / or AI. Of the cases where this process has already started, the examples given went through buying and using automatic CNC machines, AI to fine-tune customer preferences, internet-based products, data processing, Computerization of production control, robotized production systems, etc.
SME managers were asked what were the three biggest barriers the implementation of robots and AI in their business. According to the majority of them, this is mainly linked to lack of information regarding funding and legislation, lack of qualified workforce, lack of suiteness of the business and lack of awareness of opportunities.

In regard of training/mentoring on robotization/AI in the inquired companies, most of the SME managers stated that training would be really important in order to form current and future employees, as they would become more aware and skillful regarding new technologies to keep up with markets' constant demands. Since most of the countries stated that there are skill gaps due to poor training in schools/universities, this is also something that should be addressed by the project. The project will offer SME managers a guide to useful training tools.

Concerning the awareness of existing policies and available government support towards SME's robotization and the efforts of policymakers to stimulate its implementation, the high number of Don't know / No opinion responses from SME Managers should be highlighted.
Most responses from the four countries focused on the same points: policymakers are not striving enough in order to implement new technologies in the workplace, also there is a high degree of ignorance on behalf of SME managers regarding the existing legislation and support.

The same question was applied to EU policy concerning robots/AI implementation and, when asked if they were aware of it and if the existing policies could be improved and more completely articulated to SMEs, the respondents stated that they are not aware of the EU policy concerning robots / AI implementation in SMEs. Regarding measures they feel should be taken in this matter, they state that EU should include more robots / AI development funding programs, more investment in training programs, tax benefits for companies using new technologies, more informing events and workshops in companies, among others.

The last section was dedicated to finding out if the respondents would be interested to be kept up to date with the project developments and if so, they were given the opportunity to opt-in to the project contact database. The majority of respondents (62%) agreed and are now ready to receive a deeper approach on behalf of the project team.

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The desk research was an important step towards assessing the state of the art of the introduction of robots / AI in Europe and worldwide. Starting from this point, one will develop a better understanding of SME managers' position concerning the problems that could be troubling the adoption of new technologies to optimize their business, thus pushing it for the industry 4.0 era.

In order to analyse and contextualize the introduction of robots and AI in European SME Managers businesses, assessing their current state and their opinions, the Robots & SMEs project conducted an extensive web-based European survey.

The survey questionnaire was of a structured type, consisting of 26 questions, divided into four sets: the first one focusing on Generalities - Country, Gender, Age, Size of business, Economic sector - 5 questions; the second and the third on SME managers opinions on the introduction of robots/AI (the 2nd section had 13 close-ended questions, the 3rd section had 6 open-ended questions) and the fourth being the section to collect respondents' contact information (2 questions). We focused on one key group of stakeholders - SME managers.

The questionnaire was developed in English and then translated into all partner languages (Portuguese, Bulgarian and Slovakian). All language versions were available in the online web survey system Google Forms, and data collection took place from January 2019 to April 2019. Invitations were sent out when the survey was opened as well as throughout the duration of the survey. Several channels were used, from partner networks to personal invitation and posts on social networks and websites. When the survey was closed, we had received 137 replies. Of these, 25 (18,2%) were from Portugal, 27 (19,7%) from Bulgaria, 27 (19,7%) from the UK, 24 (17,5%) from Slovakia and 34 (24,8%) from Ireland.

2.1. Section I - Respondents Profile

1 – Country

We first inquired about some relevant aspects concerning the respondents' profile. The first question was about the country where their businesses were headquartered. In Portugal, 25 SME managers (100%) said their business was headquartered in that same country. The same occurred in Bulgaria (27 respondents told their business was headquartered there - 100%), Slovakia (24 (100%) of the respondents' businesses are from Slovakia) and Ireland (34 respondents - also 100%). However, in the United Kingdom survey, only 10 (37%) of the respondents have their business headquartered in the UK. Four SME managers (15%) have their business headquartered in Spain, 3 (11%) in Sweden, 3 (11%) from North Macedonia, 1 (4%) from Pakistan, 1 (4%) from the Czech Republic, 1 (4%) from Italy, 1 (4%) from Ireland and 1 (4%) from Israel.

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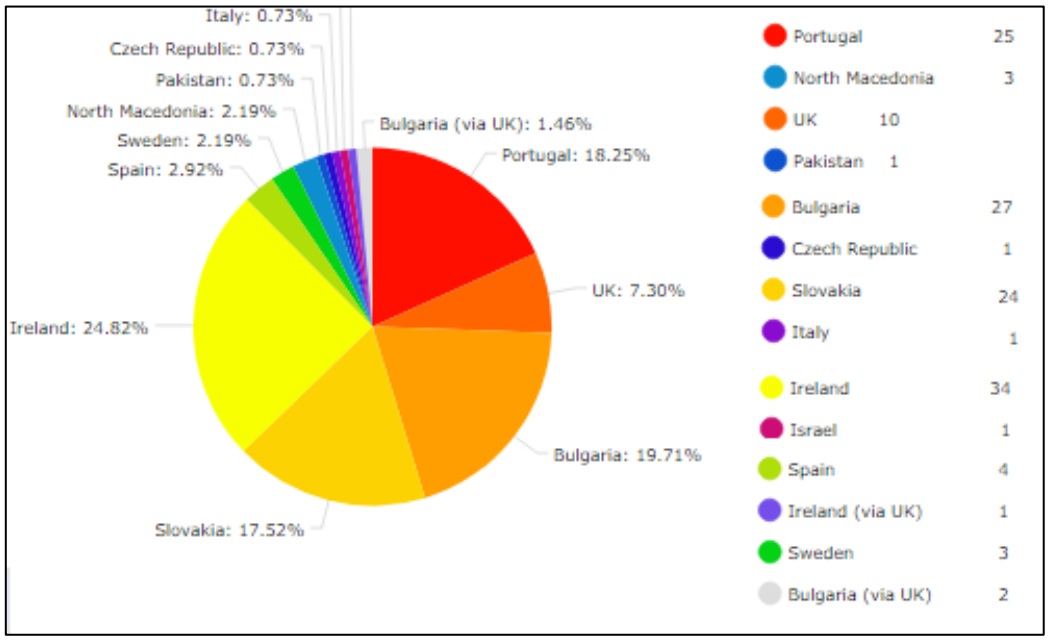

Chart 1 *- Country*

Therefore, globally, as shown in **Chart 1** above, only about 3% of the respondents' businesses are headquartered outside European Union, which allows this sample to reflect the current scenario in the EU accurately. 97% of the SME managers represent organisations headquartered in the EU (such as Portugal, Bulgaria, Slovakia, Italy, Spain, United Kingdom[1], Ireland, among others).

[1] *At the time the questionnaire was distributed, the United Kingdom was still a member of the EU.*

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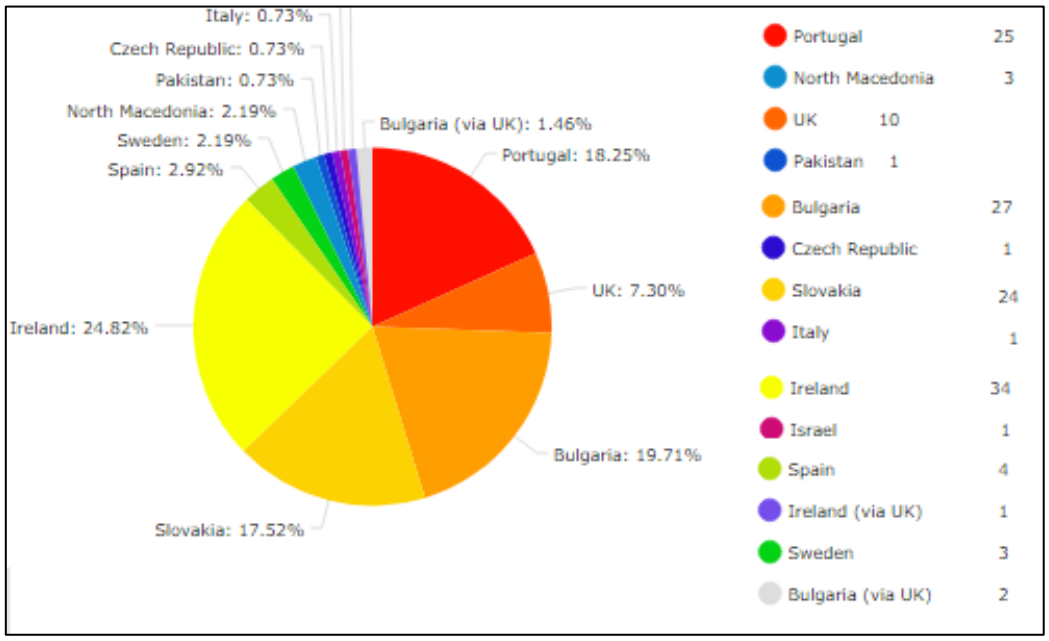

Chart 2 *- Country*

Therefore, globally, as shown in Chart 1 above, only about 3% of the respondents' businesses are headquartered outside European Union, which allows this sample to reflect the current scenario in the EU accurately. 97% of the SME managers represent organisations headquartered in the EU (such as Portugal, Bulgaria, Slovakia, Italy, Spain, United Kingdom2 , Ireland, among others).

2 - Gender

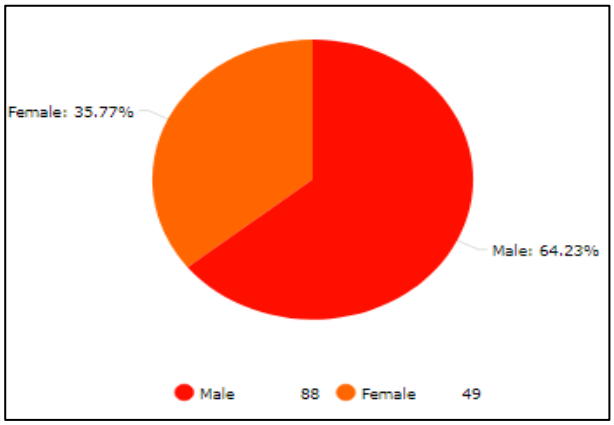

Chart 3 *- Gender*

In all countries surveyed, more men than women participated in the questionnaire. In Portugal, 64% (16) of the respondents are men, 36% (9) are women; in Bulgaria, 37% (10) of the respondents are men, 63% (17) are women; in

[2] *At the time the questionnaire was distributed, the United Kingdom was still a member of the EU.*

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UK 66, 7% (18) of the respondents are men, 33, 3% (9) are women; in Slovakia 95, 8% (23) of the respondents are men, 4, 2% (1) are women and, in Ireland,61,8% (21) of the respondents are men, 38,2% (13) are women. Globally, 64% (88) of the SME managers surveyed are men, and 36% (49) are women.

3 - Age

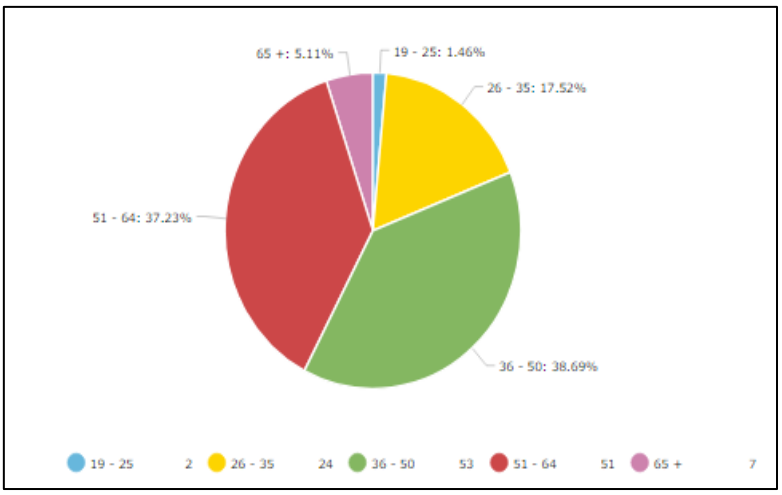

Chart 4 *- Age*

The age group with the most participants is 36-50 y.o (39%, 53 people). In Portugal, 60% (15) of the respondents are in the 36-50 y.o. range; 36% (9) are in the 26-35 and only 4% (1) is in the 51-64; in Bulgaria, 37% (10) of the respondents are in the 36-50 y.o. range; 33, 3% (9) are in the 51-64, 18, 5% (5) are in the 26-35 and 11, 1% (3) are 65+ y.o.; in UK 51,9% (14) of the respondents are part of the 51-64 y.o. range; 22,2% (6) are in the 36-50, 11,1% (3) are 26-35, another 11,1% (3) are 65+ and only 3,7% (1) is 19-25; in Slovakia 45,8% (11) are 36-50 y.o. ; 25% (6) are 26-35; 20,8% (5) are 51-64; 4,2% (1) are 65+ and also 4,2% (1) are 19-25 and, in Ireland, 64,7% (22) are 51-64 y.o.; 32,4% (11) are 36-50 y.o. and 2,9% (1) are 26-35 y.o..

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4 - Size of business (number of employees)

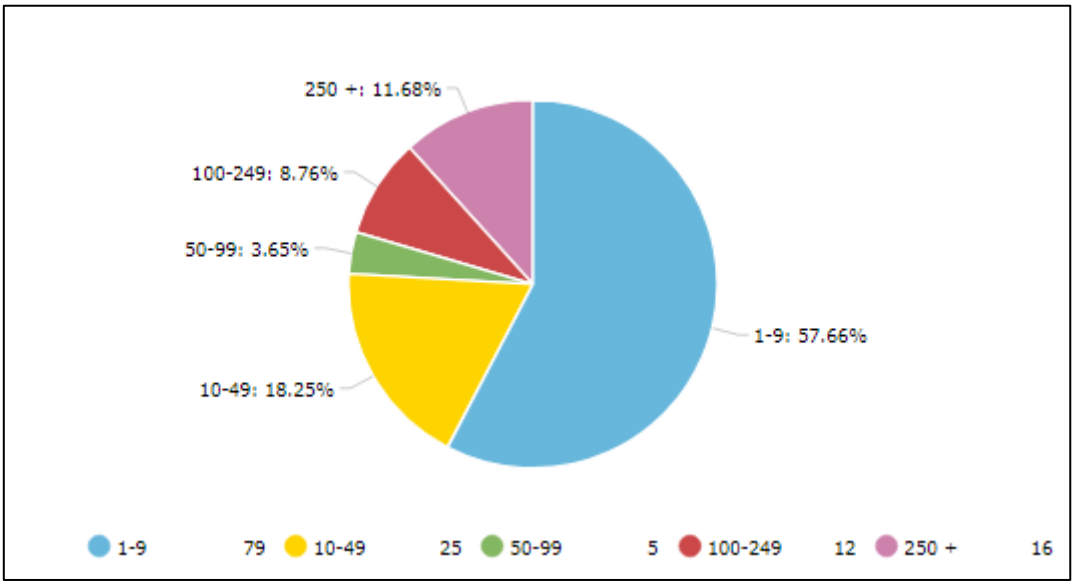

Chart 5 *- Size of Business (number of employees)*

About 58% (79) of the respondents represent Micro Enterprises (1-9 employees), ca. 18% (25) represent Small Enterprises (10-49 employees), and the remaining 24% represent Medium-sized and Big Enterprises.

In Portugal**,** 56% (14) of the companies have 1 to 9 employees; 28% (7) have 10 to 49; 12% (3) have 50-99 and only 4% (1) have 100-249; in Bulgaria 88, 8 % (24) of the Bulgarian respondents have 1 to 9 employees. Each one of the remaining three respondents has 10-49, 100-249 and 250+ employees; in the UK 63% (17) of the companies have 1 to 9 employees; 18,5% (5) have 100-249; 14,8% (4) have 10-49 and 7% (1) has 250+ employees; in Slovakia 45, 8% (11) of the companies have 1 to 9 employees; 41, 7% have 10-49 (10) and only 4, 2% (1) for each of the other options (50-99, 100-249 and 250+) and, finally, in Ireland 38,2% (13) of the companies have 1 to 9 employees; 8,8% (3) have 10 to 49; 2,9% (1) have 50 to 99 employees; 11,8% (4) have 100 to 249 employees and 38,2% (13) have 250+ employees.

