Analysis of the Impact of the Fear of Technology of Warehouse Employees on the Level of their Acceptance of Work in an Automated Environment

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Abstract:

Purpose: *The purpose of this article is to present the results of the analysis of the impact of the fear of the technology of warehouse workers on the level of their acceptance of work in an automated environment.*

Design/Methodology/Approach: *The adopted method of examining the impact of the technology fear of warehouse workers on the level of their acceptance of work in an automated environment is influenced by 12 variables reflecting various areas of technology anxiety. Statements regarding the studied variables were made on the basis of previously conducted qualitative research and literature studies. The measuring tool in the study was a paper questionnaire. The survey was conducted among warehouse employees of the company that is a leader in handling e-commerce shipments in Poland.*

Findings: *It should be noted that the impact of the fear of the technology of warehouse workers on the level of their acceptance of work in an automated environment is a relatively new. At the same time a significant phenomenon, both in the cognitive and methodological sphere, translates into the need to continue research contributing to the exploration of the problem itself. Especially when one takes into account the dynamically developing trend of automation and robotization of enterprises, which forces their clear demand for knowledge in the field of adapting employees to work in an automated environment.*

Originality/Value: *The results of the analysis of the impact of the fear of the technology of warehouse employees on the level of their acceptance of work in an automated environment constitute an important construct for the development of a prototype of the assessment center scenario. It allows for the identification of individual characteristics of employees in terms of their predisposition to work in an automated environment.*

Keywords: *Fear of technology, warehouse employees, automated work environment.*
JEL codes: *M54.*
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1. Introduction

The issue of the impact of the fear of employees' technology on the level of their acceptance of work in an automated environment is becoming more and more important. This is due to the observed use of innovative technologies among enterprises (Brodn and, Tutak, 2022), the automation and robotization of enterprises as well as the lack of sufficient knowledge in the field of adapting employees to work in an automated environment and their management (Piwowar-Sulej, 2020). In an environment which, by definition, is a chance for an employee for more efficient and friendlier workplaces, and for employers more profits (Saniuk, Grabowska and Gajdzik, 2020). However, as Spencer (2018) writes, the literature also includes studies on forecasts of "job loss" under the influence of automation.

As a result, this phenomenon leads to a large diversification of employee behavior, among others due to the fear of losing a job (Sęczkowska, 2019). These behaviors are manifested by a varying degree of fear and the resistance that follows it to work in new conditions, and it also hinders the process of the implementations themselves, at the same time spinning the cost spiral. The consequence of a high level of anxiety and the resulting resistance is a reduction in the productivity and motivation of employees, as well as the departure of employees from the organization.

It is also important to take into account the individual personality traits of employees, as it has a significant impact on the way they interact with robots / automatons (Dekker, Salomons and Jeroen van der Waal, 2017; Müller and Richert, 2018). Although this threshold varies from person to person and in different situations, there are so-called "modifying" variables that influence the susceptibility of a given employee to stress. These include, personality, age, gender, past experiences or support from family, friends and colleagues (Cooper and Cartwright, 1997).

One of the most important models for differentiating employees in terms of personality is the five-factor model, the so-called Big Five, which has already been used in stress research (Pollak, Dobrowolska, Timofiejczuk, and Paliga, 2020). This model describes the human personality through five dimensions, conscientiousness, neuroticism, openness to experience, extroversion and agreeableness (Vries, Koster, and Stam, 2015; Santamaria and Nathan-Roberts, 2017), „The Big Five taxonomy serves an integrative function because it can represent the various diverse systems of personality description in a common framework" (Oshio, Taku, Hirano, and Saeed, 2018). It is therefore reasonable that the level of acceptance for work in an automated environment will be determined, at least in part, on the basis of the personality identification of warehouse employees' characteristics.

