



## Article

# Employee Preparedness for Industry 4.0 in Logistic Sector: A Cross-National Study between Poland and Malaysia

Beata Ślusarczyk <sup>1,2,\*</sup> , Robert Jeyakumar Nathan <sup>3</sup> and Paula Pypłacz <sup>1</sup>

<sup>1</sup> Faculty of Management, Czestochowa University of Technology, 42-200 Czestochowa, Poland; paula.pyplacz@wz.pcz.pl

<sup>2</sup> College of Business and Economics, University of Johannesburg, Johannesburg 2006, South Africa

<sup>3</sup> Faculty of Business, Multimedia University, Cyberjaya 75450, Malaysia; robert.jeyakumar@mmu.edu.my

\* Correspondence: beata.slusarczyk@wz.pcz.pl

**Abstract:** Today we are witnessing a paradigm shift when it comes to the industry. There are chances that Industry 4.0 does not only involve major changes in production and business solutions, but also the ability of many enterprises (mainly production companies) to come closer to developed economies. This article highlights the aspect of creating new business models that integrate organizations around Industry 4.0 solutions and create new value for the client and internal client. The objective of this study was to demonstrate the relationship between the implementation of selected Industry 4.0 technologies as well as the knowledge and preparation of employees for changes caused by new solutions, e.g., in the area of the automation and robotization of industry or data and information management. The questionnaire research was conducted among 80 logistics companies in Poland and 80 in Malaysia. Based on the obtained data, a statistical analysis was conducted of the relationships between the above-mentioned variables. The analysis concerned: the employees' knowledge of the Industry 4.0 paradigm, preparing employees for challenges and the implementation of Industry 4.0 technology. The correlation analysis showed the existence of a statistical relationship between the analysed variables. The analysis of quantitative data showed differences between Poland and Malaysia in terms of employee preparation, their knowledge of Industry 4.0 and activities related to the implementation of specific IR4.0 technologies. The presented analysis relates to one of the analysed areas, therefore it is a contribution to further considerations and comparisons.

**Keywords:** Industry 4.0; logistics; technology; employee; business model



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## 1. Introduction

The advancement of digital technology and its impact on every area of life, including industrialization, is in continuous progress on a global scale. Increasingly more modern achievements are available to enterprises, such as the Internet of Things, artificial intelligence or augmented reality, as well as huge databases that need to be effectively managed. On the other hand, consumers demand speed, quality, customization and personalization on a scale that has not been experienced before. At the same time, the environment demands great care, including for materials, and well-planned production processes according to the spirit of circular economy.

Access to technology is increasingly more common and natural, and the most important thing is whether and how companies use these solutions. Thanks to their wide application in any area of business, organizations can avoid the trap of focusing on short-term gains at the expense of long-term growth opportunities. Thus, business has an important role to play in developing how technology will affect different spheres of business.

The Fourth Industrial Revolution, more commonly known as Industry 4.0, has turned into a typical term on the minds of industry pioneers, scholastics, politician and individuals alike. It speaks to a future which holds a promise or guarantee of the introduction of new advances that stands to revolutionize of our daily lives (Niemczyk et al. 2019). Smart

innovation nearly appears to build up its own force, frequently realizing change quicker than first foreseen. Since the turn of the millennium, there has been a much sharper curve in technology, exemplified by the rise of devices such as the smartphone, smart TVs, and the Internet of Things in accordance with the current worldwide modernization, all of which have changed the manner in which we live.

Revolution 4.0 is changing the way people work and the competency model of employees. Rigid competency models assigned to specific groups of positions or specializations have become less important. Although technical and cybertechnical competences rank first, soft competences are gaining more and more importance. Creativity understood as business competence, project management, communication and competences related to foreign languages and the ability to work in an intercultural but also multi-generational environment are very important (Saniuk et al. 2020).

The complex nature of the cited changes and their impact at all levels often result in a lack of competences, technology and increasing uncertainty when it comes to decision making. Furthermore, there are gaps in terms of appropriate strategies, ways of method implementation and appropriate solutions for Industry 4.0 (Ślusarczyk and Pypłacz 2020). An important aspect is also the preparation of an organization for changes relating to Industry 4.0. It does not only involve knowledge and skills to use the appropriate technological solutions but also the preparation and guidance of employees through one of the biggest changes. It is commonly known that changes cause resistance among employees. Preparing them, presenting and introducing the entire Industry 4.0 concept will make it possible to eliminate the negative effects of the changes, especially since the implementation of Industry 4.0 solutions and technologies is a great opportunity and even a necessity for both Polish and Malaysian entrepreneurs.

An analysis of the literature shows the strong influence of Industry 4.0 on the functioning of enterprises operating in the logistics industry. The purpose of this study is to diagnose the relations between the implementation of selected Industry 4.0 technologies and to prepare employees to the challenges understood as organizational changes in the implementation of Industry 4.0, with particular emphasis on employees' knowledge of this concept. As part of the research, we confirmed the assumptions identified in the literature, including that the greater knowledge of employees allows for faster implementation of changes related to Industry 4.0. Moreover, it is worth noting that the knowledge about the changes themselves—and therefore the Industry 4.0 paradigm—allows you to better use the organizational potential. On this basis, we have defined research hypotheses, which are presented in detail in part 4.