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5 - Economic sector

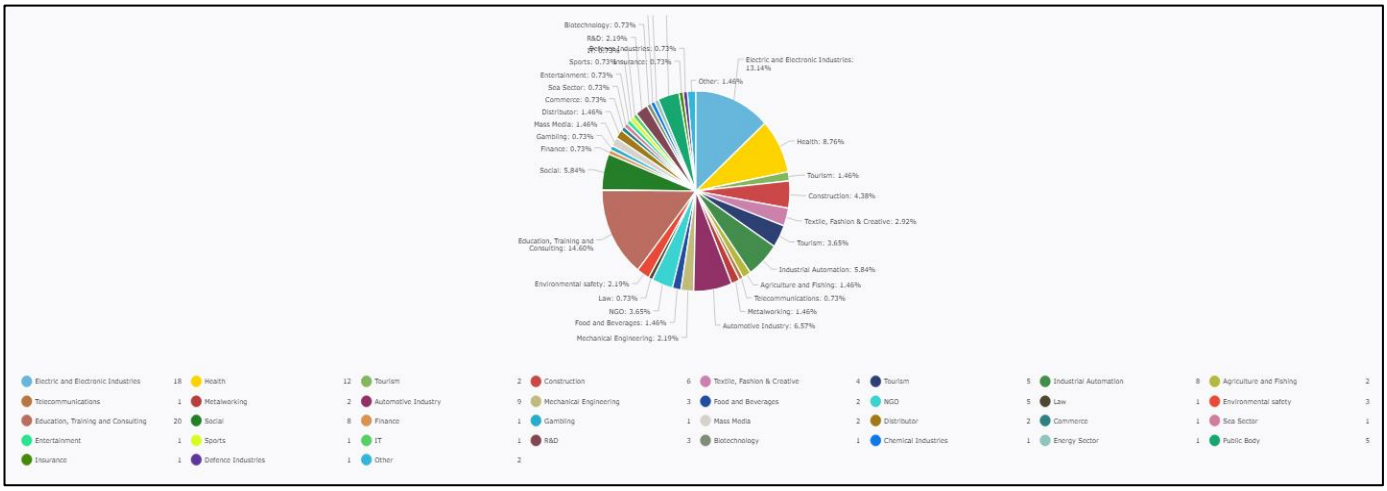

***Chart 5** - Economic Sector*[3]

Respondents sectors of activity vary widely. The least represented sector is the primary sector (agriculture, fishing) with only ca. 1% of responses, as opposed to the secondary sector (industry) with ca. 40%. The tertiary sector (services) is the most represented, with ca. 60%.

The sector with the highest number of responses is Education, Training and Consulting with 14.60% (20 responses). This questionnaire item stands out for its heterogeneity.

In Portugal, 24% (6) of the companies are part of the Electric and Electronic industries. 16% (4) belong to the Health sector, 8% (2) to Tourism, Construction and Textiles, Fashion and Creative industries. Eight other sectors share a 4% (1) percentage each. In Bulgaria, 14, 8% (4) of the organisations are NGOs; 11, 1 % (3) are from the Tourism sector. Each one of the remaining 25 answers came from different sectors, such as Environment, Finance, among others. In the UK, 29, 6% (8) of the companies responding to the UK survey work on consulting, training and education services; 18,5% (5) of the organisations work on Social Economy. Another 18,5% (5) of the companies belong to the Automotive Industry, and 7,4% (2). Each one of the remaining answers came from different sectors, such as Electrical and Electronic Engineering, Agriculture, Metal and Locksmith. In Slovakia, 12, 5% (3) of the Slovakian companies belong to the Electric and Electronic sector. Another 12, 5% (3) belong to the Health sector. Each one of the remaining 18 respondents (75%) come from different sectors, such as Sports and R&D. In Ireland, 12, 5% (3) of the Slovakian companies belong to the Electric and Electronic sector. Another 12, 5% (3) belong to the Health sector. Each one of the remaining 18 respondents (75%) come from different sectors, such as Sports, Consulting, R&D, Education, among others.

[3] *Please, zoom in on the page to see Chart 5 more accurately.*

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6 - Country Analysis

Portugal: All of the 25 respondents to the questionnaire have their companies headquartered in Portugal, the majority are men (64%), and a large part of the SME Managers under investigation is in the 36-50 age group. As for their companies, 56% are small companies (1-9 employees), which corresponds to the vast majority of companies present in the Portuguese industrial fabric (95%). The greatest diversity of responses occurred in the Economic Sector since, besides Electric and Electronic industries (24%) and Health sector (16%), eight other sectors got a 4% percentage.

Bulgaria: All of the 27 respondents to the questionnaire have their companies headquartered in Bulgaria, most of them are women (67%), around 70% are between 36 and 64 y.o.. As for the respondents' companies, almost 90% are small enterprises (1-9 workers) mainly from the tertiary/services sector.

UK: The questionnaire activity in the UK was the only one that brought responses from foreign countries (the majority coming from EU countries), 66,7% are male, more than half are between 51 and 64 years old and 63% are from small companies (1- 9 employees). Half of the respondents come from companies linked to the services sector, the other half are linked to the primary and secondary sectors.

Slovakia: 100% of the respondents in Slovakia have their businesses headquartered in the country, 95, 8% are men, almost half of them (45, 8%) are 36-50 y.o.. As for their organisations, almost 86% are from SMEs (45, 8% have 1-9 employees and 41, 7% have 10-49). The sector of activity of the responding Slovak organizations vary greatly, with the sectors with the most responses coming from the Electric and Electronic sector (12.5%) and Health (12.5%), with considerable heterogeneity.

Ireland: 100% of the respondents in Ireland have their businesses headquartered in the country, 61,8 % are men, most of the total respondents (64,7%) are 51-64 y.o. As for their organisations, 47% represent SMEs (38,2% have 1-9 employees and 8,8% have 10-49). The sector of activity of the responding Irish organizations varies greatly since only Electrical and Electronic Engineering (17,6%) and Healthcare Industries (8,8%) have more than one response.

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2.2. Section II - Close-ended questions

6. The introduction of robots and AI technology will affect the 'human' workforce in your organisation.

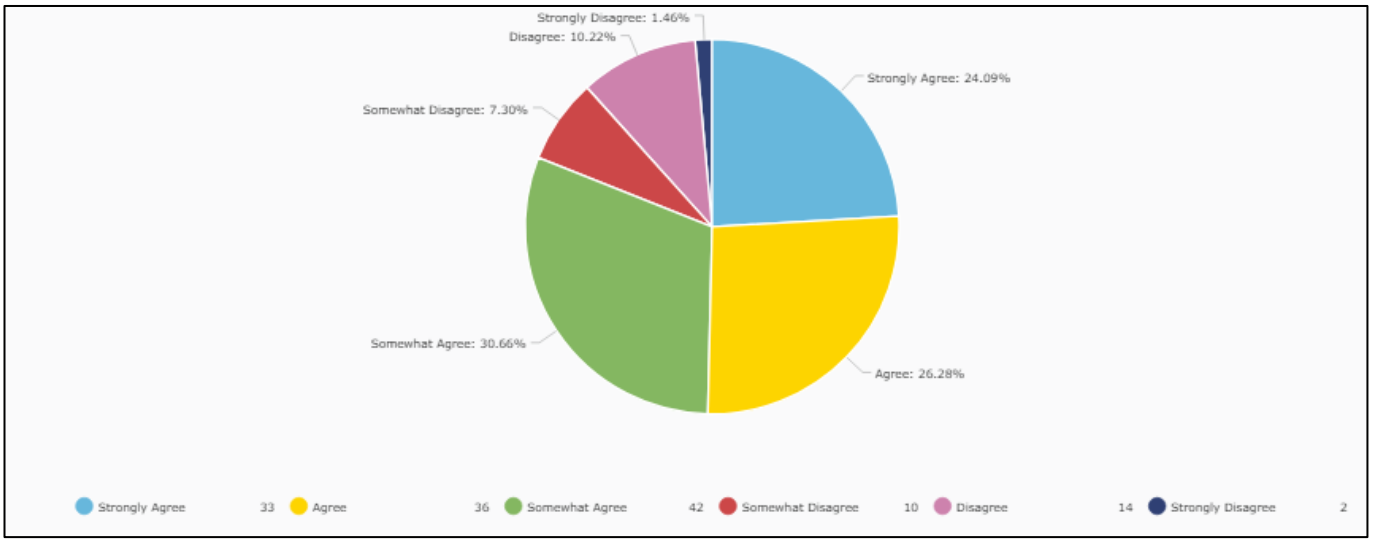

Chart 6 - *The introduction of robots and AI technology will affect the 'human' workforce in your organisation.*

Overall, SME managers claim that the introduction of robots and AI technology will affect the 'human' workforce in their organisation. 30.66% (42) of the answers were Somewhat Agree, the most voted, followed closely by Agree, with 26.28% (36) and Strongly Agree, with 24.09% (33). Negative responses had little impact, all of them together did not exceed 20%.

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7. The introduction of robots and AI technology will have a significant impact on the efficiency of your organisation.

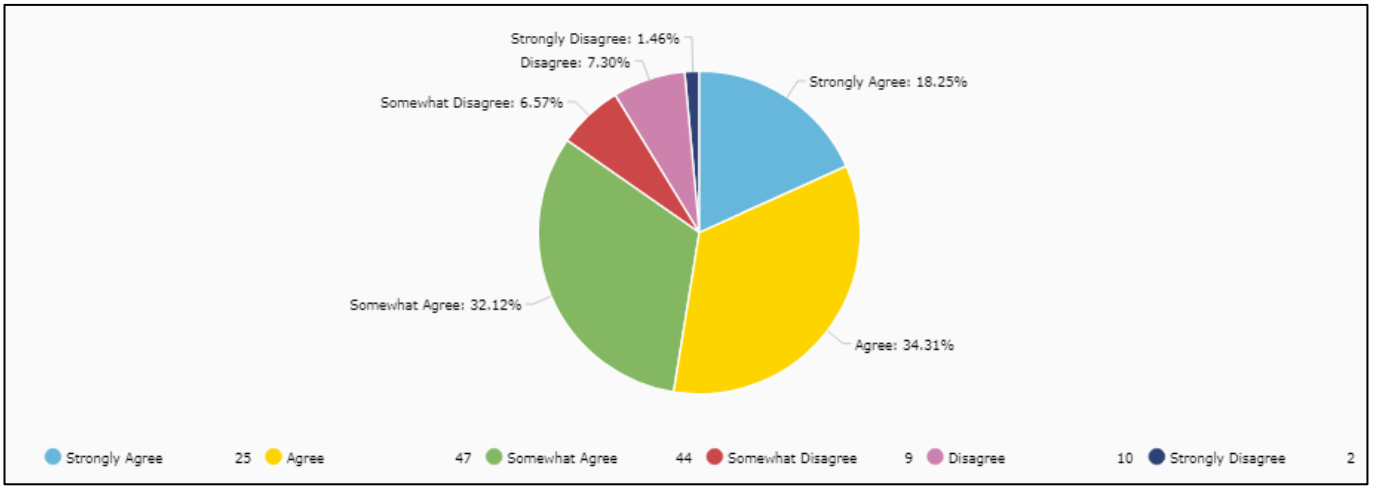

Chart 7 - *The introduction of robots and AI technology will have a significant impact on the efficiency of your organisation.*

The SME managers who responded to the survey, in general, consider that the introduction of robots and AI technology will have a significant impact on the efficiency of their organization. The most voted option was Agree, with 34.31% (47), followed by Somewhat Agree (32.12% - 44) and Strongly Agree (18.25% - 25). The negative options, all together, were around 15%.

8. Most SME Managers are not fully aware of the potential impact of robots and AI on their workforce.

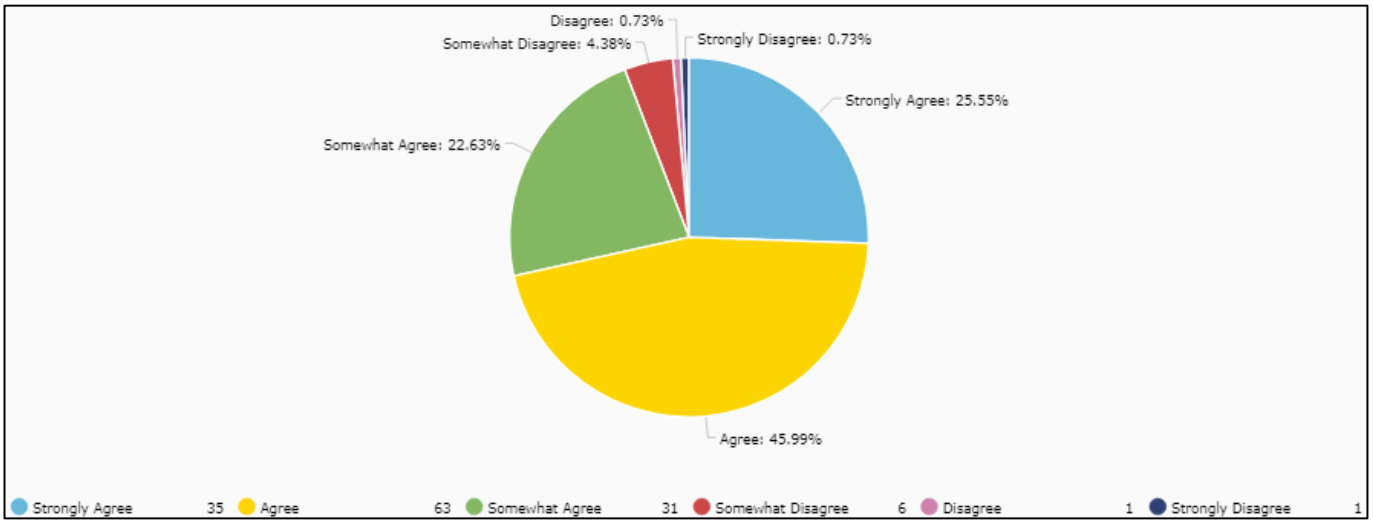

Chart 8 - ***Most SME Managers are not fully aware of the potential impact of robots and AI on their workforce.***

Respondents to the questionnaire generally believe that most SME Managers are not fully aware of the potential impact of robots and AI on their workforce, which is proved by the percentage of Agree responses (45.99% - 63

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responses), Strongly Agree (25.55% - 35) and Somewhat Agree (22.62% - 31). The negative responses were not expressive since all categories together are around 5%.

9. The staff within your organisation have the knowledge and insights they need to help to implement innovative technologies in the workplace.

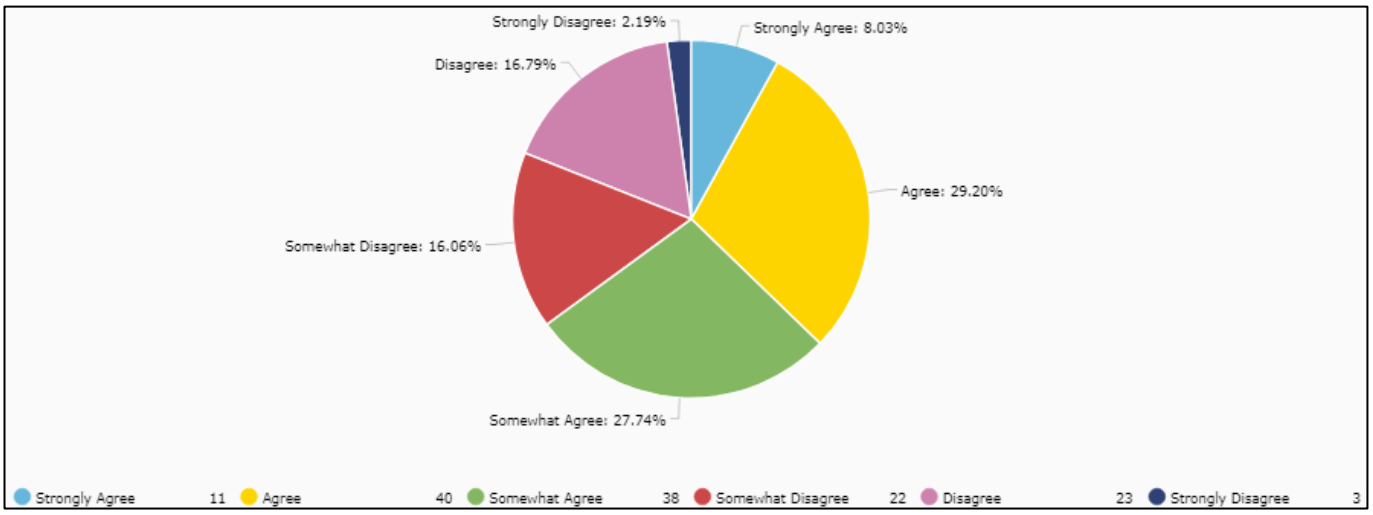

Chart 9 - *The staff within your organisation have the knowledge and insights they need to help to implement innovative technologies in the workplace.*

The most voted answer in the group of countries was Agree, with 29.20% (40), followed very closely by Somewhat Agree, with 27.74% (38). Both added to the Strongly Agree percentage of 8.03% (11), totalling 64.97% of positive responses, indicating that most SME managers surveyed believe that the staff within their organizations have the knowledge and insights they need to help to implement innovative technologies in the workplace.

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10. Your company has strategies in place to deal with the conflict between the 'human' and 'robot' workforce.