Therefore, it becomes necessary to identify and characterize employees' characteristics in terms of their fear of technology, which has a significant impact on the level of their acceptance to work in an automated environment. It is worth noting

that the presented analysis is only one of the constructs of a broader study conducted by the authors of this study in the field of self-assessment of work acceptance in an automated system by warehouse employees.

2. Research Methodology

The adopted method of examining the impact of the fear of the technology of warehouse workers on the level of their acceptance of work in an automated environment is influenced by 12 variables. Statements regarding the studied variables were made on the basis of previously conducted qualitative research and literature studies. In the process of selecting questions for the questionnaire, the scale reliability analysis using the Cronbach's alpha method was used (Cronbach, 1951). Table 1 presents the analysis of measurement variables presented in the form of statements contained in the questionnaire.

Table 1. Analysis of measurement variables

Symbol*	The content of the question	Cronbach's alpha
2.3.1.46	I am afraid of an accident while working with robots or other advanced technologies	0,8799
2.3.2.53	I am not afraid that when working with advanced devices / robots / machines, I will break something	0,8785
2.3.3.12	I am afraid that I will not understand the manual of the device / automat / robot	0,8788
2.3.4.19	Automation is not dangerous to our civilization	0,8778
2.3.5.29	I am not afraid of losing my job as a result of automation	0,8799
2.3.6.21	I am afraid that while working with vending machines, I will not have contact with other people	0,8776
2.3.7.36	I am afraid of financial responsibility for a possible mistake	0,8800
2.3.8.20	I am afraid that I am not able to master working with machines / robots	0,8786
2.3.9.25	I am not afraid of being dominated by robots / slots	0,8810
2.3.10.22	I am afraid of responsibility for possible destruction / damage to the robot / machine	0,8791
2.3.11.6	I am afraid of the possible technical responsibility of the need to ensure the proper functioning of the robot / machine	0,8811
2.3.12.4	My mistake while working with a robot or an automaton may cause the entire line to stop and have consequences for others	0,8748

*Note: * Each variable is marked with a symbol used in the further part of the article when presenting the results of the analysis of the correlation of measurement variables.*
Source: Own study.

All the variables reached satisfactory values, indicating the reliability of the scales used. Giving the possibility of drawing conclusions on the basis of the results of the conducted analyzes.

The measuring tool in the study was a paper questionnaire. Due to the fact that psychological tests are often accompanied by the phenomenon of high self-esteem by the person completing the test in questions suggesting lack of anxiety, inverted

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scoring was used. The study used a nominal, ordinal and interval (five-point Likert) scale. Questions using a nominal and ordinal scale played primarily the role of a moderator. On the other hand, the questions in which the interval scale was used were primarily used to create the respondent's characteristics, which included, inter alia, different areas of technology anxiety. All the variables from the main part of the questionnaires take on five-point scales ranging from answers from 1 to 5, where1 means "completely disagree / does not describe me at all" and 5 "completely agree / completely describes me".

The survey was conducted among warehouse employees of the company that is a leader in handling e-commerce shipments in Poland.

3. Technology Anxiety Scale Analysis

The conducted analyzes showed that the warehouse employees are not afraid that they will not be able to master their work with automatic machines / robots, or that they will have problems with understanding their operating instructions. Also, the likelihood of an accident while working with robots or other advanced technologies does not raise any major concerns for them. The respondents do not see self-control as a threat to our civilization, while the respondents fear that working in such an environment will limit their contact with people or cause them to be dominated by robots. The possibility of losing your job as a result of automation is high in the anxiety hierarchy.

However, the greatest concern among warehouse employees is the responsibility for devices, such as: technical responsibility - the need to ensure the proper functioning of the robot / machine; financial responsibility - for any error, liability for possible destruction / damage to the robot / machine. The fear of the consequences of a mistake for the rest of the team was rated the highest in the anxiety hierarchy. The fear that their mistake will stop the whole process and may have consequences for others explains the social nature of man - we are afraid of evaluation, ostracism, anger of others, our own shame and guilt. This fear is clearly greater than the other variables included in the study.