The article is structured as follows. After this introduction, in Sections 2 and 3, we reviewed the aspects covered in the article, i.e., Industry 4.0 issues, employees and references to two countries—Poland and Malaysia—as the areas in which we conducted our research. The purpose of these parts is to identify the research gap and to formulate hypotheses. Section 4 contains the research methodology. The last two sections are discussion and conclusions. Here, the contribution to science is indicated, but also the limitations of the research methodology and directions of future research.

## 2. Background and Revolution of Industry—Literature Review

The term “Industry 4.0” is constantly interpreted and defined differently, which is largely due to the need for a holistic perception of the problem. This concept is not just one implemented technology, or a single change in the way of production management, but a holistic approach to the production and business area in the organization (Ślusarczyk 2018). The fourth industrial revolution is a concept regarding the use of automation and data processing and exchange, as well as the implementation of a variety of new technologies allowing for the creation of the so-called cyber-physical systems and changing manufacturing methods. It also relates to the digitization of production, where technological devices and systems are interconnected, including via the Internet, and where large volumes of production data are analysed. Industry 4.0 is a conceptual aggregate covering a number of

new technologies, such as the Internet of Things, cloud computing, Big Data analysis and artificial intelligence as well as incremental printing, augmented reality or collaborative robots. This revolution is still run today in modern robotization framework. In logistic divisions, it changes the entire working framework, which is the method for shipping and receiving items. An important area of Industry 4.0 is the Cyber Industry Network. It allows business processes through the integration of mobile technologies in real time to be managed, and enables the reduction of costs, improvements in flexibility and, as a result, increases the competitiveness of manufacturing enterprises (Saniuk et al. 2021). Finally, the Fourth Industrial Revolution, which is the present Industry 4.0, is all about innovation in digital, physical and artificial intelligence (AI). This industry has the latest revolution in the business field, which has been a major issue examined and presented in the previous couple of years. K. Schwab emphasizes that the course of the transformation of industry depends mainly on how the barriers will be overcome and how the opportunities arising during this transformation will be used (Kovács 2020; Schwab and Davis 2018). In addition, there is a change in business models in which the employee, with his skills and competences, becomes the main aspect (Grabowska et al. 2020).

Therefore, organizations must adopt an appropriate model of transformation to the new concept of industry development because the idea of Industry 4.0 applies to all dimensions of the organization. At a basic level, it focuses on technology (Ćwiklicki and Wojnarowska 2020). Technology makes it possible to improve, accelerate or increase the efficiency of individual automation components. The second level is the integration of systems and the collection of data from individual industrial devices so that they can be used for common processing. The ability to integrate data and manage the value chains in a better way is an important driver for the development of industrial digital solutions. The huge amount of data generated by modern industrial automation systems causes a big problem, especially among maintenance workers. Thus, it becomes necessary to prepare algorithms for automatic, quasi-intelligent processing of collected data, to focus the operator's attention only on important events.

Keep in mind that Industry 4.0 does not only involve technology, but also the company's style of operation and its relations with contractors. The third important dimension is the emerging, often revolutionary business models that use digital technologies to create value. They are characterized by focusing on individual customer needs, data integration along the entire value chain as well as emphasis on looking for partnerships in the business ecosystem in order to strengthen the organization's competences (García-Muiña et al. 2020). In such business models, computer systems are just tools that must be properly used by trained employees. Innovative ERP systems are becoming useful, allowing for the automation of some contacts with customers and suppliers, 3D modeling techniques as well as virtual reality, which is a very attractive way of presenting the offered products, and more. New business models must also take into account the internal customer with their needs, fears and skills. Conversation about Industry 4.0 employees is common, but currently, it is necessary to bear in mind the internal customers who must change their habits and existing patterns completely and go through the changes caused by the Industry 4.0 paradigm specifically in the scope of the entire model of the organization's functioning.

The above phenomena show that only the comprehensive implementation of these ideas at all of the above-mentioned levels will lead to the actual and quite large benefits (Klovienė and Uosytė 2019). When approaching Industry 4.0 in a comprehensive way, we can talk about a change in the manufacturing paradigm, providing the possibility of flexible, highly personalized and cost-effective production. Industry 4.0 is also part of a larger mega-trend of digital transformation (Matyushok et al. 2021). It covers a number of other industries, in particular the financial and logistics sectors. The road ahead for organizational supply chain management is one of more automation across various components, for example, supply chain logistics, inbound logistics, distribution centre administration, intralogistics or line encouraging and outbound coordination's and coordination's directing (Krykavskyy et al. 2019).