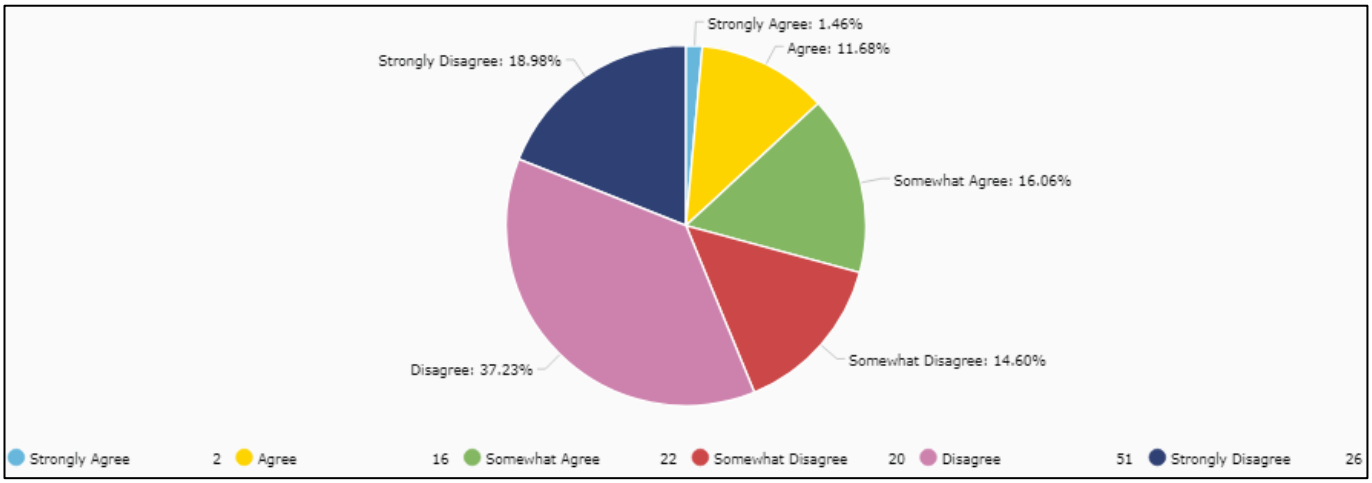

Chart 10 - *Your company has strategies in place to deal with the conflict between the 'human' and 'robot' workforce.*

The set of responses from all countries says that a considerable proportion of SME managers do not think their companies have strategies in place to deal with the conflict between the 'human' and 'robot' workforce, as evidenced by the percentage of Disagree responses (37.23% - 51), Somewhat Disagree (14.60% - 20) and Strongly Disagree (18.98% - 26). Although the Somewhat Agree answer was the third most chosen (16.06% - 22), the set of positive responses does not exceed 30%.

11. It would be helpful if you could be provided with an online mentoring service to help you understand the issues surrounding robotics and artificial intelligence (as well as in which way they could influence your business), including a best practice guide with real examples from other companies.

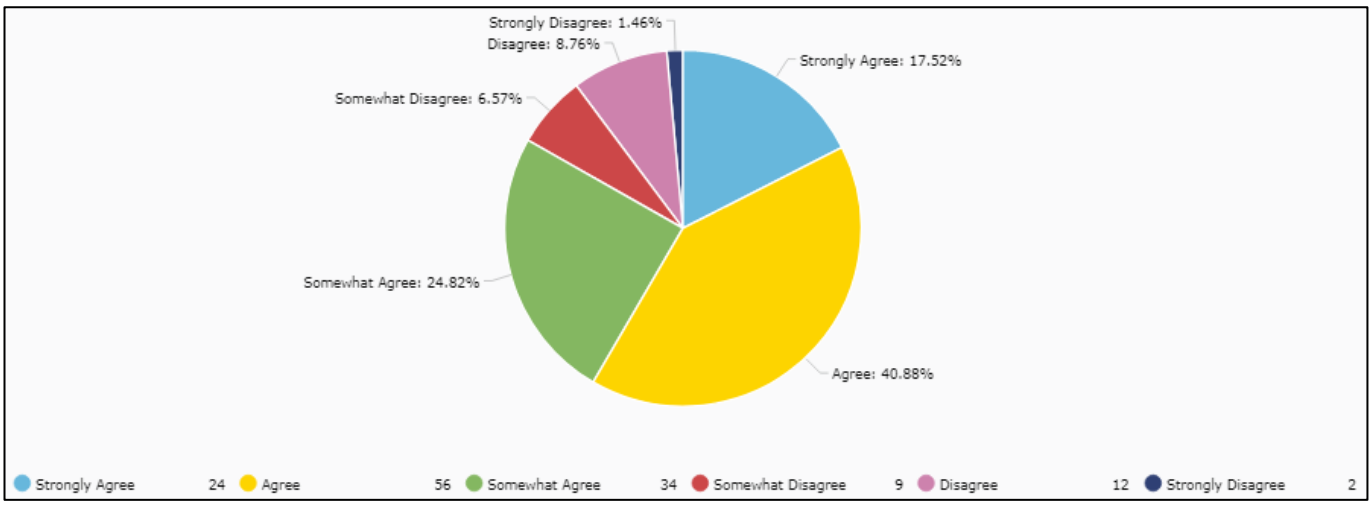

Chart 11 - *It would be helpful if you could be provided with an online mentoring service to help you understand the issues surrounding robotics and artificial intelligence (as well as in which way they could influence your business), including a best practice guide with real examples from other companies.*

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As observed in Chart 11, most SME managers think that it would be helpful if they could be provided with an online mentoring service to help them understand the issues surrounding robotics and artificial intelligence (as well as in which way they could influence their business), including a best practice guide with real examples from other companies. The option with more responses was Agree, with 40.88% (56), followed by Somewhat Agree, with 24.82% (34). Negative responses were not expressive: Disagree had 8.76% (12), being the most voted negative option.

12. Human impact factors must be considered when making decisions about the implementation of technology, as the efficiency gains provided by robots and AI cannot be compared to employee experience, skills and other people factors.

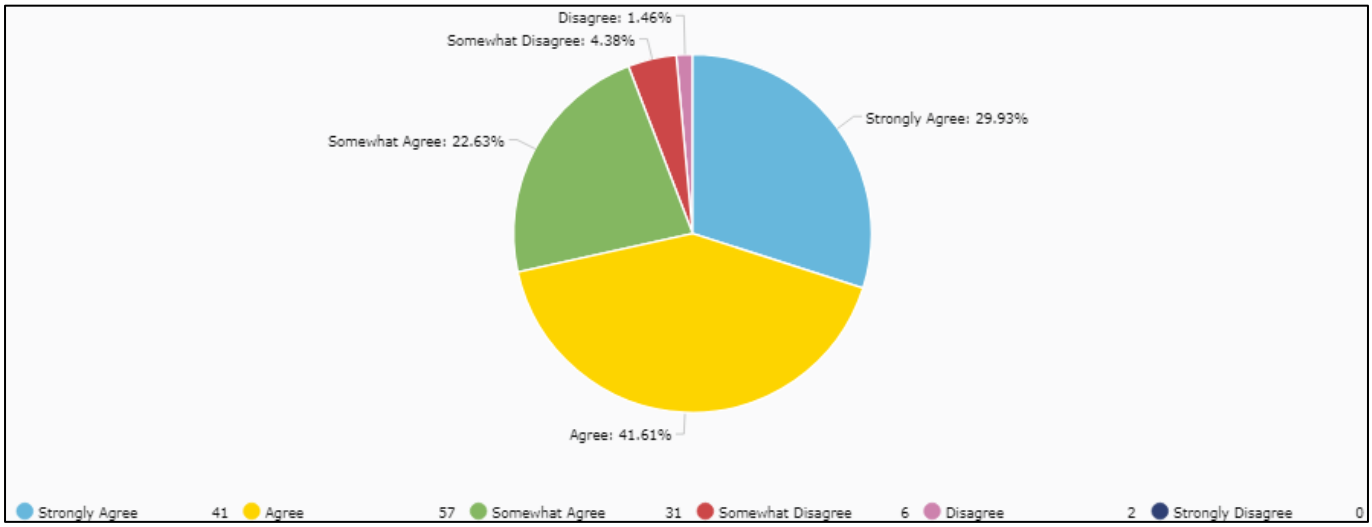

Chart 12 - *Human impact factors must be considered when making decisions about the implementation of technology, as the efficiency gains provided by robots and AI cannot be compared to employee experience, skills and other people factors.*

When asked whether human impact factors must be considered when making decisions about the implementation of technology, as the efficiency gains provided by robots and AI cannot be compared to employee experience, skills and other people factors, the SME managers of the 5 countries agree with this statement. The Agree option received the highest percentage, reaching 41.61% (57), followed by Strongly Agree (29.93%) and Somewhat Agree (22.63%). Negative responses had a very little expression, as they did not exceed 10%.

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13. The robotization and AI will affect your business in the next 5 years.

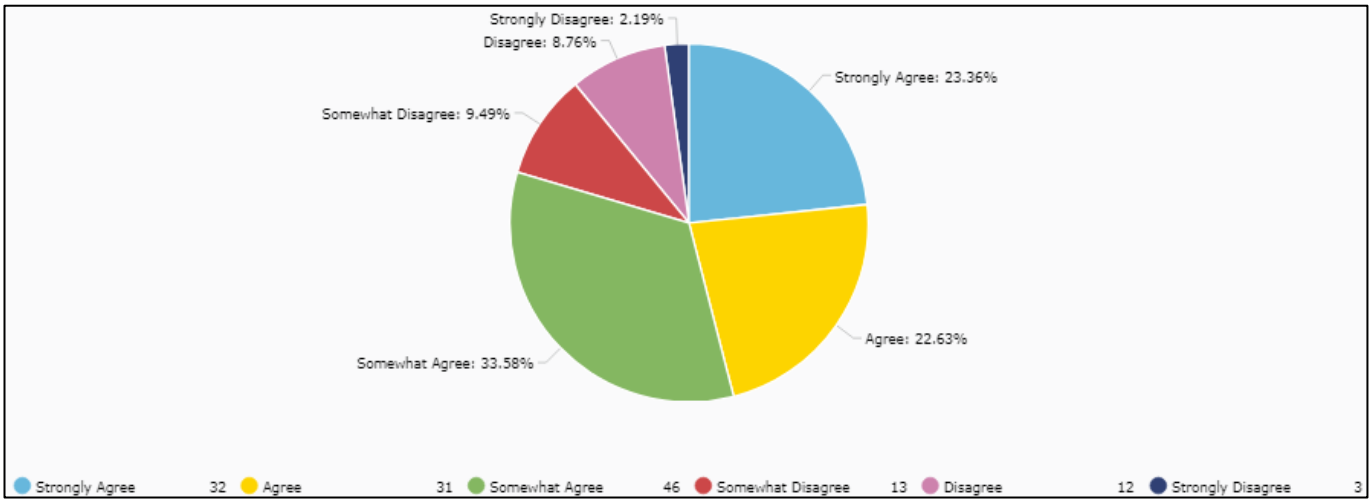

Chart 13 - *The robotization and AI will affect your business in the next 5 years.*

The majority of SME managers surveyed think that robotization and AI will affect their business in the next 5 years, as stated by the percentages of Somewhat Agree (33.58%, 46 votes), Strongly Agree (23.36%, 32 votes) and Agree (22.63%). The percentages of discordant responses were low. Each one of them is below 10%, totalling 20.44%.

14. Robotization and AI are a future threat for your business.

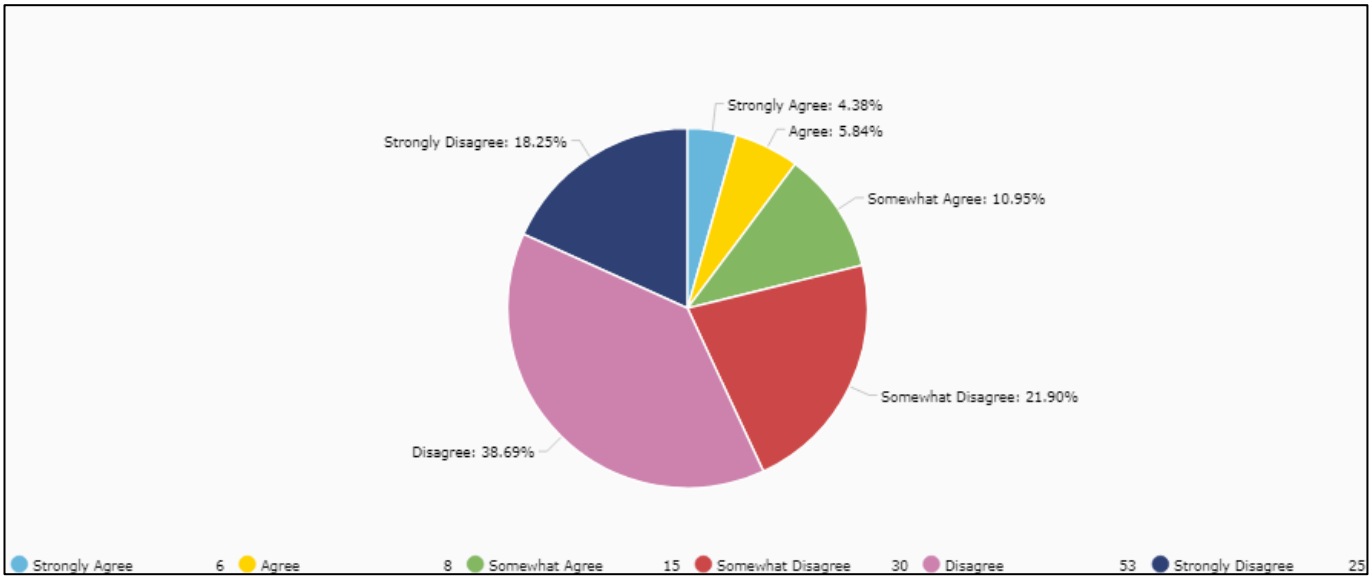

Chart 14 - *Robotization and AI are a future threat for your business.*

Overall, SME managers disagree that robotization and AI are a future threat for their businesses. The answer with the most votes was Disagree (38.69%), followed by Somewhat Disagree (21.90%) and Strongly Disagree (18.25%). The total of positive responses is around 20%.

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15. Your business is suitable for introducing robots/AI to replace humans in certain processes.

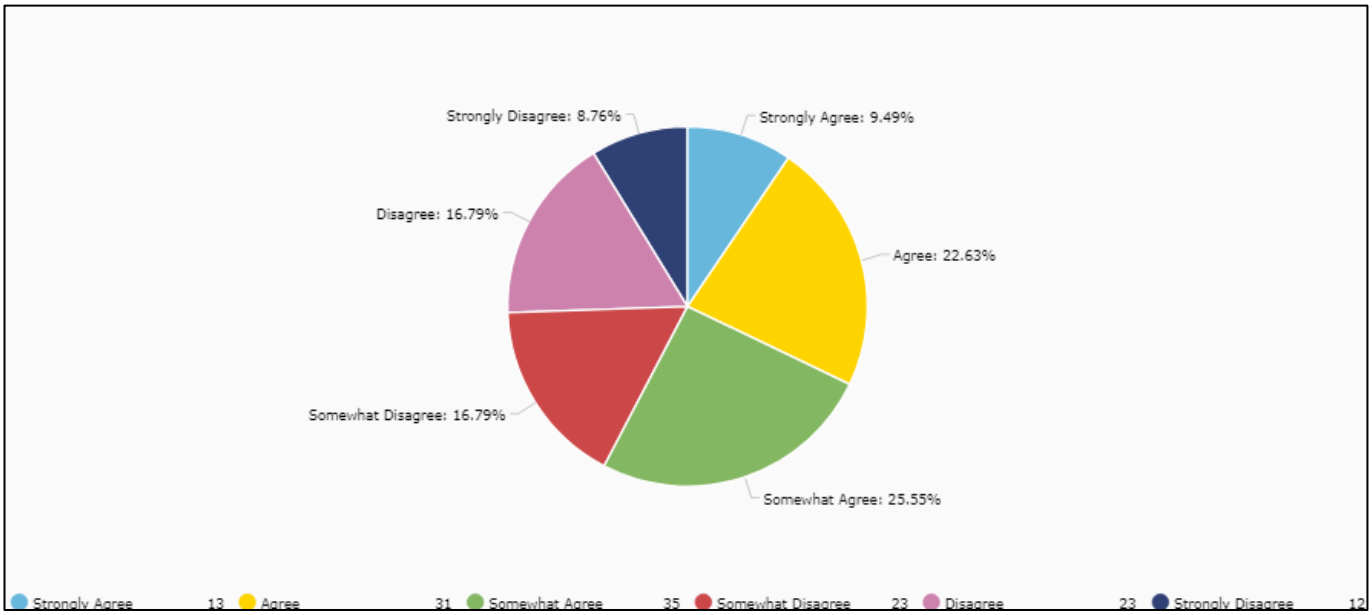

Chart 15 - *Your business is suitable for introducing robots/AI to replace humans in certain processes.*

Regarding the statement "Your business is suitable for introducing robots / AI to replace humans in certain processes", 25.55% (35) of SME managers chose the Somewhat Agree option, which was the most voted option, followed closely by Agree with 22.63% (31). The difference between the total of positive (57.67%) and negative (42.34%) responses is 15.33%. This was the question that registered the greatest balance between negative and positive responses.