In the case of gender, the fear of women is higher than that of men (Zhang, Nyheim, and Mattila, 2014). The results shown in Figure 2 are consistent - in each item, the anxiety of women is at a higher level than that of men. The gender gap remains at a similar level, it decreases in the fear of being dominated by robots / automatons, which both women and men are rather not afraid of, and definitely increases in the fear of the consequences of error for others. Women are by nature more sensitive to their environment and this type of anxiety is much higher in them.

The analysis of the anxiety level of warehouse workers' technology according to aggregated age groups showed that employees under 25 do not differ significantly from other age groups. There is only a significant difference between employees in

the 26-40 age group and 41-55 age group. In older workers, the level of fear of technology is much higher than in younger workers, among others in terms of: difficulties in mastering working with robots, breaking the robot, responsibility for taking care of the technical condition of the robot / machine. Older warehouse workers are much more afraid of losing their jobs as a result of automation.

Figure 1. *Average of the measurement variables*
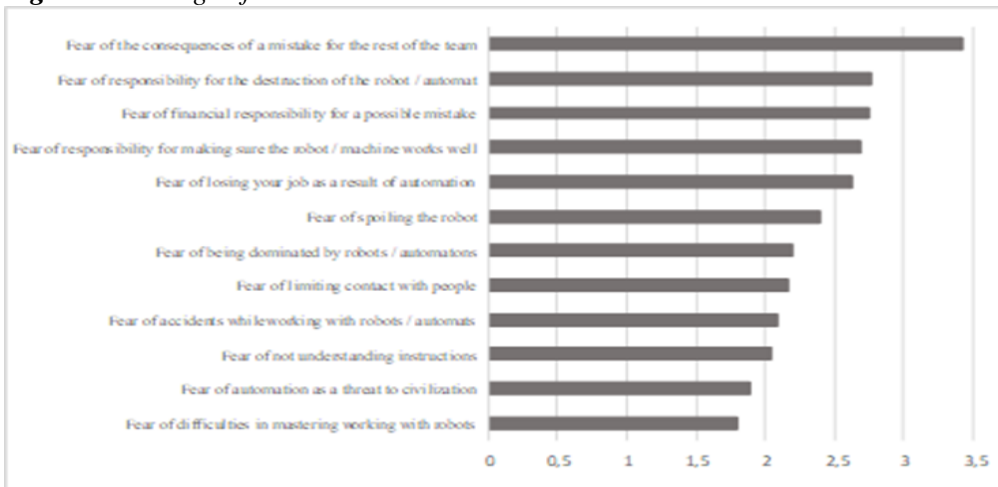
Source: Own study.

Figure 2. *Fear of technology - gender*
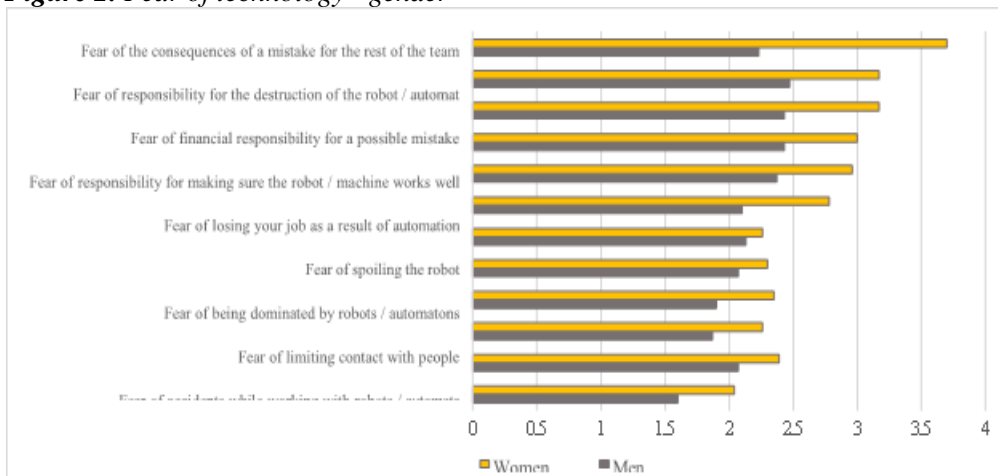
Source: *Own study.*

