ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 12, Issue, 09, pp. 58804-58811, September, 2022
https://doi.org/10.37118/ijdr.25301.09.2022

RESEARCH ARTICLE OPEN ACCESS

ASSESSMENT OF ORGANIZATIONAL SKILLS FOR INDUSTRY 4.0: A STUDY IN PERNAMBUCA COMPANIES

***Fagner José Coutinho de Melo, Ademir Macedo Nascimento, Djalma Silva Guimarães Júnior, Eryka Fernanda Miranda Sobral, Jackson Kleber Lima Nascimento, Daniela Macedo Nascimento, Virlane Lucia da Silva and Meli Gabriela Carolina de Figueiredo Fan**

[1,2,3,4,5]Universidade de Pernambuco, Recife/PE, Brasil; [6,8]Universidade Federal de Sergipe, São Cristóvão/SE, Brasil; [7]Universidade de Pernambuco, Recife/PE, Brasil

ARTICLE INFO

Article History:
Received 02nd July, 2022
Received in revised form
17th July, 2022
Accepted 27th August, 2022
Published online 23rd September, 2022

Key Words:
Industry 4.0; Micro and small companies; Competencies 4.0.

****Corresponding author:***
Fagner José Coutinho de Melo

ABSTRACT

This study sought to diagnose the competencies for industry 4.0 in the teams of employees of micro and small companies in the metropolitan region of Recife and in the Sertão of the state of Pernambuco, located in the Northeast region of Brazil. To this end, survey-type research was carried out, using a structured questionnaire, applied to 337 employees of micro and small companies. In this way, it was possible to prepare a diagnosis that proactively indicated qualification points for the teams of micro and small companies in order to allow a greater adaptation to the technologies arising from the fourth industrial revolution and, consequently, the strengthening of small businesses.

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Citation: ***Fagner José Coutinho de Melo, Ademir Macedo Nascimento, Djalma Silva Guimarães Júnior, Eryka Fernanda Miranda Sobral et al.*** "Assessment of organizational skills for industry 4.0: a study in pernambuca companies*", International Journal of Development Research*, 12, (09), 58804-58811.

INTRODUCTION

According to Cooper (2017), the industrial chain has undergone profound transformations, ranging from changing consumer behavior to changing technological innovation in industrial processes. In the context of the COVID-19 pandemic, organizations' digitization strategies have been accelerated and are taking place in a forced and improvised way (GUIMARÃES JUNIOR *et al*., 2020). In the research carried out by Twilio (2020), this transformation was accelerated in about 6 years, requiring organizations to develop the process of technological innovation and increasingly effective and fast staff training. In this sense, organizations that have adopted industry 4.0 practices (I4.0) are focusing on the production of goods using cutting-edge technology and the internet of things (IOT), Big Data, augmented reality, Artificial Intelligence, data security, intelligent systems, etc. and they increasingly need human resources that have skills related to technologies that bring the future (ALMADA, 2015; BAI *et al*., 2020). For Grzelczak *et al*. (2017) among the main challenges listed for the implementation and maintenance of industry 4.0, the development of human resources skills stands out. Hecklau *et al*. (2016) also show that the training of these professionals is essential for more strategic actions, coordination and innovative activities. Even with all the initiatives that seek to establish technological innovations in the global supply chain, when it comes to the Brazilian scenario, it is possible to verify great difficulties in implementation and monitoring due to the high level of investments both in machines, equipment and systems, as well as in management and development of people, as well as low government incentives and complex legislation in Brazil, which differs greatly from countries like Germany that have these types of initiatives as a central strategy (OLIVEIRA; SIMÕES, 2017; PORTILHO, 2020). The low initiatives related to digital transformation in Brazil can be seen through Cornell University's Global Innovation Index, which aims to evaluate countries' performance criteria in terms of innovation, where Switzerland, Sweden and the Netherlands occupy the first positions and Brazil finds ranked 69th (ABDI, 2018). In this way, this article aimed to evaluate organizational skills for industry 4.0, from the point of view of employees of Pernambuco companies. To this end, this article is structured in four sections: introduction, theoretical framework,

methodology, results and discussions, followed by final considerations.