16. The introduction of robots/AI could give your company a competitive advantage over other companies in its sector.

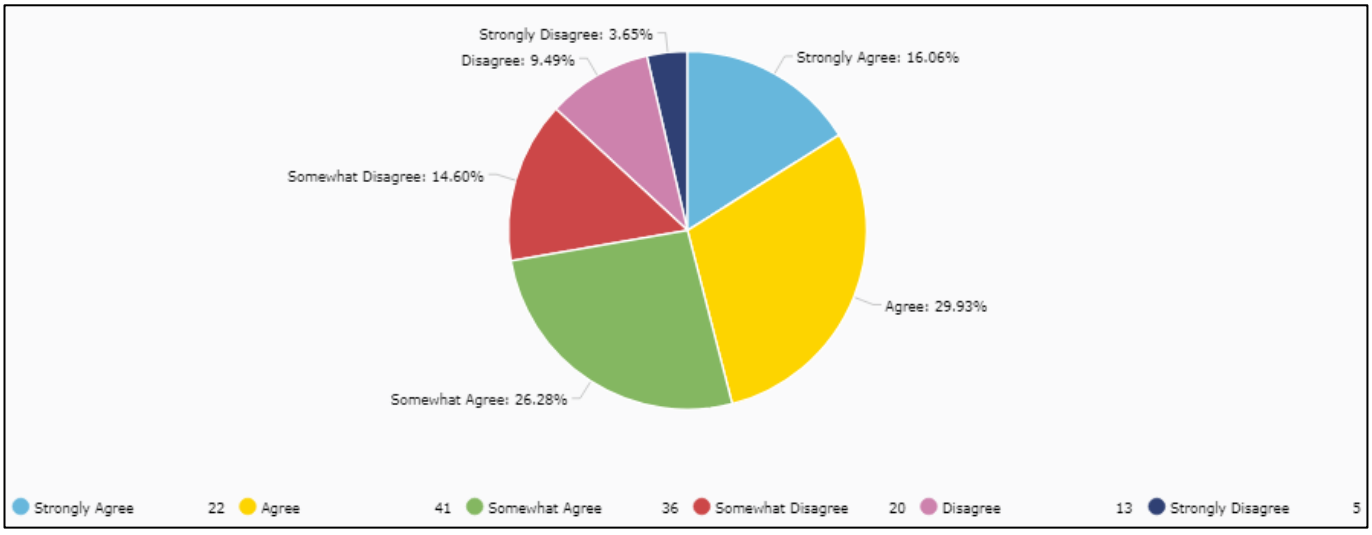

Chart 16 - *The introduction of robots/AI could give your company a competitive advantage over other companies in its sector.*

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When asked if the introduction of robots / AI could give their company a competitive advantage over other companies in its sector, 29.93% of respondents (41) chose the "Agree" option, which was the most voted. The sum of positive responses reached a percentage of 72.27%.

17. The associated consequences to the labour forces make the introduction of robots/AI troubling.

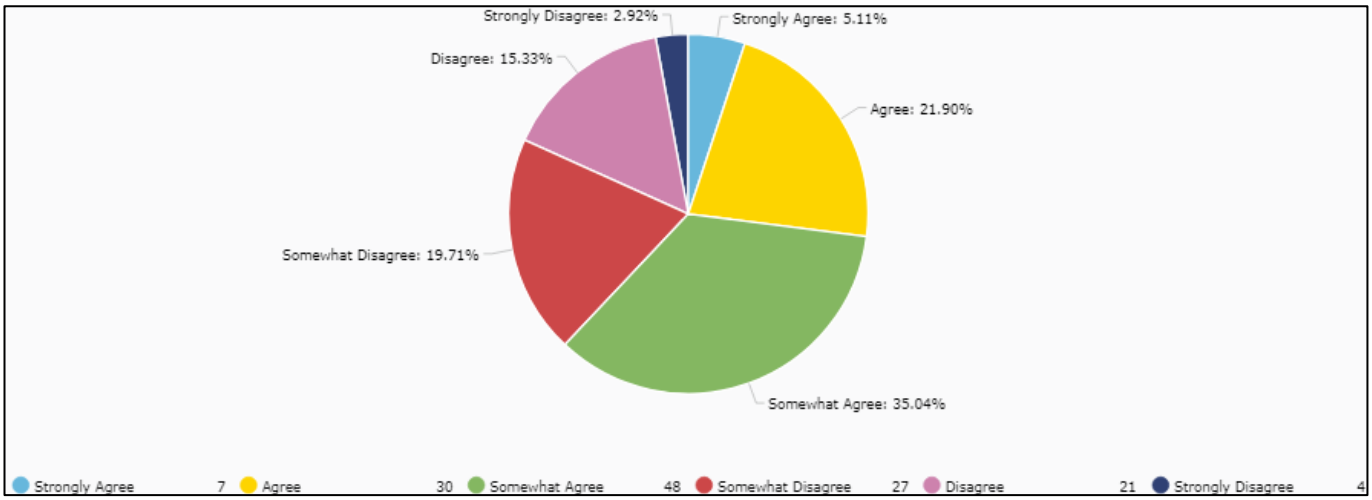

Chart 17 - *The associated consequences to the labour forces make the introduction of robots/AI troubling.*

Regarding the expression "*the associated consequences to the labour forces make the introduction of robots / AI troubling*", 35.04% (48) of SME managers **somehow agree** with it. This was the most voted answer, followed by Agree (21.90%) and Somewhat Disagree (19.71%).

18. This survey was worth your time and attention.

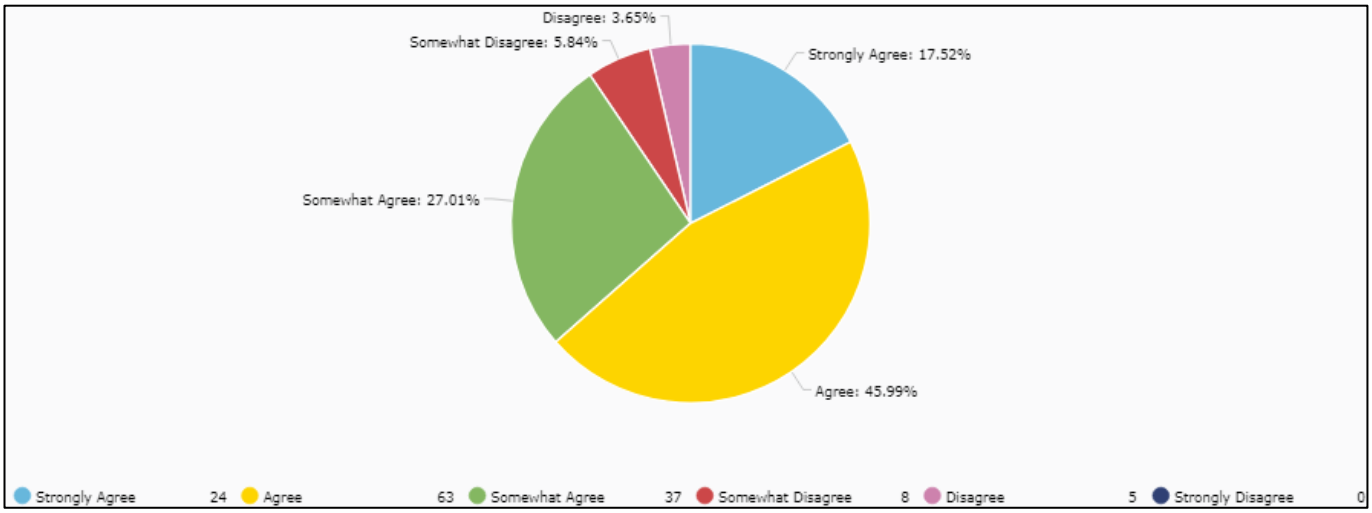

Chart 18 - *This survey was worth your time and attention.*

45.99% (63) of SME managers agree that this survey was worth their time and attention. Negative responses were scarce: the total percentage was 9.49%.

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2.3. Section III - Open-ended questions

19. Are there opportunities offered by emerging technologies to both evolve your business model and to improve the relationship with your employees? If yes, please tell us which.

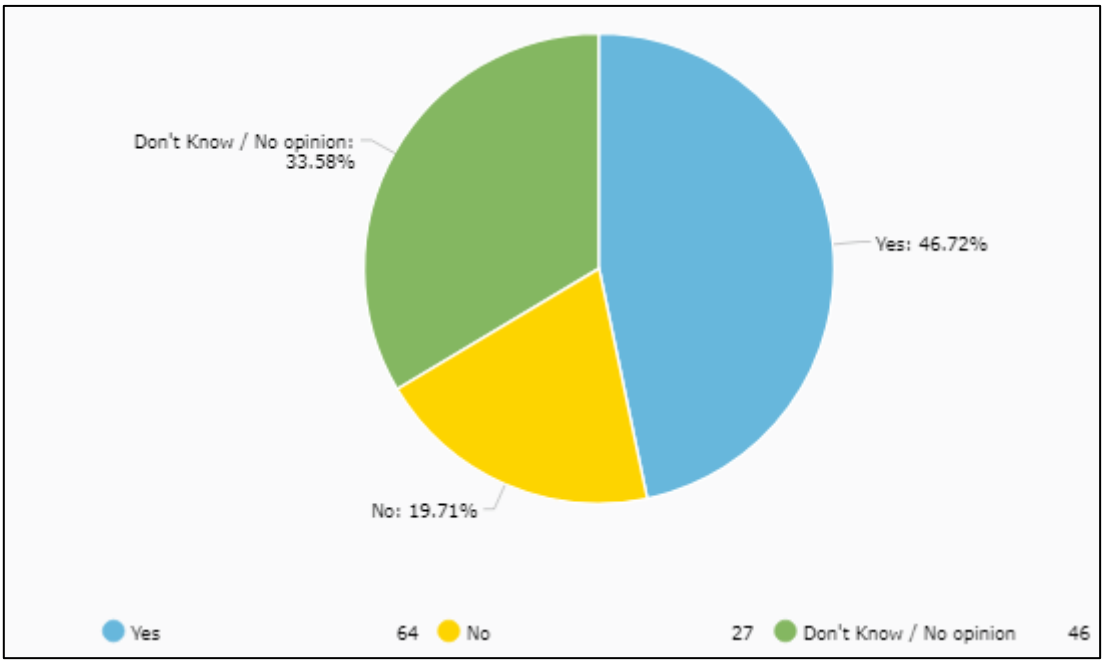

Chart 19 - *Are there opportunities offered by emerging technologies to both evolve your business model and to improve the relationship with your employees?*

46,72% (64) of the respondents think that there are opportunities offered by emerging technologies to both evolve their business model and to improve the relationship with their employees., Even though it must be stated that Don't Know / No opinion answers' percentage of 33,58% (46) has been quite meaningful. Among the examples given, computerized machinery, robotization of production processes, medical robots, co-bots, chatbots and AI in decision-making processes were the most referred examples of opportunities offered by this newly arrived emerging technologies.

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20. Has your company already started implementing steps towards digitalization, robotization and/or AI? If yes, can you briefly describe them?

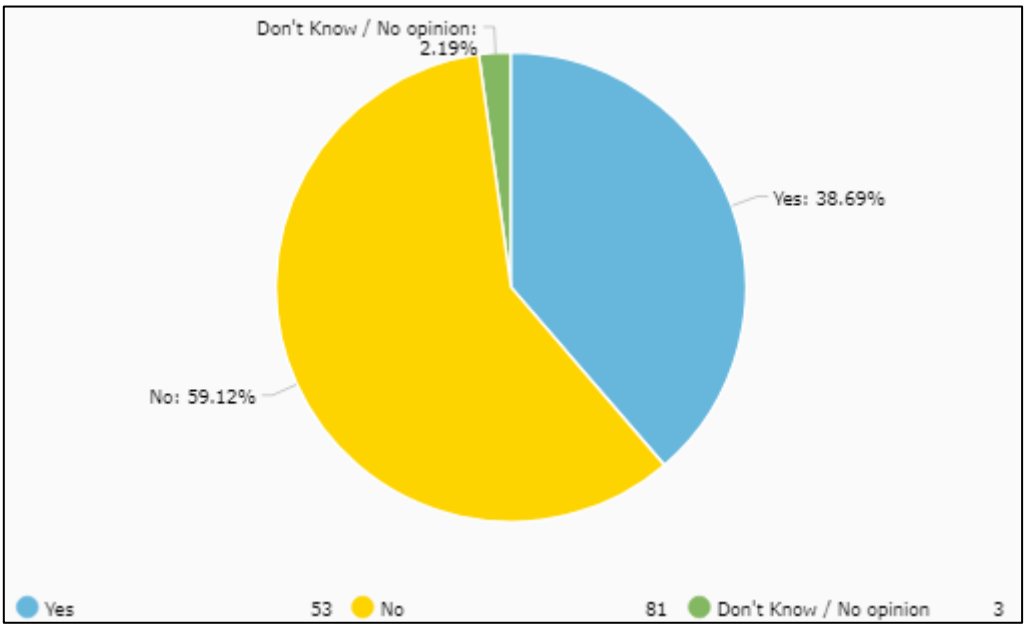

Chart 20 - *Has your company already started implementing steps towards digitalization, robotization and/or AI? If yes, can you briefly describe them?*

It can be observed that most of SME managers have not yet started implementing steps towards digitalization, robotization and / or AI, as "No" answers hit 59,12% (81). Of the cases where this process has already started, the examples given went through buying and using automatic CNC machines, AI to fine-tune customer preferences, internet-based products, data processing, Computerization of production control, robotized production systems, etc.

21. What are the three biggest barriers the implementation of robots and AI in your business might struggle with (e.g. lack of awareness of opportunities, lack of finances for such implementation, lack of qualified workforce, etc.)?

The biggest barriers to the implementation of robots and AI in SME managers' businesses are mainly linked to lack of information regarding funding and legislation, lack of qualified workforce, lack of suiteness of the business and lack of awareness of opportunities, resistance to change by employers and employees, absence of human value in the robot, lack of regulatory framework, lack of proper infrastructure, insufficient awareness regarding robots/AI benefits, ethical risks and lack of cost-effective opportunities.

22. What are your thoughts in regard of training/mentoring on robotization/AI in your company? Will it be beneficial to your company's future business development? Is the lack of robotization/AI implementation due to gaps in the training of students/workers in these areas?

In regard of training/mentoring on robotization/AI in the inquired companies, most of the SME managers stated that training would be really important in order to form current and future employees, as they would become more aware and skillful regarding new technologies to keep up with markets' constant demands, stating that the training in these areas is key, as Robotics and AI will play an active role in the future of the economy worldwide. At this point, the training in these areas is taking baby steps, and is mainly online-based, as there are no sufficient and effective political

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policies to make it a reality inside and outside companies. Initiatives as in-job mentorship are seen as really important by SME managers.

23. Are the existing policies and available government support towards SME's robotization enough? Are the policy makers in your country striving to stimulate its implementation in SMEs?

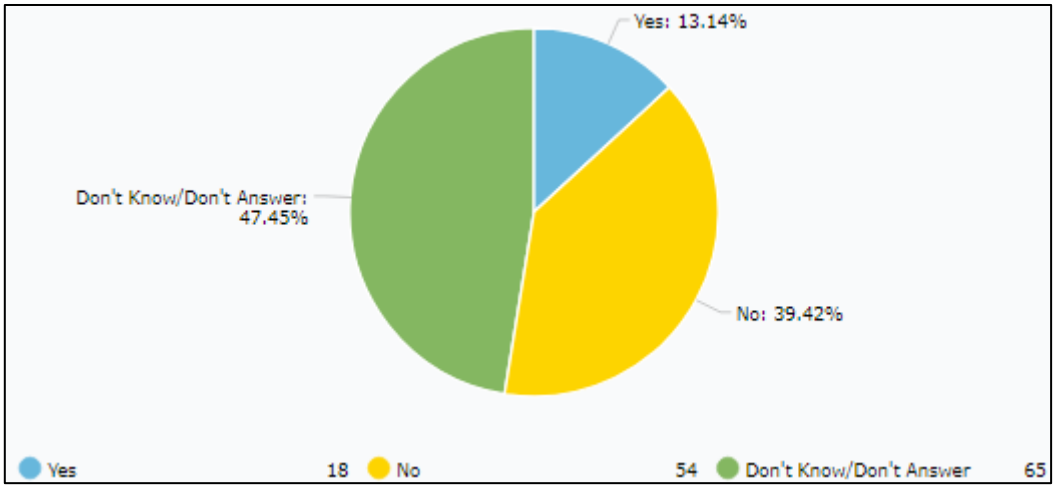

***Chart 21** - Are the existing policies and available government support towards SME's robotization enough? Are the policy makers in your country striving to stimulate its implementation in SMEs?*

The high number of "Don't know / No opinion" responses should be highlighted, which can easily be dissolved into negative responses by SME managers when asked if they are aware of existing policies and available government support towards SME's robotization or if the policy makers in their countries are striving to stimulate its implementation in SMEs (47,45% - 65 responses). However, "No" answers performed 39,42% (54) in this question, being a clear sign of SME managers stating that the existing policies and available government support towards SME's robotization is not enough. They added that governments should organize more informational events in association with business associations in order to publicize their strategies, making it possible for SME managers to know them and perhaps benefit from them. It was also stated that SME's robotization does not seem to be a political priority for now. Those who were aware of such policies stated, in general, that they are inadequate and, most of times, unavailable.

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24. Are you aware of the EU policy concerning robots/AI implementation in SMEs? Do you think the policies could be improved and more completely articulated to SMEs? Please describe measures you feel should be taken.