Education and further professional development are also essential key factors for achieving the goals of Industry 4.0, which significantly changes the professional skills of employees in many areas (Hariharasudan and Kot 2018; Vrchota et al. 2020). As noted in the research of Liczmańska-Kopcewicz and Wiśniewska (Liczmańska-Kopcewicz and Wiśniewska 2019), there is a positive correlation between the assessment of the degree of implementation of the innovation strategy, including technological innovation, and the assessment of the level of exploration and the use of knowledge about buyers and the introduction and use of new technologies. According to the Reference report (Industrial Global Union 2017), current employees do not have the required skills matching Industry 4.0. It should be realized that many jobs will be lost, but on the other hand, new jobs will be created in other areas. Nevertheless, these new opportunities will most likely require highly skilled, innovative and dynamic workers (Surajit et al. 2021; Piwovar-Sulej 2020), with a preference for employees with high IT competences who have a good understanding of practical, engineering and programming skills (Industrial Global Union 2017; Sima et al. 2020). The issue of knowledge in the aspect of Industry 4.0 is therefore a key element (Sharif 2020).

It is worth noting that the model of the traditional Porter value chain is changing as a result of digital transformation (Erboz 2020). Integration taking place in two dimensions is noticeable. In the vertical dimension, thanks to the availability of data regarding processes and production, it is possible to integrate processes within the organization in a better way—from R&D, purchasing, through production, to logistics and marketing. The comprehensive life cycle management of products and assets becomes possible. On the other hand, in the horizontal dimension, it can be observed that intelligent delivery and logistics systems (including in-house logistics), tracking the flow of raw materials and products and their management, enable the optimization of logistics and production processes as well as an increase in the quality of planning. On the other hand, the availability of digital data and the “visibility” of production allow for easier sharing of information between the organization and its contractors and suppliers as well as customers and companies in the distribution network.

### 3. Industry 4.0 in Poland and Malaysia—Background

A general image of the development of digital economy in Poland against the background of the EU economies can be obtained by analysing the changes in the Digital Economy and Society Index—DESI. The index is a weighted average of five dimensions, namely: connectivity, human capital, use of internet, integration of digital technology and digital public services. When analysing the recent years, it is clear that the common feature of the EU Member States is a solid policy and targeted investments in all areas as measured by the DESI indicator (Digital Economy and Society Index 2020). Finland, Sweden, Denmark and the Netherlands have the most advanced digital economies in the EU, followed by Malta, Ireland and Estonia. Poland ranks only 24th in the EU in terms of digitization measured by the DESI index and belongs to the group of countries staying behind in terms of digital competitiveness. The value of the DESI index for Poland is growing at a pace close to the average pace in the EU, and its level is significantly below the EU average, which means that it is not possible to catch up, not only to the digital leaders, but to even achieve the EU average. A similar situation to that in Poland also occurs in countries such as Hungary, Slovakia, Romania, Bulgaria, Croatia, Cyprus, Italy and Greece (Digital Economy and Society Index 2020). Research by Deloitte (Deloitte 2020) indicates that the three main aspects driving innovation in Poland are operating activities (75%), technologies (48%) and people (43%). Globally, the leaders in this respect were formed by the following factors: supply chain (60%), operational activity (ca. 57%) and finance (ca. 35%). As mentioned, Poland has less experience in implementing Industry 4.0, so currently only 27 percent of companies indicated that the return on investment (ROI) was average to high; 12 percent rated it as negative or zero.

Malaysia is gradually progressing towards Industry 4.0. The Malaysian Ministry of International Trade and Industry (MITI) proposed the National Policy for Industry 4.0 to help advance the nations' organizations and factories for Industrial Revolution 4.0. This is believed to empower enterprises in the country to increase their profitability, productivity, output quality and to subsequently grow new abilities ([Ministry of International Trade and Industry 2021](#)). As per MITI, Malaysia a developing economy, is presently placed in the middle of Industry 2.0, which is the large-scale manufacturing of things, and Industry 3.0, automation. Gearing towards Industrial Revolution 4.0 totally is a moderate process facing numerous difficulties, for example, the absence of mindfulness and comprehension of Industry 4.0 in the workforce, as well as the lack of relevant Industrial Revolution 4.0 standards and skillsets. The nation's Prime Minister said that the 'Industry4WRD' arrangement speaks to a critical advance for Malaysia as it seeks to strengthen on-going structural reforms and become a developed nation which is equitable, sustainable and comprehensive by 2025 or considerably prior ([Malaysia Industry Forward 2019](#)).

Malaysia prioritized selected sectors to drive the Industry4WRD agenda, which includes the Chemical, Medical Devices, Mechanical and Engineering, Aerospace, Electrical and Electronics and Automotive sectors and labour-intensive industries such as the Furniture and Food and Beverage industries. By the year 2025, the Malaysian Industry4WRD initiatives aim to increase productivity in those sectors per person by 30% up from currently RM106,747 per worker. It is also geared towards raising the contribution of the manufacturing sector to the Malaysian economy from RM254 billion to RM392 billion. Overall, the Industry4WRD focus of Malaysia is to improve Malaysia's ranking on the Global Innovation Index from 35 into the top-30 position globally and to increase the proportion of highly skilled workers in the manufacturing sector from 18% to 35%. The investments into the Industry4WRD program balances the channelling of funds to 50% for technology, 30% for process improvements and 20% on people ([Ministry of International Trade and Industry 2021](#)).