THEORETICAL FRAMEWORK: The performance of an organization is mostly dependent on the management of the company's employees. Therefore, it is necessary to encourage the development of knowledge, skills and competences of employees, with a view to raising the potential of the staff and ensuring that the proposed activities are carried out effectively. Hecklau *et al*. (2016) state that it is essential to develop new forms of strategic approaches to face the difficulties experienced through knowledge and skills related to modern technologies and processes of Industry 4.0, with the aim of providing maximum qualifications for professionals in the field. area so that they are not affected by possible changes in the working environment. As a solution, the authors suggest the use of human resources management, through a holistic approach, considering that the whole and each of the parts are linked with constant interactions. The integrative vision presented by Bornewasser *et al*. (2018) allows us to understand that the concept of competence focuses on cognitive resources, that is, it allows for action aimed at objectives in the context of work. This demonstrates the relevance of personal skills to the success of an action, and once developed, it is difficult to copy, as it becomes inherent to being, representing a particular competitive advantage (KAUFFELD, 2006; KAUFFELD; PAULSEN, 2018). According to Cicek *et al*. (2019), Industry 4.0 is described as [...] an "interconnection of people, objects and systems through real-time data exchange." That is, it encompasses technologies, automation and exchange of data and/or information. Therefore, professional qualification favors both sides and provides competence for the personnel. Hecklau *et al*. (2016) also point out that technical skills are responsible for work-related knowledge and skills, which together with other skills seek an integration of the continuous improvement cycle.

Hecklau *et al*. (2016) propose a holistic approach to human resource management in Industry 4.0, with continuous automation and the need to improve schooling, qualifying employees for more complex processes and ensuring staff retention. With the rapid changes in the current environment, jobs such as: product customization, process automation, complex and interconnected projects need strategies with essential purposes to maintain the competitive edge. For Kusmin *et al*. (2017) obtaining a data-based skills management platform for Industry 4.0 is urgent, taking into account the scenario of rising unemployment; talent shortage; crisis prevention at work; actions for education should include recycling, requalification, restructuring of the education system; need for continuing education for workers and new standards of learning assessment. Due to the rapid changes in core competencies triggered by technological and social advances, cooperation between all stakeholders is paramount to the success of the whole (KUSMIN *et al*. 2017). It is not possible within the 4.0 environment for only a company or only employee to have technological knowledge. It is critical that organisations, government, training bodies and agent/user, who are responsible for upholding professional standards, work in a unified way, in this way, the skills development of workers can be supported throughout their careers by various stakeholders. in full. In this way, operational or more strategic and/or creative actions will be necessary in all branches and levels of activity, which presents HR professionals with great challenges related to the profile and skills of employees, whether to improve processes today or in the future. For this, the Competency Models help to keep the workforce qualified by directing efforts towards competence, collaboration and organizational actions.

METHODOLOGY

The structured diagnostic questionnaire comprised five dimensions, linked to 28 skills, which makes it possible to identify the main skills of the group in terms of gender, race and social class and subsequent stratification. Table 1 presents the skills linked to each dimension. The study dimensions are considered:

- Digital: skills needed to create and handle digital content.
- Technique: skills needed to interact with digitally equipped technologies.
- Social: skills needed to interact and collaborate in virtual work environments.
- Personnel: skills necessary for self-development in digital work environments.
- Methods for efficiency: skills needed for problem solving and decision making.

Data collection was carried out with 337 employees of micro and small companies in the metropolitan region of Recife and the hinterland of the state of Pernambuco, located in the Northeast region of Brazil. The selection of respondents took place through accessibility to the interviewees, with the use of the snowball technique, in order to obtain more indications. Data were analyzed using descriptive statistics, presenting measures of central tendency and the percentage of each answer to facilitate the analysis.

RESULTS

Profile: Table 1 presents the profile of age group, gender, affective-sexual orientation, race, people or traditional community, level of education, time in the job market, economic sector, company size, number of employees, position and family income monthly of the interviewed public:

When analyzing the age group profile of the public interviewed in the survey, it can be seen that most are between 18 and 25 years old, with 71 respondents, representing 21.26% of the sample. Followed by the public from 26 to 30 years old with 66 respondents, representing 19.76% of the sample and then the following results, from 36 to 40 with 58 respondents, equivalent to 17.37%, from 31 to 35 years old with 50 respondents , equivalent to 14.97%, from 41 to 45 years old with 35 respondents, equivalent to 10.48%, from 46 to 50 years old with 25 respondents, equivalent to 7.49%, from 51 to 55 years old with 17 respondents, equivalent to 5.09% and finally over 56 years with 12 respondents, equivalent to 3.59%. The results demonstrate greater adhesion of the young public. Regarding gender, the majority of the researched public is composed of cis women with 191 respondents and a relevant percentage of 57.19%. While the respondents self-declared as cis gender, add up to exactly 127 respondents, equivalent to 38.02%. Followed by 12 respondents who reported not wishing to declare, which represents 3.59%, with 2 respondents declaring themselves as non-binary whose percentage is 0.60% and in the transgender man and woman category there is 1 respondent for each category, the which in percentage is 0.30% for each. The sample represents a greater volume of cis women.