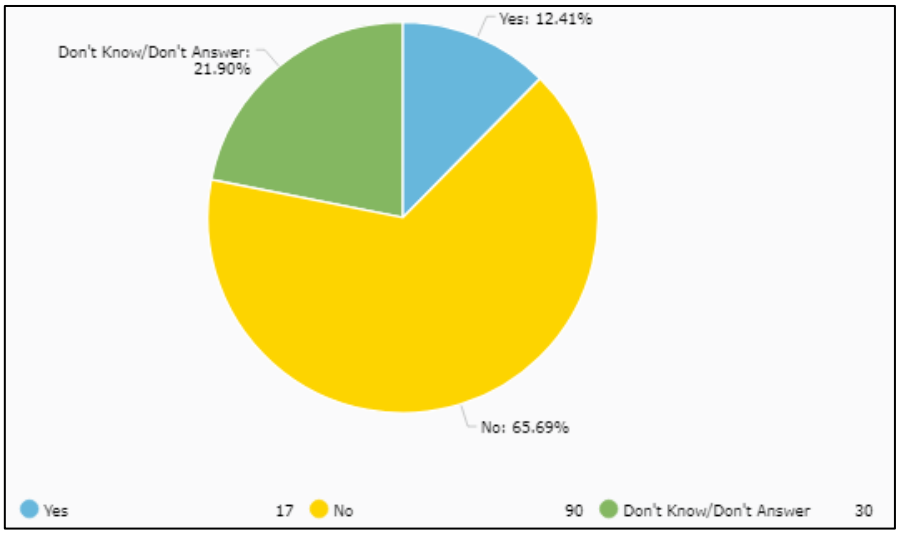

Chart 22 - *Are you aware of the EU policy concerning robots/AI implementation in SMEs? Do you think the policies could be improved and more completely articulated to SMEs?*

65,99% (90) respondents are unaware of the EU policy concerning robots / AI implementation in SMEs. Regarding measures they feel should be taken in this matter, they state that EU should include more robots / AI development funding programs, more investment in training programs, tax benefits for companies using new technologies, more informing events and workshops in companies, among others.

25. Do you wish to be kept up to date with the project developments?

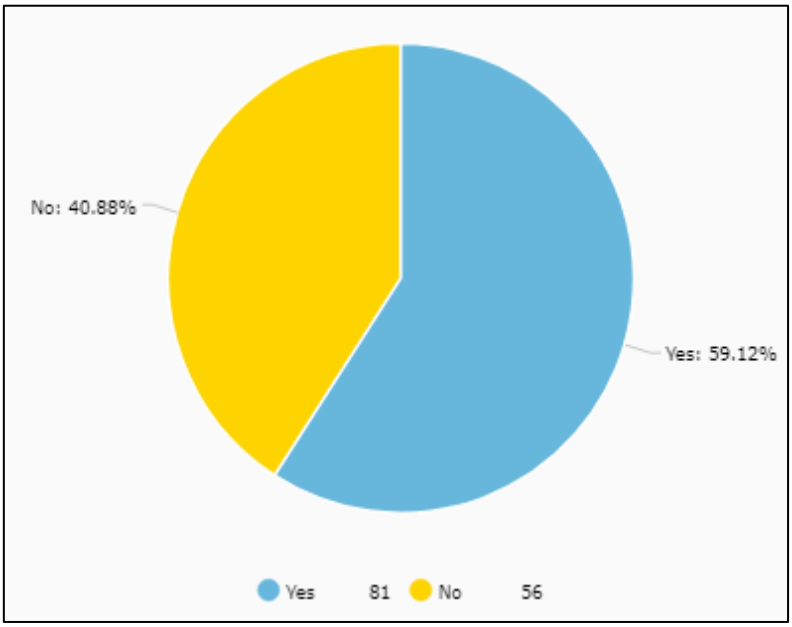

Chart 23 - *Do you wish to be kept up to date with the project developments?*

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59,12% (81) of the inquired SME managers are willing to be kept up to date with the project developments. Those who answered "Yes" to this question have kindly provided their emails to the project partnership and are stored in Robots & SME's database. Partners will spread project's information through the sending of dissemination materials.

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2.4. European Survey Analysis Conclusions[4]

The first conclusion that can be drawn from the Survey results is that in general, in all the countries surveyed there is an opinion that the introduction of robots and AI technology will affect the 'human' workforce in respondent's organizations. The most verified answer in four out of the five countries was Somewhat Agree (even though Ireland's most chosen option was Strongly Agree), which allows one to conclude that, although there is a notion that the robotization of all economic devices understudy is inevitable, there is not a very high degree of certainty on behalf of SME Managers.

This may be due to the type of business of each one (which may require a more '' traditional'' or manual modus operandi, which cannot be replaced by a machine) or some uncertainty regarding the difficulties of companies in each country in gather all the conditions to implement robotic and AI systems. However, with the concrete purpose of the question being to assess the impact on the human workforce, respondents may have expressed the fact that the human workforce of their organizations is, in a way, technically and socially prepared to deal with the arrival of the machines.

The second conclusion that can be drawn is that SME managers, in general, believe that robotic and AI systems will have a significant impact on the efficiency of their companies, with several countries surpassing 30% in Agree and Strongly Agree responses and not many negative responses (none has exceeded 20%). This means that SME managers are aware that technology can make their productive and operational process more effective, making room for beneficial investments in other areas, more linked to customer support, human relations, creativity, advertising, etc.

The third conclusion is that most SME Managers are not fully aware of the potential impact of robots and AI on their workforce, since most voted response in all countries is Agree, with negative responses having very little expression. The feeling that their peers are still at a rudimentary stage concerning knowledge about robots and AI may lead to some skepticism regarding the adoption of these instruments in the various countries surveyed.

The fourth conclusion that can be drawn is that most respondents think they have staff within their organization with the knowledge and insights they need to help to implement innovative technologies in the workplace, which is proven by the considerable amount of Agree and Somewhat Agree responses. This indicates that the difficulties in implementing robots and AI in the respondents' organizations may be related to factors other than the lack of knowledge on the part of the human workforce (possibly financial).

The fifth conclusion is that in all countries there was an agreement regarding the receptivity of SME managers to be provided with an online mentoring service to help them understand the issues surrounding robotics and artificial intelligence (as well as in which way they could influence their business), including a best practices guide with real examples from other companies, which ends up validating the purpose of the project itself. The maximum percentage of the sum of negative responses did not exceed 36% in the worst-case scenario.

The sixth conclusion. When asked if human impact factors must be considered when making decisions about the implementation of technology, as the efficiency gains provided by robots and AI cannot be compared to employee

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[4] *Please read carefully the full European Survey Report, in order to get each countries' figures.*

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experience, skills and other people factors, most SME managers were clear, being Agree the most answer in three out of the five countries.

The seventh point to underline is that most of the surveyed SME managers feel that robotization and AI will affect their business in the next 5 years. The most voted answer in the five countries was "Somewhat Agree", which reckons some doubts (they probably feel divided between financial conditions to implement such technologies, government support and the business's own propensity to adopt them).

The eighth conclusion shows that there is a predominance of negative responses (68% in Portugal, 85% in Bulgaria, 73% in the UK, 88% in Slovakia and 79% in Ireland), which means that the majority of SME managers surveyed do not consider that Robotization and AI are a future threat for their business. In this chapter, it would be interesting to discover the reasons for this disagreement, since it may go through several factors (work that can only be done by humans, lack of financial power to invest, dissenting government policy, etc.). When SME Managers were asked if their business is suitable for introducing robots/AI to replace humans in certain processes, they stated that although there is a balance between negative and positive responses in most of the countries surveyed, in Bulgaria, UK, Slovakia and Ireland the percentages of positive responses ended up exceeding, although the most voted answer was "Somewhat Agree" in all of them, except in Ireland (Agree got 44% of the votes). These results allow one to better understand the answers given in other sections of the questionnaire, as they grant to separate in a certain way the businesses that simply will never be able to adopt new technologies given their human nature.

Then, when asked if the introduction of robots/AI could give your company a competitive advantage over other companies in its sector, apart from Portugal, the majority of respondents believe that the introduction of robots/AI could give their company a competitive advantage over other companies in its sector. In regard to SME managers opinion when asked if they believe that the associated consequences to the labour forces make the introduction of robots/AI troubling, the majority of the respondents agree that there are other factors that could compromise the arrival of technologies to their companies apart from workforce issues. Finally, when asked if this survey was worth their time and attention, SME managers agreed that it was.

The third section of this questionnaire (open-ended questions), requires broader reflection by SME managers, was created in order to analyse their opinion in more detail regarding some other aspects in regard to the adoption of robots/AI by SMEs.

The first conclusion was that most of the respondents think that there are opportunities offered by emerging technologies to both evolve their business model and to improve the relationship with their employees. Among the examples given, computerized machinery, robotization of production processes, medical robots, co-bots, chatbots and AI in decision-making processes were the most referred examples of opportunities offered by this newly arrived emerging technologies. It should be noted that these technologies across several sectors of the economy and different branches of business, which proves that all sectors can benefit from these technologies, according to the respondents.

When asked if respondents' companies already started implementing steps towards digitalization, robotization and/or AI, it can be observed that most of their SME managers have not yet started implementing steps towards digitalization, robotization and / or AI. Of the cases where this process has already started, the examples given went through buying and using automatic CNC machines, AI to fine-tune customer preferences, internet-based products, data processing, Computerization of production control, robotized production systems, etc.

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SME managers were asked what were the three biggest barriers the implementation of robots and AI in their business. According to the majority of them, this is mainly linked to lack of information regarding funding and legislation, lack of qualified workforce, lack of suitedness of the business and lack of awareness of opportunities.

In regard of training/mentoring on robotization/AI in the inquired companies, most of the SME managers stated that training would be really important in order to form current and future employees, as they would become more aware and skilful regarding new technologies to keep up with markets' constant demands. Since most of the countries stated that there are skill gaps due to poor training in schools/universities, this is also something that should be addressed by the project. The project will offer SME managers a guide to useful training tools.

Concerning the existing policies and available government support towards SMEs' robotization, the high number of Don't know / No opinion responses should be highlighted, which can easily be dissolved into negative responses by SME managers when asked if they are aware of existing policies and available government support towards SME's robotization or if the policymakers in their countries are striving to stimulate its implementation in SMEs. Most responses from the four countries focused on the same points: policymakers are not striving enough in order to implement new technologies in the workplace, also there is a high degree of ignorance on behalf of SME managers regarding the existing legislation and support.

The same question was applied to EU policy concerning robots/AI implementation and, when asked if they were aware of it and if the existing policies could be improved and more completely articulated to SMEs, the respondents stated that they are not aware of the EU policy concerning robots / AI implementation in SMEs. Regarding measures they feel should be taken in this matter, they state that EU should include more robots / AI development funding programs, more investment in training programs, tax benefits for companies using new technologies, more informing events and workshops in companies, among others.

The last section was dedicated to finding out if the respondents would be interested to be kept up to date with the project developments and if so, they were given the opportunity to opt-in to the project contact database. The majority of respondents (62%) agreed and are now ready to receive a deeper approach on behalf of the project team.

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Concluding remarks

This European Review Report compiles information obtained from two key documents, prepared in the first months of the project's lifetime: Desk Research and Questionnaires to SME Managers. The information obtained in the Desk Research Report allowed us to assess the state of the art of Robotics / Artificial Intelligence around the world, with a special focus on the countries of the partnership (Bulgaria, Ireland, Portugal, Slovakia and the United Kingdom). After clarifying the concepts of Robotics and AI, we talked about the impact of Robotics / AI on the global economy in the three sectors of the economy; Global legislation, initiative and training policy regarding Robotics / Artificial Intelligence; Training policies for the use of robotics in business in European countries; Training policies for the use of robotics in business in European countries, with two practical examples of entities present in EU countries and, finally, the 2018 International Federation of Robotics Report main conclusions regarding the Impact of Robots on Productivity, Employment and Jobs around the world, explaining the impact of how Robotics is influencing sections so important to the world economy. The main conclusions drawn from the Desk Survey report are:

- The growing expansion of industry 4.0, a concept that emerged in Germany in the early 2010s, was a key factor in increasing the density of robotic and AI instruments in various economic sectors around the world;
- The role of governments, policymakers and regulators in dealing with the changes that AI and automation will bring is many-sided. Existing laws, standards and regulations for these emerging technologies will differ significantly across countries and territories, and approaches to supporting innovation while protecting workers and consumers will require the insights of experts from several fields;
- The 2018 International Federation of Robotics Report main conclusions regarding the Impact of Robots on Productivity, Employment and Jobs around the world were that robots enable companies to become or remain competitive (this is particularly important for SMEs, the backbone of both developed and developing country economies); since the last decade of the 20th century until now, automation has created jobs and increased wages, robots complement and increase labour, as the future will be robots and humans working together and governments and companies must focus on providing the right skills to current and future workers to continue the positive impact of robots on employment, job quality and wages;
- Regarding training for business, this investigation has retrieved useful good practices which may be an inspiration for the product we will work on for the next two years. Since many EU countries are striving to take the train of Industry 4.0 due to SMEs lack of investment and know-how, many programs were created from public and private initiatives around EU countries, giving the feeling that leverage for industry 4.0 is a common will;

An analysis of the responses to the questionnaires to SME Managers, were instrumental in understanding their issues when considering the introduction of Robots / AI in their organizations, grasping their doubts/concerns and transforming them recommendations on future project outputs. Thus, the main conclusions to be drawn are as follows:

- The introduction of robots and AI technology will affect the 'human' workforce in respondent's organizations;
- SME managers believe that robotic and AI systems will have a significant impact on the efficiency of their companies;
- SME managers are not fully aware of the potential impact of robots and AI on their workforce;
- Most respondents think they have staff within their organization with the knowledge and insights they need to help to implement innovative technologies in the workplace;

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- In all countries there was an agreement regarding the receptivity of SME managers to be provided with an online mentoring service to help them understand the issues surrounding robotics and artificial intelligence (as well as in which way they could influence their business), including a best practices guide with real examples from other companies.
- The inquired managers agree that human impact factors must be considered when making decisions about the implementation of technology, as the efficiency gains provided by robots and AI cannot be compared to employee experience, skills and other people factors;
- Most of the surveyed SME managers feel that robotization and AI will affect their business in the next 5 years;
- The majority of SME managers surveyed do not consider that Robotization and AI are a future threat for their business;
- The majority of respondents believe that the introduction of robots/AI could give their company a competitive advantage over other companies in its sector;
- They agree that other factors could compromise the arrival of technologies to their companies apart from workforce issues.
- Most of the respondents think that there are opportunities offered by emerging technologies to both evolve their business model and to improve the relationship with their employees;
- Most of the SME managers have not started implementing steps towards digitalization, robotization and / or AI yet;
- The three biggest barriers to implement robots/AI in SMEs are linked to a lack of information regarding funding and legislation, lack of qualified workforce, lack of suitedness of the business and lack of awareness of opportunities;
- In regard of training/mentoring on robotization/AI in the inquired companies, most of the SME managers stated that training would be really important in order to form current and future employees, as they would become more aware and skilful regarding new technologies to keep up with markets' constant demands; and
- Concerning the awareness about existing policies and available government and EU support towards SMEs' robotization, there is a high number of negative responses.

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Annex

Actual Questionnaire to SME Managers

Introduction

Robots & SMEs is an Erasmus + co-funded project, which will be implemented from 2019 to 2021. The partnership includes partners from Bulgaria, Ireland, Portugal, Slovakia, and the United Kingdom. The Robots & SMEs project aims to develop a series of training and support tools for SME Managers to enable them to assess the value of robots for their business development and sustainability and then effectively introduce them. This questionnaire is intended for SME Managers, aiming to analyse and contextualize the introduction of robots and AI in their business, assessing their current state and the opinion of SME Managers in this regard. Therefore, please respond according to your direct experience or specific knowledge regarding the topics being addressed. The data collected through this questionnaire will only be processed for cognitive, scientific and dissemination purposes of the Robots & SMEs project results.

Section I: Generalities

1. Country of origin:

2. Gender

Male

Female

3. Age range:

19-25

26-35

36-50

51-64

65 +

4. Size of business (number of employees):

1-9

10-49

50-99

100-249

250 +

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5. Economic sector:

Defence and Security

Health

Education

Energy

Construction

Technology and Communications

Services

Finance

Trade

Other (please indicate:) _____

Section II - Close-ended questions:

6. The introduction of robots and AI technology will affect the 'human' workforce in your organization.

7. The introduction of robots and AI technology will have a significant impact on the efficiency of your organization.

8. Most SME Managers are not fully aware of the potential impact of robots and AI on their workforce.

9. The staff within your organisation have the knowledge and insights they need to help implementing innovative technologies in the workplace.

10. Your company has strategies in place to deal with conflict between the 'human' and 'robot' workforce.

11. It would be helpful if you could be provided with an online mentoring service to help you understand the issues surrounding robotics and artificial intelligence (as well as in which way they could influence your business), including a best practices guide with real examples from another companies.

12. Human impact factors must be considered when making decisions about the implementation of technology, as the efficiency gains provided by robots and AI cannot be compared to employee experience, skills and other people factors.

13. The robotization and AI will affect your business in the next 5 years.

14. Robotization and AI are a future threat for your business.

15. Your business is suitable for introducing robots/AI to replace humans in certain processes.

16. The introduction of robots/AI could give your company a competitive advantage over other companies in its sector.

17. The associated consequences to the labour forces makes the introduction of robots/AI troubling.

18. This survey was worth your time and attention.

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Options: Strongly Agree; Agree; Somewhat Agree; Somewhat Disagree; Disagree; Strongly Disagree.