The Malaysian government's commitment to embark on the transition to Industry 4.0 has produced commendable results. Based on the latest data from the Department of Statistics Malaysia (DOSM), Malaysia's Industrial Production Index (IPI) soared more than 50% recently in the month of April 2021. Despite the challenges of COVID-19 to the national manufacturing productivity due to lockdowns, the manufacturing sector is still able to perform exceptionally well, with a growth of 68% ([Department of Statistics Malaysia 2021](#)). This could be attributed to smart automations and Industry 4.0 investments and factory upgrading to smart factories that has been taking place in recent years in the manufacturing industry due to Industry4WRD.

The situation in Poland looks better, although we cannot talk about Industry 4.0 in its full dimension. According to the survey, more than half of the surveyed companies (52%) familiarised themselves with the term Industry 4.0. Big producers (62%) showed greater knowledge of this concept than medium ones (41%). As many as 70% of companies familiar with the Industry 4.0 concept have planned or have already started to implement solutions that are part of it. Large companies were the leaders here, because such actions were taken by over three-fourths of them (77%). Among medium-sized players, this ratio was 59%, but both groups were equally eager to implement these technologies in the future. The most enthusiastic about this process was the manufacturers of machinery and equipment (87%) as well as cars and transport equipment (70%) ([Smart Industry Polska 2019](#)). Revolutionizing industrial processes in enterprises is possible thanks to investments in the development of modern technologies, digitization and industrialization. They are a guarantor of a more effective and competitive enterprise, thus ensuring a high position on the market. In 2019, 28.3% of the surveyed enterprises recorded an increase in the level of expenditure related to the implementation/maintenance/expansion of Industry 4.0 technology over the last 2 years. In this group, the largest share was constituted by units in which the level of outlays increased by no more than 50% (20.8%), and the lowest were those in which it increased by more than 100% (3.1%). Almost half of the surveyed

enterprises maintained their investment outlays at a similar level, and the same number planned to expand and develop modern technologies (Industry 4.0 2020).

#### 4. Research Methodology

When analysing the situation in Poland and Malaysia in terms of the implemented solutions in the area of Industry 4.0 and taking into account the analysis of literature, this study focuses on the technical aspect, i.e., the implementation of Industry 4.0 technologies combined with activities related to the internal customer, who, on the one hand, is responsible for positive and effective implementation, and, on the other hand, it is the employee who is the source of resistance to changes and often questioning the legitimacy and validity of technological implementations. Keeping the above considerations in mind, the following hypotheses were made:

**Hypothesis (H1).** *There is a positive relationship between the employees' knowledge of the Industry 4.0 paradigm and preparing employees for challenges, understood as organizational changes in the implementation of Industry 4.0.*

**Hypothesis (H2).** *There is a positive relationship between the employees' knowledge of the Industry 4.0 paradigm and the implementation of Industry 4.0 technology, understood as robotization of production lines, Big Data and production automation with the use of individual machines.*

**Hypothesis (H3).** *There is a positive relationship between preparing employees for the challenges understood as organizational changes in the introduction of Industry 4.0 and the implementation of Industry 4.0 technology, understood as robotization of production lines, Big Data and production automation with the use of individual machines.*

**Hypothesis (H4).** *The level of knowledge regarding the Industry 4.0 concept and technologies characteristic of the Industry 4.0 concept varies in Poland and Malaysia. This has a significant impact on their implementation in logistics companies in both countries.*

Employing adequate methodology in the research process is a vital feature. One of the essential parts of the study is to employ the appropriate methods (Faizan et al. 2019). Hence, in this cross-sectional research, quantitative deductive research is employed to numerically express the relationship between research variables via following the work of earlier research studies (Haque et al. 2019; Ślusarczyk and Haque 2019; Girdzijauskaite et al. 2019). In other words, the factual truth (quantitative aspect) is preferred over useful truth (qualitative perspective) to attain mathematical objectivity. Based on the Likert scale, a survey was developed to gather data. The biases are essential to be avoided in research. Thus, it is essential to have equal and fair representation of respondents (Haque et al. 2018), thus, by employing similar approach, we mixed several different sampling strategies including referral, purposive, area-cluster and convenience sampling techniques to have fair and equal representation in all three countries. Furthermore, networking and gatekeepers' strategies were employed to circulate the online survey among the targeted sectors. Since, in the absence of no availability of adequate sampling framework, therefore, purposive sampling was mainly used while area clustering was preferred over stratified sampling so that there is fair and equal representation. Combining and executing different sampling strategies are useful and effective in the attainment of appropriate response from a large population (Haque and Oino 2019). Since we targeted the logistic enterprises using Industry 4.0 technologies, therefore, we decided to have one response from management per company.

A total 160 respondents (80 from each country) participated in this study so that there is equal and fair representation. According to Haque and Oino (2019), in order to minimize biases, the stratification of major groups of respondents is an effective technique in social science research by having fair representation. Thus, we ensured that we had equal and fair representation. As we have mentioned, the selection was deliberate in both countries—thus,

both in Poland and Malaysia we reached out to logistic companies. The selection of these countries was dictated by the ongoing research process, i.e., a continuation of the research that was carried out in the following countries: Poland, Hungary and Canada. On the other hand, the choice of Malaysia was related to the analysis of data on the comparative situation in Poland and Malaysia in terms of knowledge about Industry 4.0. As shown in Section 3, the level of implementation of Industry 4.0 solutions varies in the surveyed countries, however, the degree of employee involvement—and in terms of their knowledge—is low in both.