Regarding affective sexual orientation, most of the total 304 respondents declared themselves heterosexual, which is equivalent to 91.02%, followed by 12 declared homosexuals, representing 3.59%, 9 respondents declared themselves as bisexual, which in percentage represents 2 .69% also those who do not wish to declare with the same amount and percentage as the previous one. The sample showed massive participation of the public declared as heterosexual. As for race, 145 respondents self-declare as brown, which represents 43.41%, followed by 121 white, which is equivalent to 36.23%, 46 respondents self-declare as black, which represents 13.77%, 10 respondents are self-declared Yellow, representing 2.99%, 8 respondents self-declared Indigenous, which is equivalent to 2.40%, and 4 respondents chose not to declare these, representing 1.20% of the sample. Among the interviewees, there was a higher prevalence of pardos followed by whites and blacks. As for Traditional People or Community (PCTs), about 92.81% are not part of traditional peoples or communities, which in quantity represents 310 respondents, 2.99% are indigenous, equivalent to 10 respondents, 0.90% declare themselves Quilombolas, which is equivalent to 3 respondents, 0.30% Peoples of Terreiro and 0.30% Candomblecist, with 1 respondent for each. There were no results for Caiçaras and Ribeirinhos peoples, however in the sample 9 respondents showed the desire not to

Table 1. Dimensions and Skills to assess organizational competencies

Group	Habilities	References
Technical	Ability to analyze and monitor operations	Kusmin; Ley; Normak (2017); DigComp 2.2 AT (2018); Cicek; Akyuz; Celik (2019); Bongomin*et al.* (2020).
	Quality control	
	Ability to process data and information	
	Operational troubleshooting	
Personal	cognitive flexibility	Hecklau et al. (2016); Kusmin; Ley; Normak (2017); DigComp 2.2 AT (2018), Cicek; Akyuz; Celik (2019); Bongomin et al. (2020).
	Ability to work under pressure	
	motivation to learn	
	Sustainable resource management mindset	
	Creativity	
	Time management	
Social	Coordination and leadership	Hecklau et al. (2016); DigComp 2.2 AT (2018), Cicek; Akyuz; Celik(2019); Kusmin; Ley; Normak (2017).
	Emotional intelligence and conflict resolution	
	Train and teach others	
	Written and visual expression	
	Oral expression and persuasion	
	Networking and intercultural skill	
Digital	Data search and organization	Hecklau et al. (2016); DigComp 2.2 AT (2018).
	Schedule	
	Digital content creation	
	Digitization of management and IOT	
	Personal data protection and privacy	
	Interaction and collaboration through digital technologies	
Efficiency methods	Troubleshooting	Hecklau et al. (2016), Kusmin; Ley; Normak (2017); DigComp 2.2 AT (2018); Cicek; Akyuz; Celik (2019); Bongomin et al. (2020).
	decision making	
	Innovation and entrepreneurship	
	Affinity with technology and IT	
	search skill	
	Cognitive orientation to efficiency	

Table 2. Profile

Attribute	Frequence	Percentage
Age		
18 to 25 years	71	21,26%
26 to 30 years	66	19,76%
31 to 35 years	50	14,97%
36 to 40 years	58	17,37%
41 to 45 years	35	10,48%
46 to 50 years	25	7,49%
51 to 55 years old	17	5,09%
over 56 years	12	3,59%
level of education		
Incomplete Elementary	3	0,90%
Complete Elementary	5	1,50%
Incomplete High School	6	1,80%
Medium Complete	43	12,87%
Incomplete Technician	8	2,40%
Full Technician	28	8,38%
incomplete graduation	57	17,07%
Complete Graduation	65	19,46%
Specialization/Incomplete MBA	27	8,08%
Specialization/Full MBA	66	19,76%
Incomplete Master's/PhD	15	4,49%
Full Master's/Doctorate	11	3,29%
Time in the job market		
less than 1 year	42	12,57%
Between 1 and 5 years	77	23,05%
Between 5 and 10 years	66	19,76%
over 10 years	149	44,61%
economic sector		
Agriculture, Livestock and Extractivism	5	1,50%
Industry	76	22,75%
Trade and Services	188	56,29%
Public sector	65	19,46%
Company size		
micro	67	20,06%
Little	56	16,77%
Average	65	19,46%
Great	146	43,71%
Number of collaborators		
Up to 19 employees	118	35,33%
From 20 to 99 employees	61	18,26%
From 100 to 499 employees	45	13,47%
More than 500 collaborators	110	32,93%
Post		
Technician	73	21,86%
Assistant / Assistant	104	31,14%
Analyst	45	13,47%
Supervisor / Coordinator	63	18,86%
Manager / Director / President	49	14,67%
Monthly Family Income		
Up to 1 minimum wage	44	13,17%
From 1 to 2 minimum wages	92	27,54%
2 to 4 minimum wages	101	30,24%
4 to 8 minimum wages	66	19,76%
Above 8 minimum wages	31	9,28%

