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READINESS OF POLISH SMES FOR THE CHALLENGES OF INDUSTRY 4.0/5.0 FROM THE PERSPECTIVE OF ORGANIZATIONAL CULTURE

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Purpose: The research focused on the cultural factors that condition the implementation of Industry 4.0/5.0 solutions.
Design/methodology/approach: The research was conducted among those responsible for strategic decision-making in organizations. Data were obtained using the key informant technique. The research subject was small and medium-sized manufacturing enterprises based in Poland. The research yielded a total of 171 correctly completed questionnaires. Quantitative methods were used in the research. The research procedure adopted involved conducting a survey and contacting entrepreneurs using the CASI (Computer-Assisted Self-administered Interviewing) technique, with support from the CATI (Computer Assisted Telephone Interview) technique. A tool diagnosing the existing cultural profile, including three dimensions: power distance, level of collectivism and tolerance of uncertainty, was used to conduct the research.
Findings: It was shown that from the perspective of implementing Industry 4.0/5.0, organizations are culturally ready for its adoption. The organizations studied are characterized by a relatively small distance to power, and in other dimensions, the features of a creative culture prevail. The way of assessing results, work-life balance, motivational systems, or attachment to formal procedures, are just a few examples of areas requiring further managerial work and a potential source of organizational resistance. The cultural perspectives of implementing Industry 4.0/5.0 are positive.
Research limitations/implications: The main limitations are the relatively small research sample (171 enterprises) and the static nature of the research, which only allows the organization to be captured from the perspective of a photograph.
Originality/value: The article deepens understanding of the cultural determinants of Industry 4.0/5.0 implementation. The study also showed the main areas in need of support, especially in the areas of work-life balance, attachment to formal procedures and acceptance of existing standards.
Keywords: Industry 4.0, Industry 5.0, organizational culture, SME, managerial approaches.
Category of the paper: Research paper.

1. Introduction

The flow of knowledge and innovation propels digital transformation through collaborative projects across regions, with an emphasis on the principles of the green economy and intelligent urban development (Czvetkó et al., 2021). That is why organizations are on the threshold of the next industrial revolution, which will involve a fundamental paradigm shift in their functioning (Mohelska, Sokolova, 2018). The need to enter the world of new challenges will affect companies in all sectors. According to Durana et al. (2019), existing business models must be redefined due to changes in product design, production, delivery, and collaboration with suppliers and customers. The 4.0/5.0 revolutions are a consequence of the progressive digitation of organizations (Sony et al., 2019), their environment and their interactions with each other. Production becomes based on cyber-physical systems (CPS), heterogeneous integration of data and knowledge, consequently allowing the construction of agile and flexible solutions in production, creating modularity and variability in production systems, which is required in the mass production of highly customized products (Tortorella et al., 2021). Industry 4.0 encompasses various technologies that enable value chain development, leading to improved organizational efficiency, product quality, time reduction and flexibility in the production process (Kamble et al., 2018). Industry 5.0 complements the existing Industry 4.0 paradigm as research and innovation drive the transition to a sustainable, human-centered, resilient industry (Xu et al., 2021). Most studies focus on the technical aspects of change, marginalizing or overlooking the organizational culture that determines the ability to implement the coming revolution successfully (Domańska, 2018). Few articles emphasize the direct impact of organizational culture on implementing Industry 4.0/5.0. Furthermore, they tend to focus on investigating whether the size and type of an organization influence the innovative culture (Ziaei, Mohelská, 2020) or are limited to narrow industries in a single country (Ali, Xie, 2021). On the other hand, others cover a single country with a small research sample (Pol, 2022), or organizational culture is only one of many other variables - such as leadership, incentives, organizational commitment, and service management (Liu et al., 2022). Publications covering various industries, even within one country, are rare (Szymańska, 2020). Therefore, this article aims to investigate the cultural readiness of small and medium-sized manufacturing enterprises to implement Industrial Revolution 4.0/5.0 solutions to fill the research gap in this area.

Management practitioners recognize the importance of organizational culture (OC) for their key business indicators. As many as 78% of CEOs and CFOs of Fortune 1000 companies perceive organizational culture as one of the main drivers of their companies' value (Graham et al., 2022). The importance of organizational culture is growing, especially in the digitalization and digitization of organizations, processes and environments. The Industry 4.0/5.0 concept requires continuous innovation and education, which depends on people skills and organizational culture (Mohelska, Sokolova, 2018). How work is organized, especially in

managing innovation, significantly impacts employees' attitudes toward teamwork and how they perceive the importance of innovation for the company. The success of these new approaches depends on how well they align with current values and norms. Researchers like Fletcher & Griffith (2020), Brunetti et al. (2020), and Chwiłkowska-Kubala et al. (2023) have explored this topic. The problem of resistance to innovation as the mutual influence of organizational culture and the implementation of Industry 4.0/5.0 solutions increases becomes a key issue. The research described here aims to determine the readiness of Polish small and medium-sized manufacturing enterprises to put new concepts into practice.