Warehouse workers in the 26-40 age group show the lowest level of anxiety in almost all variables - only in the case of the variable related to being dominated by robots / vending machines do they achieve the same level of fear of technology as older warehouse workers. On the other hand, warehouse employees up to the age of 25

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show a high level of fear of technical responsibility - the need to take care of the proper functioning of the robot / machine. This group excels in fear of limiting contact with other people and in fear of being financially responsible for the destruction of equipment. The highest level of anxiety in each analyzed age group was recorded in the case of responsibility for the consequences of a possible mistake for colleagues.

Figure 3. *Fear of technology - age*
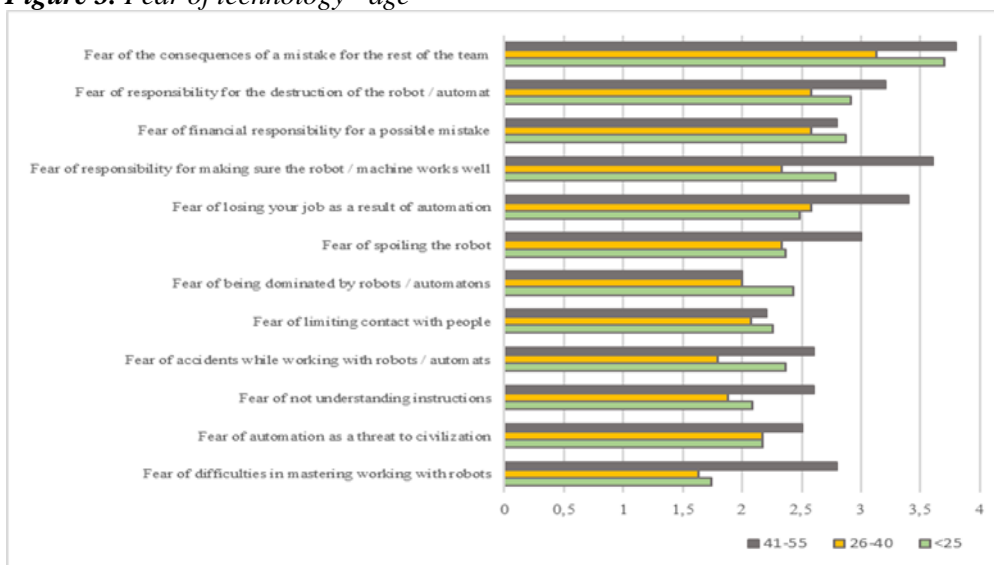
Source: *Own study.*

Further analysis showed that there are no statistically significant differences in the level of technology anxiety between people who have already worked in an automated environment and those who do not. The education, nationality and the degree of expressed enthusiasm for working with robots are also irrelevant - the level of anxiety is similar in employees who show enthusiasm for working with robots and in employees who approach them with a distance (caution).

Table 2 presents the results of the conducted correlation analysis, which included: warehouse workers' experiences with technology in the past, their general resourcefulness, the level of their interest in technology, as well as personality types according to the Big 5 typology[4]. The statistically significant correlations between the variables are marked in color.

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[4]*The Model of Big-Five Personality is a five-factor model used to measure and evaluate personalities. This model includes the following personality factors: conscientiousness, neuroticism, openness to experience, extroversion, and agreeableness (Santamaria, Nathan- Roberts, 2017).*

Table 2. *The results of the correlation analysis - other scales included in the study (for significance level p < 0.05)*

	Factors		
	Technology anxiety scale	Positive past experience	The scale of general resourcefulness
Conscientiousness	-0,152	0,357	0,404
Neuroticism	0,49	-0,514	-0,542
Openness to experience	-0,154	-0,022	0,134
Extroversion	-0,001	0,202	0,245
Agreeableness	-0,057	0,02	0,25

Source: Own study.