Table 3. Mean, mode and median for Technical Skills

Technical abilities	Average	Fashion	Median
I have knowledge about my work and that of my colleagues, being able to supervise them in the execution of the activities.	4,053892	5	4
I have competence in one of the areas of STEAM (Arts, Science, Technology, Engineering and Mathematics) and this collaborates with the actions of my work	3,54491	5	4
I am able to identify improvements and deficiencies in my work environment.	4,338323	5	5
I work with ROADMAP (roadmap) following the goals and deadlines.	3,616766	5	4
I find it easy to browse, research and understand subjects related to my work in the virtual environment (email, WhatsApp, videos and social networks).	4,535928	5	5
I am able to identify sources of errors and improve processes.	4,254491	5	4

Table 4. Mean, Mode and Median for Personal Skills

Personal Skills	Average	Fashion	Median
I find it easy to use available technology to solve problems in my work environment.	4,341317	5	5
I feel comfortable working under pressure because I have the help of technological tools.	3,491018	5	4
I use technology in the creation and dissemination of my creativity.	3,772455	5	4
I carry out my activities on time, as I use process control tools.	3,799401	5	4
I believe that technological tools make it possible to use the company's resources in an economical way, improving the well-being of everyone and the environment.	4,341317	5	5
I believe that by using technology I feel more able to overcome the challenges in my work environment.	4,320359	5	5
I feel motivated to learn and use new technologies.	4,541916	5	5

Table 5. Mean, Mode and Median for Social Skills

Social skills	Average	Fashion	Median
I am adept at the remote, online teaching-learning process.	4,011976	5	4
I assess that the use of social media in the interest of the company proactively influences.	4,329341	5	5
I find it easy to communicate and understand partners and customers with different cultures (language, perception, understanding).	4,167665	5	4
I use my leadership to drive the use of technology by my co-workers and get better results.	4,047904	5	4
I am proactive in terms of resources and time to complete activities.	4,275449	5	4
I understand all stages of the product or service in which I work as a collaborator, and I feel able to train and teach other collaborators.	4,254491	5	5
I understand the need for data protection flows related to information security and ethical issues related to IT and I share this importance with my colleagues.	4,10479	5	4
I feel stimulated, due to the presence of technology, to contribute to decision making in my work environment.	4,149701	5	4

Table 6. Mean, Mode and Median for Digital Skills

Digital Skills	Average	Fashion	Median
I think it is necessary to seek knowledge about digital technologies and apply them in the work environment.	4,655689	5	5
I perceive in my work activities that I perform manually that could be performed automatically by technology.	4,233533	5	5
I have the ability to create, edit and publish content in a virtual environment.	3,772455	5	4
I believe that the passage of information and tools from “analog” to “digital” is important for the company's productivity. (For example, a printed document for computer file or a virtual assistant instead of a human)	4,404192	5	5
I use Cloud Tools (Microsoft Teams, One Drive, Google Drive, Google Docs, Google Sheets, Google Forms, Google Slide, etc).	4,371257	5	5
I perform cloud storage (e.g., Dropbox, Box, Mega etc).	3,919162	5	5
The rise of virtual work requires greater security to protect personal data and privacy.	4,51497	5	5
I am prepared for the increase in virtual work, such as with virtual glasses.	3,592814	5	4
I believe that the integration of Artificial Intelligence in my work environment improves my results.	4,164671	5	5