In research conducted to date, the main focus has been on the diagnosis of organizational culture, especially in the context of openness to innovation (Karczewska, 2021; Mazur, Zaborek, 2016; Kmieciak, Michna, 2028; Gorzen-Mitka, 2028). Karczewska (2021) studied large companies (n = 179) and the relationship between organizational culture and the development and profitability of companies. The research indicated that the cultural characteristics of the analyzed companies were conservative, with little support for innovative employee behavior and at least an average evaluation of the innovation creation process. Mazur & Zaborek (2016) examined the links between organizational culture, use of open sources of innovation, and financial performance among 473 SMEs, 47.4% of which were manufacturing firms. They found that service firms had a stronger innovation culture, and the available data cannot reveal entrepreneurial orientation, proactivity, risk tolerance, creativity or intensive support for the innovation process. A study on knowledge management, innovation, and competitive intensity among 120 SMEs (Kmieciak, Michna, 2018) indicated a high preference for uncertainty avoidance. The author's own research indicates that its level is still high; however, it is closer to a creative culture than a conservative one. Gorzen-Mitka (2018) compared the culture of uncertainty tolerance between SMEs and large companies. The study was conducted on 269 SMEs (of which 76 were manufacturing companies), and the results were related to theoretical considerations for large enterprises. Statistically significant relationships were found between risk culture and the perception of risk culture markers by the business owner(s) or risk manager. The research identified the impact of company size on perceptions of the importance of leadership in developing a risk-conscious culture within an organization.

An interesting extension of the previous considerations is research on using HR practices in creating employee engagement (Lewicka, Glińska-Neweś, 2018). Those authors have shown that building individual employee engagement contributes to achieving the company's stated goals, including the acceptance of uncertainty and collective values, and increases the level of acceptable uncertainty, thus creating the conditions for opening up to Industry 4.0/5.0.

In summary, Industry 4.0/5.0 is not only a technological revolution but also a cultural one. Organizations must be ready to transform their structures, encourage innovation and creative approaches, and invest in the development of their employees to reap the full benefits of this revolution.

2. Theoretical framework

The congregation of inventive expertise and human resources significantly impacts the innovation capacity of the manufacturing industry during the phase of knowledge innovation (Feng, 2023). Throughout history, there have been certain breakthrough moments, new solutions, technologies, and approaches that led to quantitative and qualitative leaps in production (Fig.1). In the literature on the subject; these are usually referred to as industrial revolutions, indicating the scale and significance of the new system.

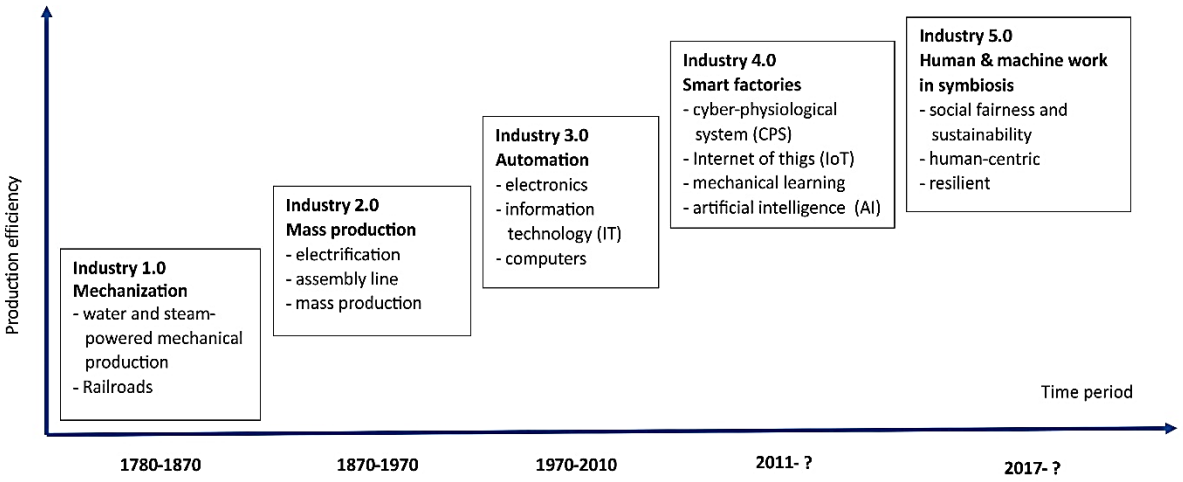

Figure 1. The Industrial Revolutions – Phases.