The ethical considerations were maintained by disclosing the purpose of research to the participants, providing the option to leave the survey at any time, no monetary reward against participation, using the shared experiences and opinions only for academic purposes and maintaining the anonymity of the participants at all stages of research.

## 5. Results, Findings and Discussions

Information obtained from numerous reports and analyses indicates that Industry 4.0 has great potential, in particular in the scope of development of production technologies and new opportunities to create value for the customer, i.e., implementing new business models (Weking et al. 2019). Smart factories make it possible to meet individual customer requirements, assuming costs similar to mass production. It becomes possible to implement changes in production in a flexible manner and ensure the ability to react quickly and predictively to disruptions and failures. Furthermore, it is also assumed that Industry 4.0 will contribute to a more efficient use of resources and energy. These varied opportunities, a wide range of changes and an increased need for investment make the development of Industry 4.0 a key challenge for the modern economy. The second area is the perspective of the internal customer, since the digital transformation of enterprises leads to lower operating costs, allowing companies to abandon labour arbitrage (the difference between wages) and increase production on local markets, increase demand for skilled labour and, at the same time, increase wages. It also involves a change in the area of the required competences and skills. The requirements and needs of employees are changing. They now have to fill their competency gaps very quickly in order to be able to find themselves in the reality of Industry 4.0.

The descriptive analysis showed that representatives of limited liability companies, both in Poland and Malaysia (58.75% in total), participated in the survey. In Poland, most studies were conducted among small entities (53.75%), while respondents from Malaysia were mostly organizations hiring over 250 employees (65%). In Poland, the largest number of companies in the study were those operating in the transport industry (55%), while in Malaysia they were packaging and customizing companies (51.25%). A detailed analysis of the data is presented in Table 1.

First of all, in order to verify the existence of relationships between the variables and to answer the question of how big of an impact on preparing employees to the challenges is their knowledge of the Industry 4.0 concept, and thus confirm the validity of the H1 hypothesis adopted in the research procedure, a statistical analysis of the relationships between the referenced variables was conducted. The Spearman's rank correlation coefficient was used and the obtained values are presented in Table 2.

**Table 1.** Characteristics of the Surveyed Enterprises (N = 160; Poland = 80, Malaysia = 80).

The Questionnaire Elements	Volume		Participation in %		Participation in %
	P*	M*	P*	M*	% in N
Organizational and legal form of company					
• Joint-stock company	6	0	7.5	0	3.75
• Limited liability company	47	47	58.75	58.75	58.75
• General partnership	11	19	13.75	23.75	18.75
• Limited liability partnership	1	0	1.25	0	0.63
• Limited partnership	0	14	0	17.5	8.75
• Limited joint-stock partnership	1	0	1.25	0	0.63
• Sole proprietorship	15	0	18.75	0	9.38
Number of employees:					
• 10–49 employees	43	0	53.75	0	26.88
• 50–249 employees	19	28	23.75	35.0	29.38
• over 250 employees	19	52	23.75	65.0	44.38
Leading business profile					
• Transport	44	12	55.0	15.0	35.0
• Warehousing and inventory management	17	21	21.25	26.25	23.75
• Forwarding	25	5	31.25	6.25	18.75
• Packing and packaging	5	41	6.25	51.25	28.75
• Information services: providing information • for planning, coordination, control of logistics • processes	2	1	2.5	1.25	1.88
• Third-Party Logistics (3PL)	8	0	10.0	0	5.0
• Supply chain management	11	0	13.75	0	6.88

P\*—Poland. M\*—Malaysia. Source: elaborated by the authors.

**Table 2.** Correlation Between the Employees' Knowledge Regarding the Industry 4.0 Concept and Preparing Them for Challenges—Results for Poland and Malaysia.

		Preparing Employees for Challenges	
Spearman's rho	Knowledge related to Industry 4.0	Correlation coefficient	0.734 **
		Significance (two-sided)	0.000
		N	160

\*\* Correlation significant at 0.01 (two-sided). Source: elaborated by the authors.

The obtained values of the Spearman's rank correlation coefficient prove a positive and statistically significant relationship. The positive nature of the correlation means that the increase in the knowledge about Industry 4.0 is accompanied by an increase in the level of the employees' preparation for these challenges. The correlation coefficient between the factors is 0.734 \*\*, which proves a fairly strong relationship.

Subsequently, in order to answer the target question and confirm the correctness of hypotheses H2 and H3 adopted in the research procedure, a statistical analysis of the relationships between the variables was carried out: knowledge related to Industry 4.0, the use of Industry 4.0 technology and preparing employees for challenges. The Spearman's rank correlation coefficient was used. The obtained values are presented in Tables 3 and 4.