Table 7. Mean, Mode and Median for Methodological Skills

Methodological Skills	Average	Fashion	Median
I find it easy to find methods and ways to apply technology to solve difficulties and setbacks that occur in my work environment.	3,862275	5	4
I use available technology to make an objective decision at work, without being influenced by values, experience and personal habits	3,784431	5	4
Even though I have support tools for data-driven decision making, I think carefully about the possibilities before acting and take responsibility for my actions.	4,227545	5	5
I have an affinity for technology and IT, and I feel able to install the basic settings of a new computer (e.g., operating system, drivers, software, etc.)	3,434132	5	4
I have the ability to locate information, and analyze the usefulness of the data using technological devices (e.g., Computer, Tablet, Cell Phone)	4,194611	5	5
I feel rewarded, due to the use of technology and its tools, for working in an organized environment with planning, in collaboration with others.	3,946108	5	4

declare, represented in percentages of 2.69%. Among the interviewees, there was no great representation of traditional peoples and communities, which were mostly indigenous. As for the level of education, the result is quite balanced, with a majority of 19.76% with Specialization or complete MBA, which corresponds to 66 respondents, followed by 19.46% with Complete Graduation, which corresponds to 65 respondents, 17.07 % with Incomplete Graduation, which corresponds to 57 respondents, 12.87% with Complete High School, which corresponds to 43 respondents, followed by 8.38% with Complete Technical, which corresponds to 28 respondents, followed by 8.08% with Specialization or Incomplete MBA, which corresponds to 27 respondents. Of these 4.49% with Incomplete Masters/Doctorate, which corresponds to 15 respondents, followed by 3.29% with Completed Masters/PhD, which corresponds to 11 respondents, and still with Incomplete Technical Education, 8 respondents are added with a percentage of 2 .40%, 6 respondents have Incomplete High School with a percentage of 1.80%, 5 with Complete Elementary School with a percentage of 1.50% and finally 3 with Incomplete Elementary School representing 0.90% of the sample. Among the interviewees, most of the public is between undergraduate and doctorate in the incomplete to complete categories. As for the time in the job market, 149 respondents reported that they have been for more than 10 years, which represents 44.61% of the sample. 77 of them are between 1 and 5 years whose percentage is 23.05%, between 5 and 10 years of insertion in the labor market are 66 respondents representing 19.76% and finally with less than 1 years of insertion in the labor market there are 42 respondents, which represents 12.57% of the sample. The result shows that most respondents already have more than a decade of experience in the labor market.

As for the economic sector in the trade and services area, the largest volume of respondents has a quantitative result of 188, which represents 56.29%, followed by the industry sector with 76 respondents, which represents 22.75%, the public sector has 65 respondents representing 19.46% and finally 5 respondents in the areas of agriculture, livestock and extractivism represented in percentages of 1.50%. In the sample, the result shows greater adhesion of the public that works in commerce and services. As for the size of the company, 146 reported composing teams of large companies with a percentage of 43.71%, then 67 are micro companies representing 20.06% of the sample, 65 are medium companies representing 19.46% and finally 56 respondents in small companies. companies, which represents 16.77%. A relevant percentage of respondents who work in large companies. As for the number of employees, 118 respondents indicated being in companies with up to 19 employees, which represents 35.33%, with 110 respondents working with more than 500 employees, which represents 32.93%, 61 respondents indicate composing the team from 20 to 99 employees, which in percentage is 18.26% and finally 45 respondents point to 100 to 499 employees, which represents 13.47% of the sample. As for the position, 104 respondents claim to be Assistant/Assistant, which represents 31.14%, followed by 73 respondents who work as Technicians, representing a percentage of 21.76%, 63 respondents act as Supervisor/Coordinator, which is equivalent to 18.86 %, 49 act as Manager/Director/President representing 14.67% and finally 45 respondents act as Analysts representing a percentage of 13.47%. As for the monthly family income, 101 respondents are in the range of 2 to 4 minimum wages, which represents 30.24% of the sample, followed by 92 respondents with a family income of 1 to 2 minimum wages, which represents 27.54%, 66 respondents in the range from 4 to 8 minimum wages, which represents 19.76%, 44 respondents in the range of up to 1 minimum wage, which represents 13.17% and 31 respondents with monthly family income above 8 minimum wages, which represents 9.28%. Considering the research with a non-probabilistic sample and for convenience, the numbers show greater adhesion of the public aged between 18 and 25 years, gender cis women, heterosexual sexual orientation, brown race, most of them not being part of traditional peoples or communities, with higher level of education in Specialization, inserted in the labor market for more than 10 years, with greater activity in commerce and services, in large companies, most with up to 19 employees, working in auxiliary and assistant positions, and a monthly family income of 2 to 4 minimum wages.