Section III - Open-ended questions:

19. Are there opportunities offered by emerging technologies to both evolve your business model and to improve the relationship with your employees? If yes, please tell us which.

20. Has your company already started implementing steps towards digitalization, robotization and/or AI? If yes, can you briefly describe them?

21. What are the three biggest barriers the implementation of robots and AI in your business might struggle with (e.g. lack of awareness of opportunities, lack of finances for such implementation, lack of qualified workforce, etc.)?

22. What are your thoughts in regard of training/mentoring on robotization/AI in your company? Will it be beneficial to your company's future business development? Is the lack of robotization/AI implementation due to gaps in the training of students/workers in these areas?

23. Are the existing policies and available government support towards SME's robotization enough? Are the policy makers in your country striving to stimulate its implementation in SMEs?

24. Are you aware of the EU policy concerning robots/AI implementation in SMEs? Do you think the policies could be improved and more completely articulated to SMEs? Please describe measures you feel should be taken.

25. Do you wish to be kept up-to-date with the project developments?

26. If you have answered YES to Q25 please leave your email address.

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Overall Results

Total of answers: 137

Portugal: 25

Bulgaria: 27

UK: 27

Slovakia: 24

Ireland: 34

Section 1 – Respondents' Profile

Country

Portugal: 100% of the respondents' businesses are from Portugal.

Bulgaria: 100% of the respondents' businesses are from Bulgaria.

UK: 38% from the UK; 18% from Spain; 12% from Sweden; 12% from North Macedonia; 4% from Pakistan; 4% from Czech Republic; 4% from Italy; 4% from Ireland and 4% from Israel.

Slovakia: 100% of the respondents' businesses are from Slovakia.

Ireland: 100% of the respondents' businesses are from Ireland.

Gender

Portugal: 64% (16) of the respondents are men, 36% (9) are women.

Bulgaria: 37% (10) of the respondents are men, 63% (17) are women.

UK: 66, 7% (18) of the respondents are men, 33, 3% (9) are women.

Slovakia: 95, 8% (23) of the respondents are men, 4, 2% (1) are women.

Ireland: 61,8% (21) of the respondents are men, 38,2% (13) are women.

Age

Portugal: 60% (15) of the respondents are in the 36-50 y.o. range; 36% (9) are in the 26-35 and only 4% (1) is in the 51-64.

Bulgaria: 37% (10) of the respondents are in the 36-50 y.o. range; 33, 3% (9) are in the 51-64, 18, 5% (5) are in the 26-35 and 11, 1% (3) are 65+ y.o. .

UK: 51,9% (14) of the respondents are part of the 51-64 y.o. range; 22,2% (6) are in the 36-50, 11,1% (3) are 26-35, another 11,1% (3) are 65+ and only 3,7% (1) is 19-25.

Slovakia: 45,8% (11) are 36-50 y.o. **;** 25% (6) are 26-35; 20,8% (5) are 51-64; 4,2% (1) are 65+ and also 4,2% (1) are 19-25.

Ireland: 64,7% (22) are 51-64 y.o.; 32,4% (2) are 36-50 y.o. and 2,9% (1) are 26-35 y.o..

Size of business (number of employees)

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Portugal: 56% (14) of the companies have 1 to 9 employees; 28% (7) have 10 to 49; 12% (3) have 50-99 and only 4% (1) have 100-249.

Bulgaria: 88, 8 % **(**24) of the Bulgarian respondents have 1 to 9 employees. Each one of the remaining three respondents has 10-49, 100-249 and 250+ employees.

UK: 63% (17) of the companies have 1 to 9 employees; 18,5% (5) have 100-249; 14,8% (4) have 10-49 and 3, 7% (1) has 250+ employees.

Slovakia: 45, 8% (11) of the companies have 1 to 9 employees; 41, 7% have 10-49 (10) and only 4, 2% (1) for each of the other options (50-99, 100-249 and 250+).

Ireland: 38,2% (13) of the companies have 1 to 9 employees; 8,8% (3) have 10 to 49; 2,9% (1) have 50 to 99 employees; 11,8% (4) have 100 to 249 employees and 38,2% (13) have 250+ employees.

Economic sector

Portugal: 24% (6) of the companies are part of the Electric and Electronic industries. 16% (4) belong to the Health sector, 8% (2) to Tourism, Construction and Textiles, Fashion and Creative industries. Eight other sectors share a 4% (1) percentage each.

Bulgaria: 14, 8% (4) of the organisations are NGOs; 11, 1 % (3) are from the Tourism sector. Each one of the remaining 25 answers came from different sectors, such as Environment, Consulting Services, Finance, among others.

UK: 29, 6% (8) of the companies responding to the UK survey work on consulting, training and education services; 18,5% (5) of the organisations work on Social Economy. Another 18,5% (5) of the companies belong to the Automotive Industry, and 7,4% (2). Each one of the remaining answers came from different sectors, such as Electrical and Electronic Engineering, Agriculture, Metal and Locksmith,

Slovakia: 12, 5% (3) of the Slovakian companies belong to the Electric and Electronic sector. Another 12, 5% (3) belong to the Health sector. Each one of the remaining 18 respondents (75%) come from different sectors, such as Sports, Consulting, R&D, Education, among others.

Ireland: 17,6% (6) of the Irish companies responding to the survey come from the Electrical and Electronic Engineering Industries; 8,8% (3) work on Healthcare Industries and the remaining 73,6% are divided by other sectors as Aeronautics, Automotive, Biotechnology, Chemicals, Constructions, Cosmetics, among other industries.

Country Analysis:

Portugal: All of the 25 respondents to the questionnaire have their companies headquartered in Portugal, the majority are men (64%), and a large part of the SME Managers under investigation is in the 36-50 age group. As for their companies, 56% are small companies (1-9 employees), which corresponds to the vast majority of companies present in the Portuguese industrial fabric (95%). The greatest diversity of responses occurred in the Economic Sector since, besides Electric and Electronic industries (24%) and Health sector (16%), eight other sectors got a 4% percentage.

Bulgaria: All of the 27 respondents to the questionnaire have their companies headquartered in Bulgaria, most of them are women (67%), around 70% are between 36 and 64 y.o.. As for the respondents' companies, almost 90% are small enterprises (1-9 workers) mainly from the tertiary/services sector.

UK: The questionnaire activity in the UK was the only one that brought responses from foreign countries (the majority coming from EU countries), 66,7% are male, more than half are between 51 and 64 years old and 63% are from small companies (1- 9 employees). Half of the respondents come from companies linked to the services sector, the other half are linked to the primary and secondary sectors.

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Slovakia: 100% of the respondents in Slovakia have their businesses headquartered in the country, 95, 8% are men, almost half of them (45, 8%) are 36-50 y.o.. As for their organisations, almost 86% are from SMEs (45, 8% have 1-9 employees and 41, 7% have 10-49). The sector of activity of the responding Slovak organizations varies greatly, with the sectors with the most responses coming from the Electric and Electronic sector (12.5%) and Health (12.5%), with considerable heterogeneity.

Ireland: 100% of the respondents in Ireland have their businesses headquartered in the country, 61,8 % are men, most of the total respondents (64,7%) are 51-64 y.o.. As for their organisations, 47% represent SMEs (38,2% have 1-9 employees and 8,8% have 10-49). The sector of activity of the responding Irish organizations varies greatly since only Electrical and Electronic Engineering (17,6%) and Healthcare Industries (8,8%) have more than one response.

Global Analysis:

Only about 1% of the respondents are from non-EU countries, which allows this sample to accurately reflect the current scenario in the EU. About 64% of responses are from men. The age group with the most response is 51-64 y.o. (ca. 40%). About 60% of the respondents represent Micro Enterprises (1-9 employees), ca. 20% represent Small Enterprises (10-49 employees) and the remaining 20% represent Medium-sized and Big Enterprises. Respondents' sectors of activity vary widely. The least represented sector is the primary sector (agriculture, fishing) with only ca. 1% of responses, as opposed to the secondary sector (industry) with ca. 40%. The tertiary sector (services) is the most represented, with ca. 60%.

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Section II – Close-ended questions

6. The introduction of robots and AI technology will affect the 'human' workforce in your organization.

Portugal:

Strongly Disagree – 8%

Disagree – 24%

Somewhat Disagree – 16%

Somewhat Agree – 20%

Agree – 16%

Strongly Agree – 16%

Bulgaria:

Strongly Disagree – 0 %

Disagree – 7 %

Somewhat Disagree – 4%

Somewhat Agree – 41 %

Agree – 26 %

Strongly Agree – 22 %

UK:

Strongly Disagree – 0 %

Disagree – 4 %

Somewhat Disagree – 7 %

Somewhat Agree – 41 %

Agree – 30 %

Strongly Agree – 18 %

Slovakia:

Strongly Disagree – 0 %

Disagree – 13 %

Somewhat Disagree – 4 %

Somewhat Agree – 37 %

Agree – 29 %

Strongly Agree – 17 %

Ireland:

Strongly Disagree – 0%

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Disagree – 6%

Somewhat Disagree – 6%

Somewhat Agree – 18%

Agree – 29%

Strongly Agree – 41%

Global Analysis: In general, in all the countries surveyed there is an opinion that the introduction of robots and AI technology will affect the 'human' workforce in respondent's organizations. The most verified answer in all countries was **Somewhat Agree**, which allows one to conclude that, although there is a notion that the robotization of all economic devices understudy is inevitable, there is not a very high degree of certainty on behalf of SME Managers. Ireland was the only country in which **"Strongly Agree"** was the most voted option.

7. The introduction of robots and AI technology will have a significant impact on the efficiency of your organization.

Strongly Disagree – 4%

Disagree – 20%

Somewhat Disagree – 8%

Somewhat Agree – 24%

Agree – 36%

Strongly Agree – 8%

Bulgaria:

Strongly Disagree – 0 %

Disagree – 7 %

Somewhat Disagree – 7 %

Somewhat Agree – 34 %

Agree – 37 %

Strongly Agree – 15 %

UK:

Strongly Disagree – 0 %

Disagree – 4 %

Somewhat Disagree – 11 %

Somewhat Agree – 48 %

Agree – 15 %

Strongly Agree – 22 %

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Slovakia:

Strongly Disagree – 4 %

Disagree – 4 %

Somewhat Disagree – 0 %

Somewhat Agree – 29 %

Agree – 46 %

Strongly Agree – 17 %

Ireland:

Strongly Disagree – 0%

Disagree – 3%

Somewhat Disagree – 5%

Somewhat Agree – 27%

Agree – 38%

Strongly Agree – 27%

Global Analysis: SME managers, in general, believe that robotic and AI systems will have a significant impact on the efficiency of their companies, with several countries surpassing 30% in "**Agree**" and "**Strongly Agree**" responses and not many negative responses (none has exceeded 20%).

8. Most SME Managers are not fully aware of the potential impact of robots and AI on their workforce.

Portugal:

Strongly Disagree – 0%

Disagree – 4%

Somewhat Disagree – 12%

Somewhat Agree – 36%

Agree – 20%

Strongly Agree – 28%

Bulgaria:

Strongly Disagree – 0 %

Disagree – 0 %

Somewhat Disagree – 4 %

Somewhat Agree – 22 %

Agree – 52 %

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Strongly Agree – 22 %

UK:

Strongly Disagree – 0 %

Disagree – 0 %

Somewhat Disagree – 7 %

Somewhat Agree – 19 %

Agree – 44 %

Strongly Agree – 30 %

Slovakia:

Strongly Disagree – 4 %

Disagree – 0 %

Somewhat Disagree – 0 %

Somewhat Agree – 17 %

Agree – 67 %

Strongly Agree – 12 %

Ireland:

Strongly Disagree – 0%

Disagree – 0%

Somewhat Disagree – 0%

Somewhat Agree – 21%

Agree – 47%

Strongly Agree – 32%

Global Analysis: Most SME Managers are not fully aware of the potential impact of robots and AI on their workforce, since most voted response in all countries is **Agree**, with negative responses having very little expression.

9. The staff within your organisation have the knowledge and insights they need to help to implement innovative technologies in the workplace.

Portugal:

Strongly Disagree – 4%

Disagree – 16%

Somewhat Disagree – 24%

Somewhat Agree – 20%

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Agree – 32%

Strongly Agree – 4%

Bulgaria:

Strongly Disagree – 0 %

Disagree – 26 %

Somewhat Disagree – 22 %

Somewhat Agree – 30 %

Agree – 22 %

Strongly Agree – 0 %

UK:

Strongly Disagree – 4 %

Disagree – 11 %

Somewhat Disagree – 11 %

Somewhat Agree – 33 %

Agree – 33 %

Strongly Agree – 7 %

Slovakia:

Strongly Disagree – 4 %

Disagree – 13 %

Somewhat Disagree – 4 %

Somewhat Agree – 21 %

Agree – 38 %

Strongly Agree – 21 %

Ireland:

Strongly Disagree – 0%

Disagree – 18%

Somewhat Disagree – 18%

Somewhat Agree – 32%

Agree – 24%

Strongly Agree – 9%

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Global Analysis: Most respondents think they have staff within their organization with the knowledge and insights they need to help to implement innovative technologies in the workplace, which is proven by the considerable amount of **Agree** and **Somewhat Agree** responses.

10. Your company has strategies in place to deal with the conflict between the 'human' and 'robot' workforce.

Portugal:

Strongly Disagree – 12%

Disagree – 24%

Somewhat Disagree – 20%

Somewhat Agree – 36%

Agree – 8%

Strongly Agree – 0%

Bulgaria:

Strongly Disagree – 19 %

Disagree – 59 %

Somewhat Disagree – 14 %

Somewhat Agree – 4 %

Agree – 4 %

Strongly Agree – 0 %

UK:

Strongly Disagree – 15 %

Disagree – 26 %

Somewhat Disagree – 22 %

Somewhat Agree – 11 %

Agree – 19 %

Strongly Agree – 7 %

Slovakia:

Strongly Disagree – 29 %

Disagree – 29 %

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Somewhat Disagree – 13 %

Somewhat Agree – 25 %

Agree – 4 %

Strongly Agree – 0 %

Ireland:

Strongly Disagree – 21%

Disagree – 44%

Somewhat Disagree – 6%

Somewhat Agree – 9%

Agree – 21%

Strongly Agree – 0%

Global Analysis: With regard to strategies in place to deal with the conflict between the 'human' and 'robot' workforce, most respondents do not seem to have developed a plan to deal with this type of conflict. **"Disagree"** was the most chosen option in almost all countries.

11. It would be helpful if you could be provided with an online mentoring service to help you understand the issues surrounding robotics and artificial intelligence (as well as in which way they could influence your business), including a best practice guide with real examples from other companies.

Portugal:

Strongly Disagree – 0%

Disagree – 16%

Somewhat Disagree – 20%

Somewhat Agree – 40%

Agree – 12%

Strongly Agree – 12%

Bulgaria:

Strongly Disagree – 0 %

Disagree – 0 %

Somewhat Disagree – 4 %

Somewhat Agree – 26 %

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Agree – 56 %

Strongly Agree – 15 %

UK:

Strongly Disagree – 0 %

Disagree – 4 %

Somewhat Disagree – 4 %

Somewhat Agree – 33 %

Agree – 48 %

Strongly Agree – 11 %

Slovakia:

Strongly Disagree – 4 %

Disagree – 17 %

Somewhat Disagree – 8 %

Somewhat Agree – 13 %

Agree – 50 %

Strongly Agree – 8 %

Ireland:

Strongly Disagree – 3%

Disagree – 9%

Somewhat Disagree – 0%

Somewhat Agree – 15%

Agree – 38%

Strongly Agree – 35%

Global Analysis: In all countries, there was an agreement regarding the receptivity of SME managers in be provided with an online mentoring service to help them understand the issues surrounding robotics and artificial intelligence (as well as in which way they could influence their business), including the best practices guide with real examples from other companies, which ends up validating the purpose of the project itself.

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12. Human impact factors must be considered when making decisions about the implementation of technology, as the efficiency gains provided by robots and AI cannot be compared to employee experience, skills and other people factors.

Portugal:

Strongly Disagree – 0%

Disagree – 4%

Somewhat Disagree – 12%

Somewhat Agree – 36%

Agree – 28%

Strongly Agree – 20%

Bulgaria:

Strongly Disagree – 0 %

Disagree – 4 %

Somewhat Disagree – 0 %

Somewhat Agree – 15 %

Agree – 55 %

Strongly Agree – 26 %

UK:

Strongly Disagree – 0 %

Disagree – 0 %

Somewhat Disagree – 4 %

Somewhat Agree – 22 %

Agree – 40 %

Strongly Agree – 33 %

Slovakia:

Strongly Disagree – 0 %

Disagree – 0 %

Somewhat Disagree – 8 %

Somewhat Agree – 38 %

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Agree – 50 %

Strongly Agree – 4 %

Ireland:

Strongly Disagree – 0%

Disagree – 0%

Somewhat Disagree – 0%

Somewhat Agree – 9%

Agree – 35%

Strongly Agree – 56%

Global Analysis: The human skills, experience and other people factors that only human workforce can offer to a company is of utmost importance, according to the majority of the respondents. When asked if human impact factors must be considered when making decisions about the implementation of technology, most SME managers were clear, being **Agree** the most upvoted answer in 3 of the 5 countries (even though in Ireland the most upvoted answer was **Strongly Agree**).