**Table 3.** Correlation Between the Level of Knowledge Related to Industry 4.0 and the Implementation of Industry 4.0 Technology—Results for Poland and Malaysia.

			Implementation of Production Line Robotization	Implementation of Big Data Solutions	Implementation of Production Automation with the Use of Individual Machines
Spearman's rho	Preparing employees for challenges	Correlation coefficient	0.621 **	0.590 **	0.604 **
		Significance (two-sided)	0.000	0.000	0.000
		N	160	160	160
Spearman's rho	Knowledge related to Industry 4.0	Correlation coefficient	0.521 **	0.769 **	0.855 **
		Significance (two-sided)	0.000	0.000	0.000
		N	160	160	160

\*\* Correlation significant at 0.01 (two-sided). Source: elaborated by the author.

The obtained values of the Spearman's rank correlation coefficient prove positive and statistically significant relationships. The positive nature of the correlation means that the increase in employee knowledge and their preparation is accompanied by an increase in the implementation level in the area of robotization of production lines, Big Data and production automation with the use of individual machines. When analysing the strength of the correlation for  $r$ , quite a strong relationship should be noted, amounting to 855 \*\*. It was observed between the implementation of automation solutions and the knowledge of employees. A slightly weaker relationship was noticed in the case of implementing Big Data solutions. However, in the case of the relationship between the other variables, there is a moderate relationship (0.4–0.7), as in the case of robotization of production lines (0.521 \*\*). There was no very strong relationships for any factor. The study also analysed other technologies, such as mobile technologies, the IoT and Cloud Computing, however, no significant relationships were found for these factors.

**Table 4.** Correlation Between Focus on Sustainable Development, the Level of CSR Strategy Implementation and Value Creation in a Sustainable Enterprise—Results for Poland and Malaysia.

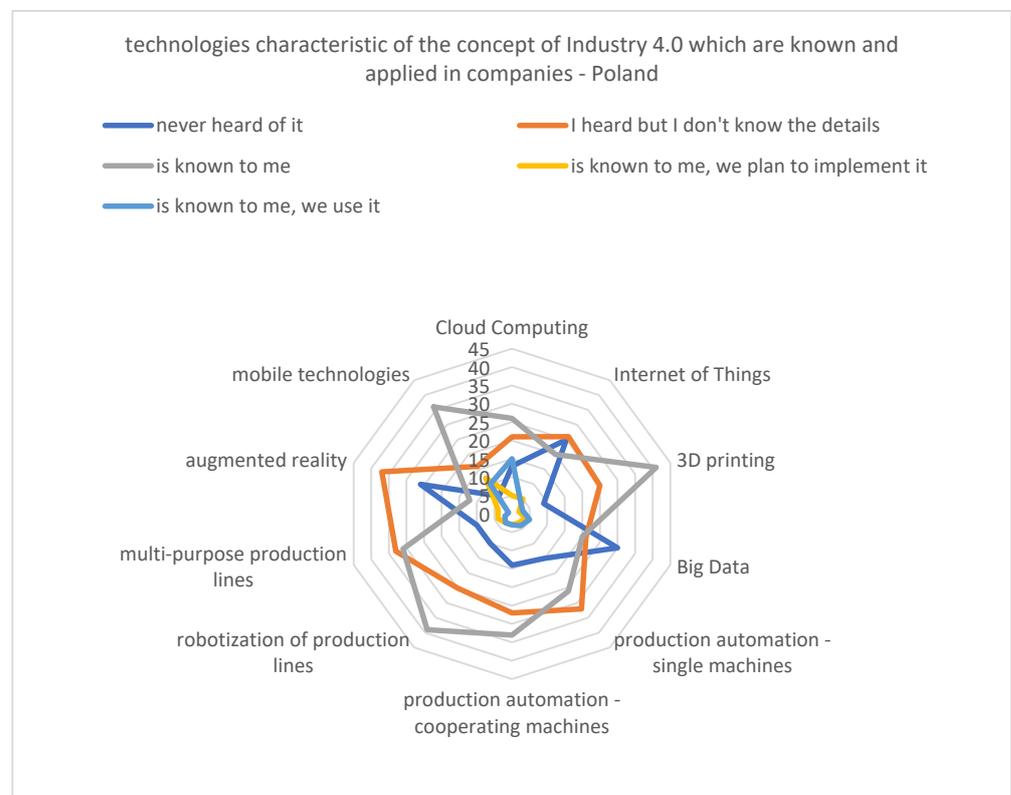
			Implementation of Industry 4.0 Technology
Spearman's rho	Knowledge related to Industry 4.0	Correlation coefficient	0.832 **
		Significance (two-sided)	0.000
		N	140
Spearman's rho	Preparing employees for challenges	Correlation coefficient	0.752 **
		Significance (two-sided)	0.000
		N	140

\*\* Correlation significant at 0.01 (two-sided). Source: elaborated by the authors.