Skills 4.0

Technical Skills: According to the data collected, Table 5 presents the mean, mode and median for the Technical Skills and their respective options:

According to Table 5, 44.9% of respondents have knowledge about their work and the work of colleagues, being able to supervise them in the execution of activities and only 3% do not have such knowledge. It can be concluded that it is a satisfactory result for the company, as there are more qualified employees than those who are not, and as a solution, the inclusion of stimuli for those who are not, through HR, can be proposed. In the other aspect, it was noticed that only 29% have competences in some of the STEAM areas (Arts, Sciences, Technology, Engineering and Mathematics) that collaborate with the actions of the works. This shows a low percentage of qualified professionals in any of the STEAM areas, reflecting a negative factor both for the company, as Industry 4.0 requires the use of the aforementioned areas to carry out the proposed activities, as well as for the employees themselves. It was noticed that 53% are able to identify improvements and deficiencies in the work environment. And only 0.9% fail. It can be seen that this relationship is very favorable for companies, because in this way, the employees themselves can develop their skills and ideas within the environment. In the third to last item, it was noticed that only 32% of the participants work with ROADMAP (roadmap) to follow the goals and deadlines, which does not mean that they cannot follow through other ways. But still, it is a negative factor that needs to be implemented to obtain greater results. In the penultimate question, it was noticed that 70.4% of the participants find it easy to navigate, search and understand subjects related to work in the virtual environment, whether by e-mail, WhatsApp, videos or social networks. Considering the participation of the Internet in people's daily lives, it is an expected and satisfactory percentage, as it is possible to see that more and more people are inserted in the industry 4.0 environment.

And in the last question, it was noticed that 48.8% of the participants are able to identify the sources of errors and improve the processes. Based on the results obtained from the research, the general average is located with variations between 3 and 4, which configures the participants as possessing the listed skills.

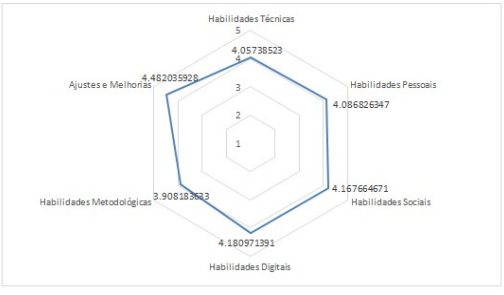

Figure 1. Radar graph of averages for Skills

The most significant variations were, respectively: ease of navigating, researching and understanding the work environment virtually and the ability to identify improvements and deficiencies in the work environment. In the fashion analysis, the participants presented the number 5 in total and in the median the variation occurred between 4 and 5, referring to “always agree” or “strongly agree”.

Personal Skills: Within the research carried out, we sought to measure, from the questions made, the attendance, availability, influence and personal motivation for the use of technologies in the work environment, which due to the strong digitalization in the labor market is applicable to manage the development of skills by employees (BORNEWASSER *et al*., 2018).

Table 8. Mean, Mode and Median for Adjustments and Improvements

Adjustments and Improvements	Average	Fashion	Median
I believe that technology can promote the process improvements that I need in my work environment.	4,550898	5	5
I want to increase the use of technological tools to improve my personal skills.	4,488024	5	5
I need to improve my knowledge and use of technology to apply it in my work environment.	4,461078	5	5
I believe that my work environment needs qualification and training to increase knowledge of technologies.	4,44012	5	5
It is necessary to implement new and/or improve existing technological tools within my work environment.	4,47006	5	5

Of the eligible participants in the survey, 57.8% claimed to have great ease in using technologies that favor the resolution of problems in the work environment, and another 24% demonstrated good use of technological tools, which together represents more than 80% of the comfortable sample with this type of activity. This shows that the use of technologies in order to solve problems is increasingly present in the corporate environment, where speed and efficiency in problem solving is required. This high rate in the previous question does not prevent discomfort at work even with the help of digital tools, which is proven when only 30.5% of the sample feels very comfortable to perform their activities under pressure, another 23.7% feel comfortable with this type of work, but still shows a very partial division among the participants. Regarding creativity, only 35.6% of the respondents showed high adherence, that is, even with a satisfactory result from moderate to high use of dissemination of creativity in the work environment, people still do not feel comfortable with this, being here a point of confrontation between the personal ability of the worker and the work environment in which he is inserted. In terms of meeting deadlines with the help of technology tools, more than 64% of the sample stated that they used the tools to support the fulfillment of activities within the schedule, which in relation to the following questions demonstrates a certain inconsistency, as 83, 2% claimed, in both questions, that they believe that technological tools allow them to use the company's resources more economically, improving everyone's well-being, and also, that the use of technology makes them feel more apt to overcome challenges within in the inserted work environment. That is, workers have the perception of implementing improvements, but for some reason they do not, and 68.3% feel highly motivated to learn and use new technologies.