Table 3 presents the results of the conducted analysis of the correlation of measurement variables. The statistically significant correlations between the variables are marked in color.

Table 3. *The results of the correlation analysis - measurement variables (for significance level p < 0.05)*

	Factors									
	2.3.1. 46	2.3.2. 53	2.3.3. 12	2.3.4. 19	2.3.7. 36	2.3.8. 20	2.3.9. 25	2.3.10. 22	2.3.11. 6	2.3.12. 4
Conscientiousness	-0,188	0,134	-0,095	-0,198	-0,076	0,063	-0,275	0,019	-0,047	0,018
Neuroticism	0,483	0,325	0,404	0,082	0,513	0,386	0,188	0,421	0,422	-0,135
Openness to experience	-0,23	-0,179	-0,098	-0,141	0,02	-0,006	-0,366	-0,1	-0,237	0,306
Extroversion	-0,152	0,009	-0,104	-0,053	-0,016	0,014	-0,074	0,05	0,063	0,167
Agreeableness	-0,192	-0,072	-0,091	-0,356	-0,063	-0,062	0,036	-0,031	0,083	0,227

Source: Own study.

The analyzes show that the level of technology anxiety is lower in people with a high sense of resourcefulness, interested in technology, having positive experience with technology in the past - although not necessarily in the context of working in an automated environment - and with a low level of neuroticism. These are features that may be taken into account when assessing a candidate at the stage of recruitment to work in an automated environment.

The obtained results can be reinforced by the statement by H. K. Jach and L. D. Smillie (2019) that people who are open to experiences or more extroverted are more likely to tolerate the so-called ambiguities related to life. On the other hand, the opposite is true for people with a higher level of neuroticism.

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4. Conclusions and Future Research

The presented analyzes allow to conclude that by identifying and characterizing certain characteristics of warehouse employees, they can reduce the level of their anxiety and the related resistance to work in an automated environment, as well as improve the process of the implementations themselves, eliminating the possibility of a cost spiral. When preparing the process of implementing automation and robotization, it is worth taking into account the gender and age of employees. Give special care to women and employees over 40. Simple and clear instructions as well as training are important for all warehouse employees. For older workers, instruction and training are important for a sense of security, while for workers up to the age of 25, instruction and training are important to enable them to feel in control of technology (Waśko, 2016.), which can reduce their fear of being dominated by robots.

In addition, it is worth ensuring that warehouse employees have the possibility of interaction (contact) with each other, as this will reduce the fear of limiting interpersonal contacts. It is also important that the incentive system is based on cooperation and eliminating opportunities for aversion or hostility towards an employee who fails in something, e.g., by not using group responsibility and eliminating the impact of one person's error on the results of other employees. Because the struggle against potentially negative social evaluation is at the root of reticence on the basis of "it is better to do nothing than to risk", which in turn translates into closure to new experiences (Hazel, Keaten, and Kelly, 2014). This is why good relationships in a team can be a buffer that counteracts the feeling of fear.

The results of the analysis of the impact of the fear of the technology of warehouse employees on the level of their acceptance of work in an automated environment constitute an important construct for further research, e.g., for the development of a prototype of the assessment center scenario. This scenario allows the identification of individual characteristics of employees in terms of their predisposition to work in an automated environment.

References:

Brodny, J., Tutak, M. 2022. Analyzing the Level of Digitalization among the Enterprises of the European Union Member States and Their Impact on Economic Growth. J. Open Innov. Technol. Mark. Complex., 8, 70. DOI: 10.3390/joitmc8020070.