Source: own elaboration based on: Önday (2020); Liao et al. (2017); Nagy (2022); Huang et al. (2022); Raja, Muthuswamy (2023).

Although there is still no consensus on what constitutes an industrial revolution, four stages are commonly identified (Liao et al., 2017). However, a growing number of authors point to the possibility of distinguishing a further fifth stage (Javaid, Haleem, 2020; Xu et al., 2021; Huang et al., 2022; Lachvajderová, Kádárová, 2023; Raja, Muthuswamy, 2023). The emergence of mechanical factories using water and steam to mechanize production is linked to the beginning of the first industrial revolution. The Second Industrial Revolution began with the implementation of Edison's invention into the industry and the widespread use of electricity to power factories and assembly lines. The next revolution is associated with the automation of production. After the Second World War, programmable machines with digital technology began to be used in production. The third industrial revolution was the revolution of computers and information technology. Industrial Revolution 4.0 is underway. The use of physiological machines, robots, and automation systems equipped with machine learning algorithms has made it possible to create smart factories (Önday, 2020).

New Industry 4.0 techniques include the Internet of Things (IoT), big data, and artificial intelligence (AI). They focus on transforming the entire value chain within the manufacturing process. The importance of Industry 4.0 is linked to its benefits, which include increased adaptability and learning, as well as the efficiency of continuous adaptation to the market.

Industry 4.0 helps to increase the speed of implementation of innovations, design procedures, and develop a customer-centric system (Koizumi, 2029). An important difference between the current and previous stages is that these digital technologies reinforce the physical part of development, production, distribution, and performance within the CPS. Real-time information flows between the physical and digital components of the production procedure. There is an exponential acceleration of industrial development through technology. Creating a highly autonomous and cognitive ecosystem is one of the anchors of Industry 4.0. This depends on machine learning, deep learning, advanced robotics, and commercial IoT (Alhosani et al., 2021). At the same time, achieving the right level of digital transformation in a company requires a reconfiguration of the organization's resources (Chwiłkowska-Kubala et al., 2023).

The concept of Industry 4.0, therefore, focuses on digitization and technologies based on artificial intelligence to increase the efficiency and flexibility of production. The Industry 5.0 concept adds to the above and emphasizes the principles of social justice and sustainable development, highlighting the importance of research and innovation to support industry in its long-term service to humanity. Man and machine cease to be antagonists, strive to work in symbiosis (Xu et al., 2021), reconcile and find ways to work together to improve the means and efficiency of production (Raja, Muthuswamy, 2023). Therefore, the primary goal of the Industry 5.0 concept is to develop and implement innovative models and procedures for more economically, socially, and environmentally sustainable industrial development (Majernik et al., 2022). It is intended to help achieve United Nations sustainable development goals (Oliński, Mioduszewski, 2022) consistent with economic resilience, environmental sustainability, and human-centricity (Müller, 2020; Akundi et al., 2022; Ghobakhloo et al., 2022). The Industry 5.0 paradigm promotes agility and resilience in systems by using flexible and adaptable technologies without disconnection from humans and the planet (Huang et al., 2022). The key technologies on which Industrial Revolution 5.0 will be based are Collaborative robots (Cobots), Smart sensors, Digital Twins, the Internet of Everything (IoE) and Artificial Intelligence of Things (AIoT), Blockchain, Edge and Fog Computing, Cognitive Computing, 6G and beyond, Augmented Reality (AR), Mixed Reality (MR), and Holography. However, the core element of Industry 5.0 will be the personal human contact that technology cannot provide (Raja, Muthuswamy, 2023).

The key differences between Industrial Revolution 4.0 and 5.0 are presented in Table 1.

Table 1.
Major difference between Industry Revolution 4.0 and 5.0

No	Industry 4.0	Industry 5.0
1	Mass customisation of the product	Mass personalisation of the product
2	Digital use of data	Intelligent use of data
3	Provide a unique experience	Provide innovative experience
4	Better coordination between machines and information technology	A close collaboration of humans with machines
5	Create digital factories	Creates smart factories

Cont. table 1.

6	Perform all customised tasks in less time and costs	Perform a precise and creative task in less time and with costs
7	Create digitisation and automation through the application of information technologies	Globalizes the manufacturing system using advanced technologies

Source: Javaid, Haleem, 2020.