Table 9. Average by Skills

Skills	Average
Technical abilities	4,0574
Personal Skills	4,0868
Social skills	4,1677
Digital Skills	4,181
Methodological Skills	3,9082
Adjustments and Improvements	4,482

Therefore, taking into account the data obtained in the research, we can conclude that the skills and personal competences of the employees who participated in this sample are positive. Table 6 shows that the average fluctuates between 3 and 4 points, corresponding to “indifferent” and “agree”, explains that the participants have a way to deal with technological tools, however there is still resistance in the systematic behavioral development generating barriers. As the topic with the lowest average is the one that points to comfort in working under pressure, there is a need for adjustments between the user and the organization, as I4.0 offers a complex, yet adaptable and flexible environment. The mode for all alternatives was 5, which corresponds to "strongly agree", demonstrating that among the sample represented in this research, the most marked option is the one where the respondents are positive to the reflection of the use of technologies in the development of their work activities , demonstrating relevance of knowledge, and even responsibility of employees in the face of the environment experienced. Finally, the median shows us an incidence of points 4 and 5, corresponding to "agree" and "fully agree" respectively, with 5 being the highest representativeness (5 of the 9 alternatives). This once again demonstrates the positivity towards the user's personal positioning in the face of technologies in the work environment, even facing some barriers within the corporate environment. In this context, we observe that there is the development of competences, but there is still space for improvements, especially in employee/company integration and adaptation of organizational structures tional.

Social Skills: In the fashion analysis, the result presented was number 5, which in the questionnaire refers to “totally agree” for all the topics listed, characterizing that the interviewees feel adapted to the social skills required for Industry 4.0. Regarding the general average very close to 4 with little variation, in which, relating to the questionnaire, it is deduced that the respondents agree that they have the listed skills makes this a very positive factor, highlighting the three largest variations, respectively: the use of media for the company's interest, proactivity in relation to resources and time to complete activities and finally the understanding of all stages of the product or service in which I work as a collaborator and I feel able to train and teach other collaborators. In the median analysis, the midpoint of the dataset was always between 4 and 5, that is, always “agree” or “strongly agree”, so the variable distribution center showed little modification. Number 4 being more representative, which agrees on six items, as listed: remote teaching-learning process; ease of communicating and understanding partners and customers with different cultures; leadership to drive the use of technology; proactivity in relation to resources and time to complete activities; I understand the need for data protection flows related to information security and ethical issues related to IT; stimulated, due to the presence of technology, to contribute to decision making in my work environment.

Digital Skills: Table 8 presents the result of mean, mode and median of the Digital Skills listed by the authors. In view of the data obtained in the research, it is observed that the digital skills of the employees who participated in this sample are favorable for working in Industry 4.0, since Table 8 shows that the average varies between 3 and 4 points, referring to the options " indifferent” and “agree”, leading to the thought that the participants are aware of the need to seek knowledge about digital technologies and apply them in the work environment that obtained the highest average (4.655689). Similarly, other topics related to perception also obtained an average close to the maximum value of 5, which corresponds to "strongly agree", such as the perception that the increase in virtual work requires greater security to protect personal data and privacy (4.51497); that the transfer of information and tools from “analog” to “digital” is important for the company’s productivity (4.404192); that, in their work, activities performed manually could be performed automatically by technology (4.233533); as well as that the integration of Artificial Intelligence in the work environment improves its results (4.164671). From a more practical perspective of the work, very high values of the average (4.371257) were pointed out for the use of cloud tools (Microsoft Teams, One Drive, Google Drive, Google Docs, Google Sheets, Google Forms, Google Slide, etc.). This data may have been influenced by the increase in remote work and the adaptation of companies during the most critical period of the Covid-19 pandemic, since, for the other practical work tools, an average value was presented well below the other topics. , mainly related to having the ability to create, edit and publish content in a virtual environment (3.772455) and perform cloud storage, such as: Dropbox, Box, Mega, etc. (3.919162). In this way, it can be seen that the respondents claim to use cloud tools, but do not feel empowered to effectively use them for creation and storage. In the same way, the lowest average of digital skills was in relation to being prepared for the increase in virtual work, for example, with virtual glasses, which obtained an average of 3.592814, demonstrating the need for training and education of these employees for the new technologies.