13. The robotization and AI will affect your business in the next 5 years.

Portugal:

Strongly Disagree – 8%

Disagree – 16%

Somewhat Disagree – 24%

Somewhat Agree – 32%

Agree – 0%

Strongly Agree – 20%

Bulgaria:

Strongly Disagree – 4 %

Disagree – 4 %

Somewhat Disagree – 11 %

Somewhat Agree – 41 %

Agree – 26 %

Strongly Agree – 14 %

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UK:

Strongly Disagree – 0 %

Disagree – 7 %

Somewhat Disagree – 4 %

Somewhat Agree – 33 %

Agree – 30 %

Strongly Agree – 26 %

Slovakia:

Strongly Disagree – 0 %

Disagree – 4 %

Somewhat Disagree – 0 %

Somewhat Agree – 38 %

Agree – 29 %

Strongly Agree – 29 %

Ireland:

Strongly Disagree – 0%

Disagree – 12%

Somewhat Disagree – 9%

Somewhat Agree – 27%

Agree – 27%

Strongly Agree – 27%

Global Analysis: Most of the surveyed SME managers feel that robotization and AI will affect their business in the next 5 years. The most voted answer in the 5 countries was **Somewhat Agree**, which however reckons some doubts in this regard.

14. Robotization and AI are a future threat for your business.

Portugal:

Strongly Disagree – 32%

Disagree – 20%

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Somewhat Disagree – 16%

Somewhat Agree – 16%

Agree – 8%

Strongly Agree – 8%

Bulgaria:

Strongly Disagree – 7 %

Disagree – 52 %

Somewhat Disagree – 26 %

Somewhat Agree – 11 %

Agree – 4 %

Strongly Agree – 0 %

UK:

Strongly Disagree – 19 %

Disagree – 37 %

Somewhat Disagree – 19 %

Somewhat Agree – 15 %

Agree – 7 %

Strongly Agree – 4 %

Slovakia:

Strongly Disagree – 17 %

Disagree – 58 %

Somewhat Disagree – 13 %

Somewhat Agree – 4 %

Agree – 0 %

Strongly Agree – 8 %

Ireland:

Strongly Disagree – 18%

Disagree – 29%

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Somewhat Disagree – 32%

Somewhat Agree – 9%

Agree – 9%

Strongly Agree – 3%

Global Analysis: In all countries, there is a predominance of negative responses (68% in Portugal, 85% in Bulgaria, 73% in the UK, 88% in Slovakia and 79% in Ireland), which means that the majority of SME managers surveyed do not consider that Robotization and AI are a future threat for their business.

15. Your business is suitable for introducing robots/AI to replace humans in certain processes.

Portugal:

Strongly Disagree – 32%

Disagree – 20%

Somewhat Disagree – 16%

Somewhat Agree – 16%

Agree – 8%

Strongly Agree – 8%

Bulgaria:

Strongly Disagree – 4 %

Disagree – 15 %

Somewhat Disagree – 26 %

Somewhat Agree – 33 %

Agree – 22 %

Strongly Agree – 0 %

UK:

Strongly Disagree – 7 %

Disagree – 15 %

Somewhat Disagree – 15 %

Somewhat Agree – 37 %

Agree – 15 %

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Strongly Agree – 11 %

Slovakia:

Strongly Disagree – 4 %

Disagree – 17 %

Somewhat Disagree – 12 %

Somewhat Agree – 33 %

Agree – 17 %

Strongly Agree – 17 %

Ireland:

Strongly Disagree – 12%

Disagree – 9%

Somewhat Disagree – 6%

Somewhat Agree – 18%

Agree – 44%

Strongly Agree – 12%

Global Analysis: Although there is a balance between negative and positive responses in most of the countries surveyed, in Bulgaria, UK, Slovakia and Ireland the percentages of positive responses ended up exceeding (respectively 55%, 53%, 67% and 74%), although the most voted answer was **Somewhat Agree** in all countries but Ireland (in which **Agree** got the highest percentage).

16. The introduction of robots/AI could give your company a competitive advantage over other companies in its sector.

Portugal:

Strongly Disagree – 32%

Disagree – 20%

Somewhat Disagree – 16%

Somewhat Agree – 16%

Agree – 8%

Strongly Agree – 8%

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Bulgaria:

Strongly Disagree – 0 %

Disagree – 11 %

Somewhat Disagree – 11 %

Somewhat Agree – 40 %

Agree – 34 %

Strongly Agree – 4 %

UK:

Strongly Disagree – 0 %

Disagree – 7 %

Somewhat Disagree – 4 %

Somewhat Agree – 30 %

Agree – 33 %

Strongly Agree – 26 %

Slovakia:

Strongly Disagree – 4 %

Disagree – 8 %

Somewhat Disagree – 17 %

Somewhat Agree – 21 %

Agree – 33 %

Strongly Agree – 17 %

Ireland:

Strongly Disagree – 9%

Disagree – 9%

Somewhat Disagree – 12%

Somewhat Agree – 27%

Agree – 24%

Strongly Agree – 21%

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Global Analysis: Apart from Portugal, all the inquired countries' respondents believe that the introduction of robots/AI could give their company a competitive advantage over other companies in its sector (**Agree** was the most chosen answer in Bulgaria, UK and Slovakia).

17. The associated consequences to the labour forces make the introduction of robots/AI troubling.

Portugal:

Strongly Disagree – 4%

Disagree – 36%

Somewhat Disagree – 24%

Somewhat Agree – 36%

Agree – 0%

Strongly Agree – 0%

Bulgaria:

Strongly Disagree – 0 %

Disagree – 11 %

Somewhat Disagree – 19 %

Somewhat Agree – 40 %

Agree – 30 %

Strongly Agree – 0 %

UK:

Strongly Disagree – 11 %

Disagree – 11 %

Somewhat Disagree – 22 %

Somewhat Agree – 33 %

Agree – 19 %

Strongly Agree – 4 %

Slovakia:

Strongly Disagree – 0 %

Disagree – 12 %

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Somewhat Disagree – 17 %

Somewhat Agree – 33 %

Agree – 38 %

Strongly Agree – 0 %

Ireland:

Strongly Disagree – 0%

Disagree – 9%

Somewhat Disagree – 18%

Somewhat Agree – 32%

Agree – 24%

Strongly Agree – 18%

Global Analysis: Unlike Portugal, where 64% of respondents disagree that the associated consequences to the labour forces makes the introduction of robots / AI troubling, respondents from the other four countries agree that there are other factors that could compromise the arrival of technologies. However, only seven **Strongly Agree** response was recorded, therefore there is no total consensus upon this subject.

18. This survey was worth your time and attention.

Portugal:

Strongly Disagree – 0%

Disagree – 4%

Somewhat Disagree – 4%

Somewhat Agree – 24%

Agree – 44%

Strongly Agree – 24%

Bulgaria:

Strongly Disagree – 0 %

Disagree – 0 %

Somewhat Disagree – 4 %

Somewhat Agree – 22 %

Agree – 52 %

Strongly Agree – 22 %

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UK:

Strongly Disagree – 0 %

Disagree – 7 %

Somewhat Disagree – 7 %

Somewhat Agree – 22 %

Agree – 48 %

Strongly Agree – 15 %

Slovakia:

Strongly Disagree – 0 %

Disagree – 4 %

Somewhat Disagree – 4 %

Somewhat Agree – 38 %

Agree – 46 %

Strongly Agree – 8 %

Ireland:

Strongly Disagree – 0%

Disagree – 3%

Somewhat Disagree – 9%

Somewhat Agree – 29%

Agree – 41%

Strongly Agree – 18%

Global Analysis: Overall, respondents agreed that their time and attention was well invested in answering this questionnaire. **Agree** responses registered values in the range of 50% in all countries. The percentages of negative responses were low in the five countries (the average was 8%).

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Section III – Open-ended questions

19. Are there opportunities offered by emerging technologies to both evolve your business model and to improve the relationship with your employees? If yes, please tell us which.

Portugal:

Yes – 14 answers (56%)

No – 8 answers (32%)

Don't Know / No opinion – 3 answers (12%)

Computerized machinery; The technologies that we identified as potential promoters of our company, would be with the increasing increase in the value of labour, the penetration of automation/robotization of production processes and in parallel implementation of the industry 4.0 methodology; Co-robots; Robotics; Production automation; Digitalization of processes; Production automation; Better planning through IA; Medical robotics and telemedicine; Assist in treatments; Electric vehicles assembly;

Bulgaria:

Yes – 10 answers (37%)

No – 3 answers (11%)

Don't Know / No opinion – 14 answers (52%)

Analysis of business turnover AI technologies, logistics of production materials, applying statistical methods using artificial intelligence; Technologies in the field of data processing, medical operations, agriculture; Customer service automation and programmatic advertising; Improvement communication technology; New technologies in the field of communications; Analyzing data from different sources; Reception robot, cleaning robot; communication technologies.

United Kingdom:

Yes – 10 answers (37%)

No – 5 answers (19 %)

Don't Know / No opinion – 12 answers (44%)

The emerging technologies will be readily used by younger employees who will see the need to embrace them. I think the experienced employees will be more fearful that the technology will either replace them or that it will be too difficult for them to learn; More related to the products lines we promote to the Powertrain Industry rather than the actual business; Expert Tooling & Automation; Citizenship with full rights to AI; 3D printing of large tools; Automated robotic testing; Chat boots.

Slovakia:

Yes –12 answers (50%)

No – 7 answers (29%)

Don't Know / No opinion – 5 answers (21%)

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In AI, the situation is very similar to when Microsoft separated SW from HW. Nowadays, a huge group of SW (IT) activities is being formed and it is a huge assumption that a completely new market will emerge; they are certainly able to simplify and speed up the work of employees in many ways and to facilitate their work in some constantly repeating activities; reducing the amount of monotonous work in favour of creative activity; Improved communication between human and robot, increased intelligence of the robot; Yes there are, increasing the comprehensive overview of low-trained staff; blockchain, virtual reality, chatbot, quantum computing; Robots boosting human performance in monotonous work; the use of AI in decision-making models; Neural networks;

Ireland:

Yes – 18 answers (53%)

No – 4 answers (12%)

Don't Know / No opinion – 12 answers (35%)

We strive to reduce the strain on our employees, through the introduction of new computer systems etc. And considering we are involved in the Nursing home sector and have looked at some of the Robots being used by the elderly in Japan to hold the elderly with their general day to day living, including providing companionship; Remote monitoring, self-field analysis/sampling/results, self-calibration, greater field measurement accuracy compared to lab analysis, shorter sampling times in labs and in the field, remote access analysis, self-calibration of field technology; To improve efficiency and replace routine tasks that require a low level of employee engagement and involvement such as invoice and compliance form processing. Warehousing tasks such as product picking and packing will be greatly enhanced.; Yes, it could help us to use staff at a higher level of thinking. AI should be more aligned to AI assistance to work as a human has to responsible for the impact AI has on the services being delivered; Emerging technologies can help evolve our business model, but i do not see it improving our relationships with our employees - quite the opposite in fact.; Yes it will remove some of the time consuming but necessary work employees do and allow them to branch into other more interesting and satisfying work; Gathering and analysis of metadata to provide suitable and easy of use AI to assist in the delivery of public services; There is a need to address the fear of AI and promote the benefits to be gained by deploying this technology; Reduction in base/ship security personnel. Logistics - reduction in-store men (stock checks etc.); seeing more opportunities in the last few years but still behind the curve; Yes, use robotics to remove boring paper-based processes; Replace humans/staff for health and safety reasons/risk; Healthcare Technology, Pandemic Management; Automated advances in Website Design; Promoting the learning organization; Improve my business model; Yes- trade shows; Maybe so.

Global Analysis: Most of the respondents think that there are opportunities offered by emerging technologies to both evolve their business model and to improve the relationship with their employees., Even though it must be stated that **Don't Know / No opinion** answers' percentage has been quite meaningful (from 12% to 52%). Among the examples given, computerized machinery, robotization of production processes, medical robots, co-bots, chatbots and AI in decision-making processes were the most referred examples of opportunities offered by this newly arrived emerging technologies.

20. Has your company already started implementing steps towards digitalization, robotization and/or AI? If yes, can you briefly describe them?

Portugal:

Yes – 9 answers (36%)

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No – 14 answers (56%)

Don't Know / No opinion – 2 answers (8%)

We have already started the implantation of the robotic process and the implantation in some parts of the process of Industry 4.0 methodologies; Scanning using programs that make the ordering process faster and more efficient; Acquisition of productive cells (cabinet + robot + milling machines); Digitalization of documentation and adoption of IT solutions to manage the workflow; Digitization in logistics and commercial aspects; Computerization of production control; ROSE Project: https://youtu.be/b-PXUVOqjZY; Machines that promote human well-being, through tasks that cannot be performed by humans.

Bulgaria:

Yes – 4 answers (15%)

No – 23 answers (85%)

Don't Know / No opinion – Zero answers (0%)

Software program and report on the Internet; Data processing with software, cloud technologies for data sharing and more; Entering some of the client information automatically; Analyzing and calculating; Informing customers through an automated system, and more; digitalization of business by introducing new digital platforms that optimize the workflow.

United Kingdom:

Yes – 12 answers (44%)

No – 15 answers (56%)

Don't Know / No opinion – Zero answers (0%)

Yes, the business is making steps towards Industry 4.0 and efforts to better understand introduction at the earliest stages: digitalization - yes - ROB/AI not yet; All products are digital now... All communication (almost) is online/video etc.; Expert are amongst the world leaders in tooling and automation integrated solutions; Yes, already introducing and supplying collaborative robots to our customers; AI for network analysis and intervention; Yes - new robot installed in January; yes, installation on customer sites; Yes, business intelligence models.

Slovakia:

Yes – 13 answers (54%)

No – 11 answers (46%)

Don't Know / No opinion – Zero answers (0%)

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As an IT company automates processes (DevOps), we teach RPA and try to transform from SW house to AI house of the future by successive steps (including culture and business model); We try to eliminate human error and all processes are digitized and automated; YES, besides the implementation we are also developing ... We teach and guide the robot to self-maintenance; Partially yes, by buying and using automatic CNC machines and so on; Introduction of a new semi-automatic toilet paper production line; in manufacturing, logistics and prototype testing; we are developing neural networks to facilitate the work of doctors; we will be introducing AI within our customer product; we bought a line to wash and decompose templates; we digitize all documents in the company; digitization yes robotization no and AI is not solved; Implementing AI in our products; AI pilot projects, drones.

Ireland:

Yes – 15 answers (44%)

No – 18 answers (53%)

Don't Know / No opinion – 1 answer (3%)

Yes, we computerised everything we possibly can to make life easier on our staff and in doing so we created greater accountability through better record-keeping with the added benefit of hugely reduced storage of hard file paper records. There are areas were currently exploring, where Robotic devices are currently available, such as for floor cleaning, sanitisation and gardening; Baby steps, Planning our Strategic Statement for 2021, and are exploring the possibilities with digitalization /AI on our work and to plan to gain effectiveness and efficiency; Use of drones is a work in progress, however, no discussions re AI and its impact on how employees can work with it have not been discussed.; Yes, Dalata Online learning platform for employees has reduced face to face training, ALKIMII app is a team and HR Communications app.; scanning in post is done automatically with barcodes so the post goes to the correct department.; From a corporate perspective - yes. Locally we have examined RPA applications in light of Brexit; Yes. Bots are used to communicate with customers and offer technical support; Yes- automation of accounting/invoicing; robotics for cleaning (irobot); a number of digitization projects underway no robotics AI ones yet; I have automated the data processing of my online technology; AI is a key part of every product line; Yes - bespoke T&A system; Yes in admin section; Yes - data recording; Yes.

Global analysis: Only Slovakia had more positive responses than negative, yet they are sparse (54%). In the remaining countries, it can be observed that most of their SME managers have not yet started implementing steps towards digitalization, robotization and / or AI. Of the cases where this process has already started, the examples given went through buying and using automatic CNC machines, AI to fine-tune customer preferences, internet-based products, data processing, Computerization of production control, robotized production systems, etc.

21. What are the three biggest barriers the implementation of robots and AI in your business might struggle with (e.g. lack of awareness of opportunities, lack of finances for such implementation, lack of qualified workforce, etc.)?

Portugal:

Don't Know / No opinion – 5 answers (20%)

Lack of awareness of opportunities, lack of finances for such implementation, lack of qualified workforce, etc.; growing blurring of the economy; resistance to change by the team that collaborates daily in the production; lack of business suitability, absence of human value in the robot;

Bulgaria:

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Don't Know / No opinion – 7 answers (26%)

Lack of information on the possibilities of introducing artificial intelligence in the service sector, lack of knowledge and skills to implement it, lack of adequate incentives, given the high value of the investment for implementation against the low level of remuneration; lack of regulatory framework, lack of qualified personnel, the willingness of customers to operate with automated solutions;

United Kingdom:

Don't Know / No opinion – 7 answers (30%)

lack of finances for such implementation; expert's workforce are fully aware of the advantages, however, we see many companies that have not communicated properly the improvements and benefits, indeed that there will be huge productivity improvements that will necessitate re-distribution of the workforce to areas such as despatch, thus guaranteeing future employment; lack of knowledge and enough information, lack of opportunities and lack of adequated financing for the acquisition and implementation and we need a very well trained labour force; Lack of awareness of opportunities certainly. Also ensuring efficient implementation, and inability to do an accurate risk analysis; lack of awareness of opportunities, lack of finances for such implementation, lack of qualified workforce; Finances - to buy equipment/software - and as we lack competence also to buy knowledge service; lack of awareness of opportunities, lack of finances for such implementation; lack of awareness of opportunities and covered all the implementation; lack of qualified workforce, not useful, lack of finance; the biggest barrier is the lack of qualified workforce; Robot programming and robotic workstation planning; convincing our customers of the safety factors; lack of qualified workforce; type of work; Lack of qualified workers.