However, it should be emphasized that as a society, as well as organizations, we are in the early stages of implementing the Industrial Revolution 5.0, so it is difficult to predict the target direction and final solutions that will be implemented as part of it (Lachvajderová, Kádárová, 2023).

In the realm of corporate governance, elements like organizational culture and human resources, regarded as human capital, hold substantial importance (Borodako et al., 2022). The concept of organizational culture has many meanings and connotations. The evolution in the perception of organizational culture has made it interdisciplinary, becoming an area of interest for many different sciences and research orientations (Siemiński et al., 2020). Most indicate that it can be understood as a set of shared norms, values and worldviews that develop within an organization as its members interact with each other and their environment. Organizational culture encompasses shared beliefs, principles, standards and assumptions that shape behavior by establishing commitment, providing guidance and generating integrated recognition (Abduraimi et al., 2023). Organizational culture includes visible organizational structures and processes, accepted values and beliefs, and deeper and unconscious beliefs, perceptions, thoughts, feelings and behaviors. Organizational culture is an indirect source of social control because it reflects learned behavior and creates normative expectations (Koroni et al., 2023). Organizational culture fulfills its intended function when aligned with the organization's environment, resources, values and goals (Gölzer, Fritzsche, 2017). Organizational culture can create an environment that influences both business and operational performance (Zhang et al., 2023). Business readiness is crucial for the implementation of Industrial Revolution 4.0/5.0. To successfully implement the new industry's tenets, an open mind and a flexible culture must be allies of change (Chonsawat, Sopadang, 2020). Adequate resources, qualified and competent staff and an open organizational culture are essential for implementing new concepts. According to E.H. Schein (2019), the major misunderstanding of many CEOs is that they believe they can implement changes contrary to deep cultural values. Organizational culture can support or hinder organizational change (Ng, Hempel, 2020). Organizational culture influences how employees perceive reality, even to the extent that it can affect the success of implementing a new one (Lingmont, Alexiou, 2020). For this reason, cultural barriers must be considered when redesigning corporate organizations, and if overlooked, they can seriously affect the final success of the implementation process (Liu et al., 2022).

Although there are many different elements of organizational culture, this study focuses on the elements most relevant to the implementation process of Industry 4.0/5.0 assumptions. Therefore, three specific dimensions are focused on: collectivism, power distance, and level of uncertainty tolerance due to their potential impact on implementing new innovative solutions in companies.

Individualism describes the relationship between the individual and the collective (Hofstede, 2021), particularly the extent to which people are autonomous, decisive, or embedded in their groups (Triandis, Gelfand, 2012). Individualistic cultures replace the individual's dependence on particular support groups with a more anonymous dependence on universal norms. Community ties and obligations persist but are chosen rather than imposed (Beugelsdijk, Welzel, 2018). In collectivist cultures, people take group-dominant norms and obligations as guidelines and place a high value on in-group relationships (Siemiński, 2020).

Collectivism in a team increases employees' loyalty to the organization. In a collective environment, employees are more likely to collaborate and share knowledge with others, which is likely to improve the efficiency of innovation and enhance the innovativeness of their organization (Zhang et al., 2023) and consequently foster the implementation of Industry 4.0/5.0.

Power distance is defined by the extent to which less powerful members of the organization (subordinates) expect and accept an unequal power distribution. It determines how the organization defines internal inequalities (Saha, Nanda, 2022). In low power distance cultures, people are equal, and hierarchy signifies inequality of roles rather than people. Power is based on legitimacy, meant to be ethical and subject to scrutiny (Adamovic, 2022). A great distance from power means taking inequality for granted due to the nature of things. Observable actions of a symbolic nature emphasize differences, and subordinates have little discretionary power. Power is a source of prestige and overrides ethics (Siemiński et al., 2022).

E.H. Schein (2019) stated that in many organizations, we still prefer to treat people in limited roles to maintain social distance. In his view, this is a serious mistake because if managers do not get close enough to their subordinates, they will be unable to find out what they want and know, which will be a source of resistance and untapped potential.

Organizations with a high power distance are often characterized by the concentration of decision-making rights at the top. This leads to difficulties in rapid learning and innovation, which hurts organizational development. Leaders may be more willing to delegate authority in cultures with low power distance, creating a creative, innovative work environment and increasing employee opportunities to express and implement innovative ideas (Zhang et al., 2023).