In this line of thought, Blayone *et al*. (2019) corroborate the need for technological readiness, starting through the regular use of conventional hardware (e.g., personal computers and mobile devices) and software/apps, whose skills offer an essential starting point for digitized work. The mode for all alternatives was 5, which corresponds to "strongly agree", demonstrating that among the sample represented in this research, the most marked option is the one where respondents perceive the importance of using digital technologies in their work environment. Finally, the median shows us an incidence of points 4 and 5, corresponding to "agree" and "strongly agree" respectively, with 5 being the highest representativeness (7 of the 9 alternatives), where the two topics that did not reach the incidence of points The maximum were those directed to the practice of the tools that evaluated whether the respondents have the ability to create, edit and publish content in a virtual environment and if they are prepared for the increase in virtual work. At this juncture, the role of digital skills stands out where educational organizations should focus on building fundamental cognitive and socio-emotional skills and ensuring that students acquire basic knowledge of Information Technology (IT). (KUSMIN *et al*., 2017)

Methodological Habilities: Table 9 presents the result of the mean, mode and median of the Methodologies listed by the authors:

According to Table 9, by observing the mode, whose value appears the most in the data collected, in the first question a median value of 4 was observed, which is very close to the value of the mode, as well as the average of 3.862275, which represents that employees find it easy to apply technology to solve problems. In the second topic, when using the available technology to make an objective decision at work, without being influenced by values, experience and personal habits, the respondents show a response with a median value of 4, which is very close to the mode value, as well as the average of 3.784431, which indicates that most of them have the ability to use technology objectively. In the third topic, the data have a mode and median of 5, which means that the values converge to this value and the mean value approaches the same, which means that most of them have the ability to think before acting and take responsibility. In turn, topic four whose mean and median values are between 3 and 4, both treated values converge to 5, which means fully applicable, it is clear that the respondents have the ability to use technology in the workplace. Topic five displays equal mode and median values, with the mean approaching 5, where most respondents have the ability to search for information and analyze data. Finally, in topic six, the median value is 4, which makes sense because its mean is close to this value and the mode is a value of 5, whose values converge to 5, representing that most respondents feel rewarded for working in an organized environment.

Adjustments and Improvements: The development of employees presents itself in this new industry as something vital for the frequent mobility of the market, so the concentration of the organization is instructed to develop activities related to the learning and training of individuals and teams, seeking to stimulate organizational development (HECKLAU *et al*. 2016). Therefore, the "Adjustments and Improvements" section was included in the applied questionnaire, as the improvements can be seen as advances that allow us to facilitate processes in the work environment, making us more efficient. The research carried out encourages the arguments mentioned above, as 69% of the participants claimed that technology can promote improvements in necessary processes in the work environment, another 64.4% think it is necessary to implement or improve technological tools in the work environment, making a comparison with these data, it becomes noticeable that technologies have already gained a place in the organizational environment, making production processes increasingly faster and more efficient.
Using technological means to improve skills is another point that obtained a high rate in the questionnaire, it was 64.1%, another factor that exposes the importance relationship between technological and personal skills in the work environment, but for these skills to be To really be improved, mastery of technology is necessary and this mastery requires training with the objective of expanding knowledge in the area of technology, which relates the high rate of responses that agree with the fact that training is needed, above 62% . The data that was exposed serves to show how relevant technology is to the work environment and how it directly impacts the effectiveness and efficiency of employees. In Table 10, it can be seen that the average found is higher than 4 in all alternatives, demonstrating high agreement of the respondents with the exposure performed. Moda and Median reached unanimity 5, referring to the alternative "I fully agree", exposing once again that the worker understands the need for the importance of technological tools in their work environment, as well as being able to discern the capacity for improvement and training. still existing by both parties involved: companies and employees. Thus, it is observed that the set of skills and competences studied by this research, as shown in Table 11 and Figure 4 within the sample, results in a positive positioning with averages close to 4, demonstrating demand for excellent communication skills to promote teamwork and customer relationships. All competency requirements advocate the development of entirely new qualifications that comply with the interdisciplinary nature of the work. This means that new learning content and didactic methods need to be established and included in professional education and lifelong learning. To support the continuing education of workers, the development of new standards to assess formal and informal learning is critical.

FINAL CONSIDERATIONS

This study aimed to map the competencies for Industry 4.0 among workers in micro and small companies in the metropolitan region of Recife and in the hinterland of the state of Pernambuco, located in the Northeast region of Brazil. Among the results presented above, it is worth highlighting the importance of the "Adjustments and Improvements" dimension due to its high value compared to the others. This result indicates that employees are inclined to use technology for efficiency gains in activities carried out in the company. At the other extreme, a lower value is observed in the methodological skills dimension, which seems to indicate a lack of tools for planning and organizing activities in general. This dimension highlights the importance of applying industry 4.0 along with quality management issues, process improvement and strategic planning. As limitations, the sampling used in this study is general for different types and sizes of companies. For future studies, an analysis by field of activity or by company size is suggested so that more specific results can be observed.

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