Slovakia:

Don't know / No opinion – 1 answer (4%)

Usually, custom production assumes a significant proportion of creative human work according to the client's requirements. Only a few activities can be replaced by robots, eventually. AI, respectively. this will be possible after starting up for mass production. Finance = time, low prices on SVK cause pressure to effectively integrate people and this usually happens when they do billing hours (and not optimization). Insufficient perception of the possible added value of AI, lack of qualified experts in this field, legal, social, ethical risks. Insufficient information and confidence in technology, the measurement accuracy of implemented sensors, insufficient dataset size. Creativity design solutions man vs. man AI; be able to ask AI the right questions/questions; check and accept AI results. Unclear rules, lack of skilled labour, lack of resources for research and development in this area. Lack of funding, lack of data to implement A.I., credibility A.I. in the eyes of users. Lack of information on implementation, lack of people able to implement robots / AI. Return on investment - it is necessary to consider how fast and generally returns the investment. Price of robots, lack of information, lack of qualified experts; lack of financial resources, insufficient repeatability of production; lack of funding for such implementation; market crisis, lack of skills. prac. Power; lack of understanding of the use of AI management by the company; your business is not quite suitable for robotics; In particular, a lack of skilled labour.

Ireland:

Don't know / No opinion – 4 answers (12%)

Staff resistance; Considering the constantly reducing workforce in our sector, we feel that we may have to gravitate towards Japanese caring Robots in the next 5 years. Although we do see greater short-term barriers in the implementation of same in Ireland due to a general unwillingness of the elderly to embrace technology.; 1. No management or leadership on what the implications of AI are 2. Lack of discussion within the civil and public services on pros, cons and implications of introduction. 3. Lack of engagement with Unions to prepare any groundwork that is required.; Lack of qualified workforce, who are in short supply, - will have to buy in services, Need to look at doing a gap

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analysis to assess what will and will not suit our work Will need to understand the financial implications and to consider how to fund; Industrial relations with employees, lack of buy-in from senior management who might not understand the benefits of such investment, resistance to change from employees; Lack of qualified workforce, resistance from the union, a requirement for human interaction in hospitality (although not required in all areas); Some members of staff are change averse and innovation and they will resist the introduction of such implementation.; Finance, Existing ICT infrastructure, ICT workforce needs to be expanded in terms of capability and capacity; Lack of qualified workforce. Some levels of feasibility funding would be very useful; Lack of finances. Also time in learning new process may slow down processes.; technology to develop and implement / awareness and resources to develop; Lack of awareness of use, lack of in house design, lack of understanding.; Finance, Trust in AI (backup), Loss of skills in event of system failure; Lack of expertise inside and outside the business. Resistance to change; lack of awareness, lack of confidence and financial constraints; Lack of awareness, much of our work is manual in nature; lack of suitability at present to the workplace,; Lack of knowledge, cost, client reaction; Language, finance and change management; lack of awareness & qualified workforce; Finances and qualified workforce; One to one with another Human; Lack of qualified workforce; Application and training; GDPR and Regulation; Lack of awareness.; Lack of workforce.

Global Analysis: The biggest barriers to the implementation of robots and AI in SME managers' businesses might struggle with as stated by them in the four countries are mainly linked to lack of information regarding funding and legislation, lack of qualified workforce, lack of suiteness of the business and lack of awareness of opportunities.

22. What are your thoughts in regard of training/mentoring on robotization/AI in your company? Will it be beneficial to your company's future business development? Is the lack of robotization/AI implementation due to gaps in the training of students/workers in these areas?

Portugal:

Don't know / No opinion – 4 answers (16%)

In my opinion, it is an asset, there are very complicated / dangerous jobs that increasingly have fewer followers. It is essential that companies find tools to improve them and I believe that robotics associated with AI is a solution; We are a small company that grows according to needs, today robotization is not a priority; But we are aware of some robots that could be beneficial to the company; Yes, we consider both issues important in the company's strategic vision. Robotics in particular will form an important pillar in the future; The lack of training in these areas can compromise the adoption of instruments of this nature; The implementation for how much can only be done by using software; Above all, there is a lack of financial resources and public support; We already know these topics, not missing a training; I think it will be beneficial, with moderation and awareness; Yes, we consider digitization beneficial; It is beneficial. It is not due to gaps; In our business it is not advantageous; It will not add benefits.

Bulgaria:

Don't Know / No opinion: 8 answers (30%)

It will be useful; Automation of some processes would increase efficiency in our industry. There are STEM schools where, from an early age, children can learn the basics of robotics and computer science; Yes It will be useful Due to gaps in education and due to too much material online (internet and television); Yes, it will be polished, there is a need for training, as there are major gaps in the knowledge and training of the staff; Lack of human resources is currently the most significant problem for such an initiative. Yes, it will be useful. Yes, due to gaps in education and training; Yes training would be helpful; I think it will be useful !!

Training would be useful; Yes, it will be useful; Yes, it will be useful; Yes, it will be usefull; Yes, it will be useful; It would be helpfulit's not appropriate; There is none; Good idea.

United Kingdom:

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Don't Know / No opinion: 8 answers (31%)

We are concerned with the Rise of Christian fundamentalism, which will set a stop to innovation work. Därför There may not be available competences for the necessary training; We need to get the competence somehow
The problem for new employees is the understanding of the connection between existing business and new technology ; We are great supporters of mentorship in principle across a range of opportunities for staff development, and this area seems to be particularly appropriate.; Should be implemented in close time horizon.; I don't think i'ts a big need in our organisation. Maybe for other sectors will be more interesting to implementing.; There are significant gaps in the learning and preparedness of students in regard to training in AI and Automation; training is very important and should be available for all, training providers do to keep up with our demands; Training on latest technology and products available will always be an advantage; Our company are already training staff in the implementation requirements; Beneficial in the future but people wary. No training in this whatsoever; No, it will not; No, it is not due to gaps in the training; For the moment, we don't such a big change in robotics; Yes, there are an important lack of training to gaps in the training of students/workers; None; yes; No; I think it could be beneficial by automation the processes which do not require creativity.

Ireland:

Don't Know / No opinion: 10 answers (29%)

We feel that it's essential to move with the times to benefit the company & our workforce, and believe through training, the progressive introduction of technology our workforce will learn to embrace all that is new.; The lack of implementation is due to the lack of technology in this area. When more readily available, training and mentoring would be hugely necessary in order to successfully plan an implementation strategy.; It would be paramount to have training and on-going mentoring. I would imagine there currently are gaps due to lack of awareness of the benefits and a resistance to change and the additional expenditure; Once we know how we are planning to move forward, we will need to use a consultant to devise a plan, but keeping an eye on what is happening with our international regulators; It would be beneficial for management and employees to undergo workshops and discussion forums re the implications of AI and Robotics; Strongly agree. Training and mentoring would be very beneficial and greatly welcomed. We would happily engage in such a process.; Training/ mentoring would be of assistance. Benefit greater awareness, lack of AI due to poor training/awareness; Training and consultation are required prior to any introduction of robotics or AI.; Both technical, individual and cultural barriers to implementation; New training systems critical to acceptance and potential trials.; training and mentoring will be useful and relevant going forward; Robotics training should be part of Third Level Education. Possibly and knowledge of systems and applications; All engineers required to do ML training; Staff resistance/ highly unionised; it needs to be managed carefully; Extremely beneficial.

Global Analysis: In regard of training/mentoring on robotization/AI in the inquired companies, most of the SME managers stated that training would be really important in order to form current and future employees, as they would become more aware and skillful regarding new technologies to keep up with markets' constant demands.

23. Are the existing policies and available government support towards SME's robotization enough? Are the policy makers in your country striving to stimulate its implementation in SMEs?

Portugal:

Don't Know / No opinion: 6 answers (24%)

No; do not know; I am not aware of the EU policy regarding the implementation of robots / Artificial Intelligence in SMEs, perhaps they should organize more information events in partnership with business associations; The process of granting support must be faster, if the company does not have financial stability, it can simply "choke" with a higher investment project; Do not know. But there are always opportunities for improvement; I don't know the policy in that area; I have no knowledge in this area; Without knowledge. We don't know; Do not know; Vaguely; No; No; Do not.

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Bulgaria:

Don't Know / No opinion: 8 answers (30%)

No; no; I am not familiar with the policies available in detail, but given the low level of business digitalization, they may not be sufficient. Currently, there is only one measure available to support business digitalization - the OPIC voucher, but it has not yet launched into business and the result is unclear; I do not think this is a priority for politicians; There is no political support, there are private initiatives supporting robotics; Politicians are clearly not seeking to stimulate the digitalisation of SMEs; Are not sufficient. At this stage, they rather do not aspire; Not enough. I don't think there is any real aspiration; Policies in this area are not sufficient; No, they are not enough; No, it's not enough; Not at this stage; They are not sufficient; I am not familiar; No I do not think so; Not particularly.

United Kingdom:

Don't Know / No opinion: 8 answers (31%)

Yes; Yes; No; No; No, nothing; Not really; No exist; Not enough; The government only make policy for SMEs a serious priority when there is a firm stance taken by more than one of the SME representative associations; Not really
The focus is more on manufacturing and financial/insurance services, customer support etc. ... in larger organizations; Yes, but threatened by the already outlined policies of racism movements, totalitarian parties and Christian fundamentalism; No, not enough awareness at this stage on what is available to support SME's; no central government support for robots, some local council support; The UK is well behind the curve in moving towards; I think it can be much better; No more support is required. I'm not informed about the policies in my country.

Slovakia:

Don't Know / No opinion: 10 answers (42%)

I do not have detailed information yet as this topic was not crucial for the current state of our project and we did not focus on it as a priority; There is a country policy and available government support for SME robotization, but there is not enough effort to implement them within SMEs; No - usually when trying to support something, the end just the opposite ... no offence; Yes, but absolutely inadequate or unavailable, or I don't know about them ...; NO, there is a discrimination against start-ups; I'm trying to make sure it's not enough; I don't know, maybe for some industry, yes; In general, yes.; I haven't met this in person yet; Yes, support exists and is effective; Very weak; No.

Ireland:

Don't Know / No opinion: 10 answers (29%)

No; I don't think so; We would be of the view that our policy makers haven't the foresight or possibly they don't understand that we as a country have to embrace all technologies, including robotics to keep a lead position in this ever-changing world and understand their fears of further unemployment. But since the pandoras box has been opened and there's no going back, and I have a saying, if you stay in the middle of the road, you'l get run over. So, we've no choice but to move with the times and equally try to find ways to avoid the civil unrest the further will bring; Policies are not evolved and Government agencies are simply at the stage of raising awareness. Individual SMEs particularly in the medical tech field are forging ahead alone; Do not know have enough information to answer this question but I would think not think that there are enough supports given the level of discussion that I am exposed to; No - not at the moment, there needs to be a greater level of awareness and greater government support.; to a degree - have had some presentations and comms but not clear on the full suite of policies; Some government backed schemes; unaware of leading activities of policy makers in this area; I'm not in possession of enough direct knowledge to respond; Government does not understand how quickly this will happen; Yes; No.

Global Analysis: In this section, the high number of **Don't know / No opinion** responses should be highlighted, which can easily be dissolved into negative responses by SME managers when asked if they are aware of existing

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policies and available government support towards SME's robotization or if the policy makers in their countries are striving to stimulate its implementation in SMEs.

24. Are you aware of the EU policy concerning robots/AI implementation in SMEs? Do you think the policies could be improved and more completely articulated to SMEs? Please describe measures you feel should be taken.

Portugal:

Don't Know / No opinion: 8 answers (32%)

No; do not know; I am not aware of the EU policy regarding the implementation of robots / Artificial Intelligence in SMEs, perhaps they should organize more information events in partnership with business associations; The process of granting support must be faster, if the company does not have financial stability, it can simply "choke" with a higher investment project; Do not know. But there are always opportunities for improvement; I don't know the policy in that area; I have no knowledge in this area; Without knowledge. We don't know; Do not know; Vaguely; No; No; Do not.

Bulgaria:

Don't Know / No opinion: 15 answers (56%)

Given that the EU will approve a whole program for financing digitalisation of business for the new programming period, in parallel with the traditional schemes in Horizon Europe, I believe that this should be one of the main priorities in BG. First, emphasis should be placed on enhancing the knowledge and capacity of both potential users of artificial intelligence and those who would deploy it. The next stage is implementation, for which there should be adequate support; I am not aware, there is not much talk on the subject unless the manager himself is not interested in reading; we are not familiar with EU policy on the implementation of robots / AI in SMEs; I'm not aware. Such information is not disseminated; EU-no .... in Germany-yes. It's a long time ....; yes, in the automotive field; I am not aware of EU policies; I have no information about these policies; I don't have enough; information; Rather not; No.

United Kingdom:

Don't Know / No opinion: 14 answers (50%)

Yes, I am aware of the policy and believe that much more could be done in many areas of engagement to improve the current situation. Training at the grass roots with secondary schools, colleges and universities should be the start point for changing the whole culture. Training is the key top embracing the integration of automation into the businesses that would benefit from the next generation of automation & AI; A Good policy could be to make a business discount for SME which use robots or something similar to improve their business; A good policy concerning robots it could be beneficial for SME in order to implementing with effectively; I would certainly value directions to where such information is stored and available; Yes, brief explanation on what is available and why would be beneficial; I think the policies could be improved; It should be improved, surely; More funding is necessary.

Slovakia:

Don't Know / No opinion: 8 answers (33%)

Not; I do not know; Not; Vouchers for companies implementing AI solutions (PoC coverage), most businesses that decide to go to PoC after the benefit, but the bulk of the majority will not go to PoC, because even a lack of understanding of AI and hard to explain from the table - financial support research, while the R&D write-off is great, but the AI investing company has been generating a loss for the first years and so let it go); Maybe Germany. Measures could be adopted especially in the cyber area and its protection, protection of information systems, etc; Some exist. We participated in the creation of the Trustworthy AI Assessment List prepared by the AI4EU Group; Structural Funds with simple and

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meaningful administration, non-refundable funding; We are kept informed about EU policy and consider it sufficient; Improve companies' awareness of EU support opportunities; I am not familiar with this policy in detail; No, I dont know. I am not orientated in this topic; Facilitating the absorption of EU projects; education and mentoring; I know grant schemes; do not list them in detail; I don't know about it; I do not know; I do not know.

Ireland:

Don't Know / No opinion: 7 answers (21%)

No; Not aware; Yes, and certainly the EU policies concerning robots/AI implementation in SMEs could be greatly improved. But we should also understand their fear of the unemployment the further will bring and would feel the EU would rather slow the progression of Robotics down in this socialist world to find alternative ways of making money to support our ever reducing workforce; Aware of research by Juha Heikkilä, PhD, Head of UnitnRobotics & Artificial Intelligence- feel that there will be significant impact in the areas of health, ageing population, environment, security- whilst Digitilisation Hubs have been of been of benefit significant lack of Government investment in broadband infrastructre is hampering development; I am not aware of EU policy concerning robots/AI implementation in SMEs and i do believe these could be better articulated to SME's. On line blogs/web sites and white papers. Awareness campaigns through social media...; No. Outlining what defines bot/AI. Having clear policy on how it can be used to supplement/replace a workforce.; No; yes; Please gethe EU Policy out to all SME's and Statutory Bodies and Agencies; Too focused on regulation and not enough on development and leadership; No - would not have enough information to answer this question; I'm not in possession of enough direct knowledge to respond; I am not familiar with the EU policy - will check it out; Very briefly aware and it's an emerging area for SMEs; No. Policies and supports could be improved; No. This needs to be promoted more; Not aware of such policies.

Global Analysis: As with the answers to the previous question, it is clear that most respondents are unaware of the EU policy concerning robots / AI implementation in SMEs. Regarding measures they feel should be taken in this matter, they state that EU should include more robots / AI development funding programs, more investment in training programs, tax benefits for companies using new technologies, more informing events and workshops in companies, among others.

25. Do you wish to be kept up to date with the project developments?

Portugal:

Yes: 6 answers (24%)

No: 19 answers (76%)

Bulgaria:

Yes: 22 answers (81%)

No: 5 answers (19%)

United Kingdom:

Yes: 19 answers (70%)

No: 8 answers (30%)

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Slovakia:

Yes: 18 answers (75%)

No: 6 answers (25%)

Ireland:

Yes: 16 answers (47%)

No: 18 answers (53%)

Global Analysis: Apart from Portugal and Ireland, the majority of respondents would like to keep up with the project activities.

26. If you have answered YES to Q25 please leave your email address.

62% responded positively

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