Organizations try to control reality by creating mechanisms to deal with uncertainty. If uncertainty causes anxiety and the organization's members have high uncertainty avoidance tendencies, they try to reject uncertainty as much as possible. In organizations with low levels

of uncertainty avoidance, members accept uncertainty, approach risk with curiosity, and are flexible to change and novelty (Küçükkömürler, Özkan, 2022).

Organizations with a low uncertainty tolerance will prefer rules and a defined order. More rules and regulations will be imposed, resulting in a lower propensity for change and innovation (Escandon-Barbosa et al., 2021). In societies with a high degree of uncertainty avoidance, where the status quo is valued and maintained, considered safe, comfortable and potentially part of the cultural identity, resistance to change is high, and innovation levels are low. Members of the organization with a high level of uncertainty tolerance are open to novelty, change, and new technologies, treating them as opportunities.

3. Materials and Methods

The research focused on the cultural factors that condition the implementation of Industry 4.0/5.0 solutions. The literature review pointed out that from this perspective, the key cultural values are very similar, and both concepts can be analyzed together.

The research was conducted among those responsible for strategic decision-making in organizations. Data were obtained using the key informant technique, which aligns with previous research (Liu et al., 2022). The choice of an executive as a respondent is supported by the fact that, by his or her position, he or she knows the scope of the research completed. The research subject was small and medium-sized manufacturing enterprises based in Poland. According to the Central Statistical Office (GUS), in 2022, there were 26 thousand small and medium-sized manufacturing enterprises. The research yielded a total of 171 correctly completed questionnaires. Due to the representation, the research should be regarded as a diagnostic survey.

Quantitative methods were used in the research. The research procedure adopted involved conducting a survey and contacting entrepreneurs using the CASI (Computer-Assisted Self-administered Interviewing) technique, with support from the CATI (Computer Assisted Telephone Interview) technique. A combination of these two quantitative methods was adopted to increase the response rate.

The research was carried out in a two-stage procedure. The pilot study was conducted in 2019 and included five selected entities. Once the survey instrument was validated, surveys were conducted in 2022. The delay of the survey was due to the situation caused by Covid-19. Given the systematic method bias (CMB), Brewer's (2006) split-sample approach was used to create the questionnaire. This approach aimed to eliminate CMB by using one sample of respondents to assess the independent variable and another to measure the dependent variable. The next step was Cronbach's alpha, Kaiser-Meyer-Olkin and Barlett's alpha tests (Table 2).

Table 2.
Results of the tests

Relaibility Cronbach's α test		
Item Cronbach's α value		
All questions 0,881		
Individualism vs. collectivism questions 0,734		
Power distance questions 0,825		
Culture of low vs. high uncertainty tolerance questions 0,704		
Validity KMO and Bartlett's Test		
KMO Value	0,821	
Approximate Chi-Square	2183,743	
Bartlett's Test of Sphericity	df	630
	Sig.	<0,001

* p < 0,000.

Source: based on the research results.

With the results of the Cronbach's Alpha and Kaiser-Meyer-Olkin tests, the reliability of the survey instrument was confirmed. The factors selected for the study were correlated with each other. However, this was because they related to a single phenomenon. However, the study aimed not to indicate their correlation but to identify their occurrence and assess their impact on implementing Industry 4.0/5.0 assumptions.

A tool diagnosing the existing cultural profile, including three dimensions: power distance, level of collectivism and tolerance of uncertainty, was used to conduct the research (Czerska, 2016). The survey questionnaire used predefined closed-ended questions. A five-point R. Likert scale was used to determine the intensity of a given phenomenon. Declarations were unambiguous, i.e. no more than one answer to the question was allowed. The respondents gave individual answers to the actual development of the respective parameters in their organizations (1 - definitely situation A, 2 - situation A, 3 - balanced situation, 4 - situation B, 5 - definitely situation B). After collecting and verifying the completed questionnaire sheets, the average for each parameter was calculated. The mean for each dimension and the total were then calculated to determine the cultural type value. The results made it possible to assess whether the diagnosed culture corresponds to the requirements of a conservative (conservative) (1-2.5), sustainable (2.5-3.5) or creative (3.5-5) strategy. The former implies continuing the existing way of doing things and continuously improving existing solutions. The organization is identified as an autonomous entity in relation to its environment, not having to react to signals from it. Creative strategy is identified with permanent monitoring of the environment, scanning for new opportunities or threats. The organization is open to implementing innovative, pre-emptive solutions. A balanced strategy contains features of both extremes without the dominance of any of them (Siemiński, 2020).