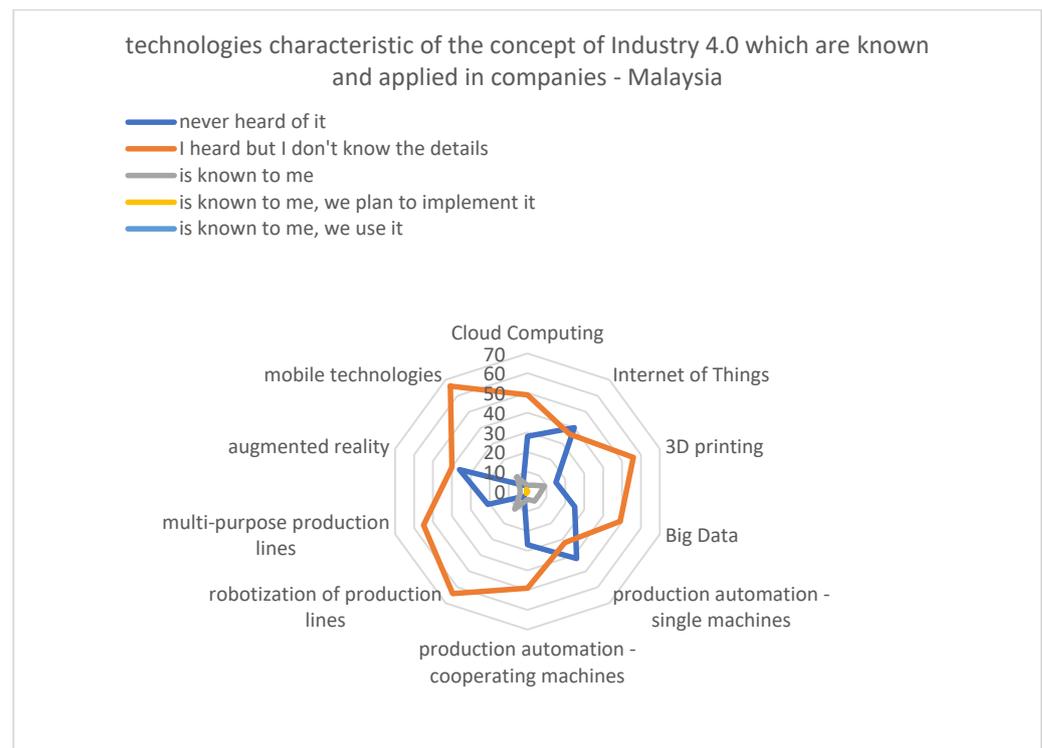
The relationships between the employees' knowledge of the Industry 4.0 paradigm, preparing employees for the challenges understood as organizational changes in the implementation of Industry 4.0, and the implementation of Industry 4.0 technologies understood

as robotization of production lines, Big Data and production automation with the use of individual machines were also analysed. The positive nature of the correlation means that the increase in knowledge and preparation of employees is accompanied by an increase in the implementation of Industry 4.0 technology. The correlation coefficient between the knowledge of employees and the implementation of Industry 4.0 technology is 832\*\*, which proves a fairly strong relationship. On the other hand, the coefficient between preparing employees for challenges and implementing Industry 4.0 technology is 752\*\*, which also proves a fairly strong relationship.

When analysing the quantitative data, differences can be noticed that exist between the respondents in Poland and Malaysia. The level of knowledge about the Industry 4.0 concept is at a higher level among Polish respondents. In Poland, 78% of respondents know of the concept of Industry 4.0, and 8% have implemented it or plan to do so. However, 22% declare that they have never heard of the concept. In Malaysia, 36% of respondents have not heard about this concept, and at the same time, none of the surveyed companies have implemented or plan to implement solutions. When analysing individual solutions (Figures 1 and 2), it should be noted that virtually none of the technologies are used or are planned to be implemented in enterprises in Malaysia in the near future. The indicated technologies are not well-known, and the respondents do not know what they are characterized by. There are more than 80% indications that the technology was unheard of or only heard without knowing the details, for each of the technologies mentioned. In Polish enterprises, Big Data solutions (37% of indications) and augmented reality (32% of indications) are the two main technologies that are the least known. It is important to note that, apart from augmented reality, all technologies are implemented in enterprises, and the most implementations are mobile technologies (12% of the surveyed enterprises) and Cloud Computing (19%).



**Figure 1.** Technologies characteristic of the concept of Industry 4.0 which are known and applied in companies—Poland. Source: elaborated by the authors.



**Figure 2.** Technologies characteristic of the concept of Industry 4.0 which are known and applied in companies Malaysia. Source: elaborated by the authors.

When noting the results of the activities carried out by enterprises to prepare employees for the challenges arising from the implementation of the latest technologies under Industry 4.0, it should be noted that the situation is diverse when comparing Poland and Malaysia. In Malaysia, respondents paid attention to particular specific training, such as stress management training (90% of respondents in Malaysia and 16% in Poland), training for management staff (75% of respondents in Malaysia and 28% in Poland). On the other hand, 51% of companies in Poland, do not conduct nor plan any activities in the area of training. The fact that that companies plan to hire specialists with appropriate external skills is worrying to employees in Malaysia (76% of respondents in Malaysia and 23% in Poland).