Cooper, C.L., Cartwright, S. 1997. An intervention strategy for workplace stress. Journal of Psychomatic Research, 43(1), 7-16.

Cronbach, L.J. 1951. Coefficient alpha and the internal structure of tests. Psychometrika, 16(3), 297-334.

Dekker, F., Salomons, A., Jeroen van der Waal, A. 2017. Fear of robots at work: the role of economic self-interest. Socio-Economic Review, 15(3), 539-562. DOI: 10.1093/ser/mwx005.

Hazel, M., Keaten, J., Kelly, L., 2014. The Relationship Between Personality Temperament, Communication Reticence, and Fear of Negative Evaluation, Communication

Research Reports, 31(4), 339-347, DOI: 10.1080/08824096.2014.963219.

Jach, H.K., Smillie, L.D. 2019. To fear or fly to the unknown: Tolerance for ambiguity and Big Five personality traits. Journal of Research in Personality, 79, 67-78. DOI: 10.1016/j.jrp.2019.02.003.

Müller, S.L., Richert, A. 2018. The Big-Five Personality Dimensions and Attitudes to-wards Robots: A Cross Sectional Study. PETRA '18: Proceedings of the 11th Pervasive Technologies Related to Assistive Environments Conference, June, 405-408. DOI: 10.1145/3197768.3203178.

Oshio, A., Taku, K., Hirano, M., Saeed, G. 2018. Resilience and Big Five personality traits: A meta-analysis. Personality and Individual Differences, 127, 54-60. DOI: 10.1016/j.paid.2018.01.048.

Piwowar-Sulej, K. 2020. Human Resource Management in the Context of Industry 4.0. Scientific Quarterly "Organization and Management", 1, 49. DOI: 10.29119/1899-6116.2020.49.7.

Pollak, A., Dobrowolska, M., Timofiejczuk, A., Paliga, M. 2020. The Effects of the Big Five Personality Traits on Stress among Robot Programming Students. Sustainability, 12, 5196. DOI: 10.3390/su12125196.

Saniuk, S., Grabowska, S., Gajdzik, B. 2020. Social Expectations and Market Changes in the Context of Developing the Industry 4.0 Concept. Sustainability, 12, 1362. DOI: 10.3390/su12041362.

Santamaria, T., Nathan-Roberts, D. 2017. Personality Measurement and Design in Human-Robot Interaction: A Systematic and Critical Review, Proceedings of the Human Factors and Ergonomics. Society 2017 Annual Meeting, 61(1), 853-857. DOI: 10.1177/1541931213601686.

Sęczkowska, K. 2019. Lęk przed utratą pracy a problemy psychosomatyczne człowieka (Fear of losing a job and human psychosomatic problems), Problemy Nauk Medycznych i Nauk o Zdrowiu, no 2, 16-21.

Spencer, D.A. 2018. Fear and hope in an age of mass automation: debating the future of work. New Technology, Work and Employment, 33, 1-12. DOI: 10.1111/ntwe.12105.

Vries, J., Koster, R., Stam, D. 2015. Exploring the role of picker personality in predicting picking performance with pick by voice, pick to light and RF-terminal picking. International Journal of Production Research. DOI: 10.1080/00207543.2015.1064184.

Waśko, R. 2016. Wybrane aspekty różnicujące pokolenie X, Y i Z w kontekście użytkowania nowych technik i Internetu (Selected aspects differentiating the X, Y and Z generation in the context of using new techniques and the Internet). In: Rykla, Z., Kinala, J., (Ed), Socjologia codzienności jako niebanalność (The sociology of everyday life as originality), 136-153. Stowarzyszenie Naukowe Przestrzeń Społeczna i Środowiskowa, Rzeszów.

Zhang, L., Nyheim, P., Mattila, A.S. 2014. The effect of power and gender on technology acceptance. Journal of Hospitality and Tourism Technology, 5(3), 299-314. DOI: 10.1108/JHTT-03-2014-0008.