4. Results

The collectivism vs. individualism dimension identifies the nature of behavior in terms of the role of the individual and their needs in the organization. In order to diagnose this dimension, 12 verifying factors were used (Czerska, 2016) (Table 3).

Table 3.
Individualism vs. collectivism index

Variable	points	median	kurtosis	skewness	SD	Variance
Importance of team achievements	4	4	0,479	-1,04	1,109	1,229
Method of solving emerging problems	3,5	4	-0,43	-0,630	1,233	1,520
Sharing knowledge	4,2	5	1,184	-1,374	1,079	1,165
Importance of teamwork	3,8	4	0,1	-0,825	1,150	1,322
Atmosphere at work	4,1	4	0,604	-1,136	1,086	1,179
Results under assessment	2,9	3	-1,03	0,048	1,332	1,773
Importance of conflict at work	3,4	3	-0,631	-0,36	1,163	1,353
Expectations towards work	3,2	3	-0,324	0,032	1,024	1,050
Objectives pursued at work	3,9	4	0,456	-0,886	1,033	1,067
Work-private life balance	2,5	2	-0,913	0,445	1,303	1,697
Spending time together at the organization	2,9	3	-1,13	0,121	1,326	1,758
Appreciated skills	2,7	3	-1,023	0,123	1,260	1,589

Source: based on the research results.

The surveyed companies are characterized by the characteristics of a balanced culture about the individualism-collectivism dimension, but a shift in the value of the factors describing this dimension towards a creative culture can be observed. From the point of view of the assumptions of Industry 4.0/5.0, issues related to knowledge sharing (4.2), a positive working atmosphere (4.1), support for team achievements (4.0), or awareness of the importance of teamwork (3.8), among others, are particularly important. A certain threat from the point of view of the requirements of the contemporary labor market may be the lack of understanding of the role of work-life balance, especially in the context of generational change. Additionally, the high median values for team achievements and knowledge sharing indicate a strong emphasis on collaborative aspects. Meanwhile, the high standard deviation and variance in work-life balance suggest considerable disparities in its perception and implementation across different organizations.

The power distance dimension determines the nature of the relationship between supervisor and subordinate. M. Czerska (2016) used 14 verifying factors to diagnose this indicator (Table 4).

Table 4.
Large vs. small power distance index

Variable	points	median	kurtosis	skewness	SD	Variance
Accessibility of the superior	4,2	5	0,446	-1,097	1,048	1,098
Superior-subordinate relations	3,4	3	-0,797	-0,298	1,189	1,415
Scope of discussions with a superior	3,7	4	-0,581	-0,611	1,123	1,262
Sources of the superior's knowledge	3,4	4	-0,812	-0,364	1,215	1,476
Scope of independence and initiative	3,5	4	-0,293	-0,444	1,086	1,18
Attitude towards a superior's suggestions	3,5	4	-0,905	-0,292	1,169	1,367
Possibility of showing initiative	3,3	3	-0,829	-0,276	1,238	1,533
Importance and rank of formal attributes of power	3,6	4	-0,631	-0,229	1,046	1,094
Possibility of expressing one's views	3,5	3	-0,381	-0,265	1,070	1,145
An employee's impact on their work and its outcome	3,3	3	-0,853	-0,245	1,194	1,427
Comments passed on by the superior	3,1	3	-0,321	-0,21	1,034	1,069
Support from the superior	4	4	0,308	-0,917	1,043	1,088
Sharing authority by the superior	3,6	4	-0,769	-0,428	1,157	1,338
Effect of managerial control	3,9	4	0,100	-0,796	1,045	1,092

Source: based on the research results.

The research results indicate that organizations have a low power distance, but compliance with the creative strategy is insignificant (3.6). Within the analyzed sample, the observed maximum value was 5.0, the minimum 2.1, and the median 3.6. From the point of view of the possibility of implementing the assumptions of the Industrial Revolution 4.0/5.0, the indicator's value is positive, as it strengthens the flexibility of the organization's actions and the speed of its adaptation to new conditions. The high median values for variables like accessibility of the superior and support from the superior suggest a trend towards open and supportive superior-subordinate relationships in studied organizations. However, the negative skewness and kurtosis in most variables, such as superior-subordinate relations and scope of discussions with a superior, indicate that there is still a tendency towards less open communication and limited scope of discussions in hierarchical structures. This dichotomy implies that while there is an aspiration towards open and supportive environments, traditional hierarchical constraints might still be influential in shaping the dynamics of superior-subordinate interactions.

The uncertainty avoidance dimension indicates how organizations cope with uncertainty. In the model in question, ten verification factors were used (Table 5).