When analysing the results obtained in Poland and Malaysia regarding the knowledge of technologies characteristic of the Industry 4.0 concept, the level of the employees' knowledge of the Industry 4.0 concept, as well as the activities supporting employees, e.g., training courses, it is possible to confirm Hypothesis H4, stating that the level of knowledge about Industry 4.0 and knowledge of the technology is different in Poland and Malaysia, which results in a lower level of implementation in Malaysia.

The link between employees' knowledge of the Industry 4.0 paradigm, their preparation for changes and the implementation of various technologies is a complex issue that has an impact on many areas. We are not only talking about typical, expert engineering and technical knowledge. In the study, the author considered knowledge regarding the assumptions, activities and results of the Industry 4.0 concept, i.e., a holistic view of Industry 4.0 as a comprehensive approach to the operation of the organization. Thus, a strong relationship was established between knowledge related to Industry 4.0, preparing employees for challenges and the implementation of Industry 4.0 technologies. This evidences that it is important to act appropriately when implementing changes in the organization. Industry 4.0 means big changes in the area of the organization's operation, which undoubtedly contributes to employees' concerns and resistance. Employed people feel threatened, and they fear they may lose their job due to the automation of activities or due to competency gaps. In reference to the attitudes and concerns of employees, it is worth quoting the

Industry 4.0 study—a revolution in work organization carried out among 278 enterprises, operating primarily in the machine industry. The study has shown that 54% of enterprises expect an increase in the number of employees after introducing Industry 4.0, and 26% of enterprises expect the current number of employees to stagnate.

The results of empirical research presented in this article confirm that, according to hypothesis H1, the increase in employees' knowledge of the Industry 4.0 paradigm is accompanied by an increase in readiness to introduce changes in the area of Industry 4.0. Considering the above findings, it should be stated that there are no grounds to reject hypotheses H2 and H3. The study is also consistent with the fact that the recognition of potential changes resulting from the implementation of the Industry 4.0 technology affects the functioning of logistics organizations. Hypothesis H4 indicates significant differences between the level of knowledge regarding Industry 4.0 in both countries, and thus it translates into the implementation of the Industry 4.0 technologies.

The above analyses are also confirmed by studies conducted by [Vrchota et al. \(2020\)](#) who identified the areas that make it possible to improve the quality of human capital so that it is better prepared for the introduction of Industry 4.0. In addition, [Gudanowska et al. \(2018\)](#) stated that employees should have both greater professional knowledge and technical skills when it comes to Industry 4.0. Employees should have highly developed communication skills, be focused on precise task completion and be able to work both autonomously and in a team. They should also be open to exchange and sharing of knowledge and experience.

## 6. Conclusions

Industry 4.0 is a complex process of technological and organizational transformation of enterprises, related to the change of the business model and integration of the value chain in the entire product life cycle. The precondition for this transformation consists in the advanced use of digital technologies and data resources in order to achieve business success and competitive advantage in the market. The use of digital technologies as well as the change of the company's strategy both assume the possibility of profitable personalized production in response to the individual needs of customers and maintaining the needs of internal customers.

Solutions that fit into the concept of Industry 4.0 are implemented all over the world. Both Poland and Malaysia should follow these trends. Industry 4.0 is the definition of digital transformation that takes place throughout global economy. It is important to think about it in a holistic way because this approach allows people dealing with technology to look more comprehensively at solutions for the industry and look for technologies that will be appropriate both to achieve current goals, but also allow organizations to prepare for what the future holds.

When summarizing the activities in the surveyed countries, i.e., in Poland and Malaysia, it should be stated that a number of public institutions (government and local government), agencies and private entities are involved in the activities, which offer financial support and professional assistance. Cooperation between administrative, scientific and business institutions is the basis for active participation in the fourth industrial revolution. Based on the findings, it is recommended that logistics companies place more focus on employees, in terms of their knowledge of the Industry 4.0 concept itself, which will contribute to a better perception of the changes that are inevitable when implementing new technologies, which will often result in the need to change the business model. Sharing knowledge with internal customers should become a regular practice and raise awareness of changes caused by new solutions.

Despite the best efforts of the authors, there are limitations to this study that need to be overcome in the future. The biggest limitation of the study is representativeness, therefore, it is recommended to improve the sample size in future studies, as 60–80 companies per economy are too few for generalizing results. It is suggested that further research also examines inference statistics based on quantitative data using pathway modeling.

In addition, sampling techniques need to be improved as the use of a mixed sampling technique creates errors. The authors suggest conducting qualitative research in addition to quantitative research in the future. In the case of such complex issues, interviews would increase the effectiveness of research and knowledge about Industry 4.0. All considerations will contribute to obtaining more detailed insight and the possibility of generalization.

In the further perspective, the authors suggest expanding the analysis and conducting additional research that will allow for the identification of the links between specific Industry 4.0 technologies as well as the required competences and skills of employees. A comparison of two or more countries may show recommendations for introducing targeted measures to increase the competences necessary or the development of the Industry 4.0 concept in companies operating in the logistics industry.

The analyses carried out relate to a part of the study, while another economic perspective from the point of view of Poland, Hungary and Canada was presented in the publication by Ślusarczyk et al. (2020).

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