Table 5.
Low vs. high uncertainty tolerance index

Variable	points	median	kurtosis	skewness	SD	Variance
Easy acceptance of change	3,8	4	-0,004	-0,717	1,015	1,031
The effect of unpredictable future conditions and tasks on the operation of the organization	3	3	-0,662	0	1,122	1,259
Attitude to change	3,8	4	0,002	-0,477	0,935	0,874
Importance of procedures and results	3	3	-0,908	-0,037	1,185	1,404

Cont. table 5.

Importance of obedience and creativity	3,3	3	-0,558	-0,12	1,112	1,236
Right to take risks	3	3	-0,751	0,094	1,148	1,318
Attitude to formal procedures	2,7	3	-0,76	0,345	1,213	1,471
Attitude to the failure to follow standards	2,6	3	-0,855	0,258	1,233	1,521
Importance of stabilisation and development opportunities	3,1	3	-0,724	-0,008	1,114	1,240
Attitude to present times	3,5	4	-0,141	-0,419	1,025	1,050

Source: based on the research results.

With a slight advantage, some behaviors are more likely to maintain the status quo, e.g. attachment to formal procedures (2.7), but on the other hand, a relaxed attitude towards adherence to standards can be observed (2.6). With a slight advantage, some behaviors are more likely to maintain the status quo, e.g. attachment to formal procedures (2.7), but on the other hand, a relaxed attitude towards adherence to standards can be observed (2.6). Thus, the statistical analysis of the uncertainty avoidance dimension in organizations, reveals a nuanced picture of how enterprises manage uncertainty. The median values, predominantly at 3 and 4, such as in 'Easy acceptance of change' (median 4) and 'Attitude to change' (median 4), indicate a moderate level of tolerance towards change and uncertainty in most organizations. However, the negative kurtosis and skewness in several factors, like 'Importance of procedures and results' (-0.908 kurtosis, -0.037 skewness) and 'Attitude to formal procedures' (-0.76 kurtosis, 0.345 skewness), suggest that while there is a general openness to change, there remains a significant inclination towards maintaining established procedures and standards. This indicates a balance between innovation and adherence to existing norms, reflecting a cautious approach to managing uncertainty in organizational contexts.

In summary, the cultural profile of the surveyed SMEs is characterized by features of a balanced culture (Table 6).

Table 6.
Cultural indexes

Index	points	median	kurtosis	skewness	SD	Variance	max	min
cultural	**3,4**	**3,4**	**0,535**	**0,195**	**0,499**	**0,249**	**4,9**	**2,1**
level of collectivism	3,4	3,5	0,474	-0,351	0,593	0,352	4,8	1,8
power distance	3,6	3,6	-0,433	-0,035	0,620	0,384	5	2,1
uncertainty tolerance	3,2	3,2	1,348	0,676	0,583	0,340	5	1,7

Source: based on the research results.

No diametrical polarization exists in any of the three dimensions proposed by M. Czerska (2016). Detailed analysis revealed a clear value shift towards a collectivist culture, and levelling of the differences between managers and executives was indicated only by the distance to authority. The level of uncertainty tolerance was identified as balanced, showing some characteristics of both low and high acceptance of change. The lack of clear polarization is

likely due to the considerable diversity of companies in terms of industries and, thus, their operation in different market conditions.

5. Discussion

Implementing Industry 4.0/5.0 successfully is not only a matter of introducing modern technologies. The process also requires the consideration of various soft aspects, linked to the organizational culture. One such aspect is collectivism. Research to date shows that companies with a collectivist orientation are likely to invest more heavily in infrastructure resources (e.g. team-based improvement programs) and structural resources (e.g. robotics) than companies with an individualist orientation (Power et al., 2010). Thus, it can be assumed that collectivism as a dimension of organizational culture is conducive to implementing Industry 4.0/5.0. Thus, the research results allow for moderate optimism - although the diagnosed culture in the area of collectivism has reached a balanced level, it is nevertheless very close to the limit of an active culture, which means the dominance of cooperation and teamwork. Consequently, the relationships forming in this area are conducive to the implementation of Industry 4.0/5.0-related solutions.

Another dimension of organizational culture linked to collectivism is the low power distance between managers and employees. This creates partnerships and trust, which should also foster the development of innovative solutions. Research conducted to date indicates that employees in a high power distance context are unwilling to participate in decisions and are reluctant to implement new solutions in line with Industry 4.0/5.0 (Khatri, 2009). For example, managers from Industry 4.0-experienced German manufacturing companies claim that small power distance integrates employees into the 4.0 implementation process and establishes an open-minded and flexible corporate culture (Veile et al., 2020). Other studies show that large power distance and lack of superior support can hinder the Industry 4.0 implementation in manufacturing industries (Bakhtari, 20216; Petrillo, 2018). Therefore, obtaining a score in the surveyed companies at an average level of 3.6 points (which allows this dimension to be included in the highest separated level, the so-called creative level - although it should be mentioned that this is a score at the lower end of the range), should be considered a positive phenomenon in the implementation of Industry 4.0/5.0.

Both of the above dimensions (i.e. collectivism and a low distance to authority), form the basis for increasing openness to change. This is certainly conducive to the implementation of Industry 4.0/5.0 - as an environment of trust, cooperation, knowledge sharing, support from superiors, and power-sharing provides a good basis for the implementation of Industry 4.0/5.0.

The level of tolerance of uncertainty is slightly worse in the surveyed companies. Regarding the index of tolerance and uncertainty (openness to change) and the right to risk, the surveyed organizations are characterized by a balanced level, meaning that both open and closed behavior towards change can be encountered. In this area, in particular, the surveyed companies should look at the right to take risks. In business, each process and decision is affected by risk and uncertainty (Birkel et al., 2019). This also applies to taking risks regarding changes related to the implementation of Industry 4.0/5.0, in which the connections between humans, systems, and objects have become more complex (Tupa et al., 2017). Therefore, the low level of this indicator in the surveyed companies is an area that particularly needs improvement. This should be a major concern for managers if they want to adapt their companies to the requirements of Industry 4.0/5.0. Even worse results in the tolerance of uncertainty were recorded by the attitude to the failure to follow standards and the attitude to formal procedures. This means that despite existing procedures, employees may manifest actions that violate them. Determining the reasons for this is beyond the scope of this article (it could be, for example, a shaped cultural trait or the consequences of the previous communist system, in which most people did not pay attention to any rules and regulations, even those concerning work safety). However, given that the implementation of Industry 4.0/5.0 brings with it major changes in the functioning of Polish enterprises, it is important to introduce these changes in an orderly manner. Therefore, with regard to the implementation of Industry 4.0/5.0, the use of specific methodologies and toolboxes is proposed (Liebrecht et al., 2021; Leone, Barni, 2020; Quiroga et al., 2021).

In summary, given the results obtained, it can be concluded that the cultural indicators identified, such as collectivism and low distance to authority, support the implementation of Industry 4.0/5.0 solutions. In these dimensions, the organizational culture of the surveyed small and medium-sized manufacturing companies supports the implementation of Industry 4.0/5.0. However, it is important to be aware that the relatively low level of the uncertainty tolerance index indicates a potential barrier to the implementation of new, revolutionary solutions.

6. Conclusions

Industry 4.0 is increasingly becoming a reality of the global economy. Despite certain doubts and conceptual ambiguities, Industry 5.0 seems to be the next step in its development. The process of necessary changes, their depth and complexity across many dimensions, necessitates the identification of potential limitations and barriers as urgent. A conducted literature review indicated that one such limitation is the culture prevalent in organizations. Research conducted in small and medium-sized manufacturing enterprises allows us to look at the level of cultural acceptance for new, revolutionary solutions.

In the conducted research, the existing culture was identified from the perspective of three fundamental dimensions, namely the level of collective behaviors, distance to power, and acceptance of uncertainty. It was shown that from the perspective of implementing Industry 4.0/5.0, organizations are culturally ready for its adoption. The organizations studied are characterized by a relatively small distance to power, and in other dimensions, the features of a creative culture prevail. Certain areas, such as the way of assessing results, work-life balance, motivational systems, or attachment to formal procedures, are just a few examples of areas requiring further managerial work and a potential source of organizational resistance. However, the cultural perspectives of implementing Industry 4.0/5.0 are positive.

The authors of this article are aware of certain limitations of their study. The main limitations are the relatively small research sample (although compared to the research presented in many other articles, the number of companies surveyed is not small) and the static nature of the research, which only allows the organization to be captured from the perspective of a photograph. Culture determines the success of the change implementation process; however, in the long term, it is also influenced by change.

In future research, the authors seek to focus on a deeper analysis of the relationship between organizational culture and the Industrial Revolution 4.0/5.0 - especially over a longer period. They want to determine how the implementation of new technologies, processes, the digitalization of the organization, the environment and the relationships between them affect the change of organizational value systems and norms. Ultimately, based on long-term research, the aim is to develop a conceptual model for implementing the assumptions of Industrial Revolution 4.0/5.0 in a cultural context.

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