
Job Satisfaction in Manufacturing SMEs During Digital Transformation

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Abstract:

Purpose: The purpose of this article is to explore and identify how the various factors, such as inclusive leadership, organizational justice, work engagement, and perceived organizational support simultaneously affect employee job satisfaction in Polish SMEs during digital transformation.

Design/methodology/approach: This research applies fuzzy set Qualitative Comparative Analysis (fs/QCA). The sample consists of 61 Polish small and medium manufacturing enterprises, and the fieldwork contains information from a series of surveys. The survey includes four scales (inclusive leadership, organizational justice, work engagement, and perceived organizational support) in the form of statements to which respondents indicate their level of agreement/disagreement on a five-point Likert scale.

Findings: The empirical results show that different configurations of variables such as inclusive leadership, organizational justice, work engagement, and perceived organizational support can lead to the same outcome (job satisfaction) in multiple ways. The research found three configurations of factors.

Practical implications: The results have practical implications for managers and owners of manufacturing SMEs because they provide the configurations of factors that lead to job satisfaction in the Fourth Industrial Revolution.

Originality/value: This article not only presents selected factors leading to job satisfaction in SMEs but also attempts to show how different configurations of the analyzed factors lead to job satisfaction in the conditions of the Fourth Industrial Revolution.

Keywords: Job satisfaction, Small and Medium Enterprises (SMEs), Industry 4.0, fs/QCA.

JEL codes: M10, L10.

Paper Type: Research paper.

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1. Introduction

In recent years, digital transformation has attracted much interest from researchers in a wide range of scientific fields, from engineering to management, as it has transformed manufacturing through digitalization and the use of advanced technologies (Rojko, 2017). Industry 4.0 since 2013 has attracted exponentially growing interest from researchers across technical and managerial disciplines (Pranab *et al.*, 2019).

There is no universally accepted, single definition for Industry 4.0 (Culot *et al.*, 2020), nevertheless, the literature broadly describes the topic, where the Industry 4.0 paradigm implies organizing production processes according to the principles of interoperability between physical and cyber-physical systems, service orientation, modularity, real-time data analysis, and decentralization. Industry 4.0 undoubtedly originates from engineering, but in recent years it has become a really interesting issue also in the managerial sphere (Ślusarczyk, 2018). Oztemel and Gursev (2020) define Industry 4.0 as "a methodology for generating a transformation from machine-dominated to digital manufacturing".

The successful implementation of Industry 4.0 principles and practices facilitates the integration and collaboration of enterprise systems across the value chain, the self-adaptation of manufacturing systems, and agile response to customer demand (Xu *et al.*, 2018). Digital transformation focuses heavily on interconnection, automation, digitization, and real-time information sharing to create a holistic and better-connected ecosystem for companies that heralds innovation, improves productivity and efficiency, and creates new opportunities (Kohnova *et al.*, 2019).

Industry 4.0 is also defined as "a set of technologies, devices and processes [...] capable of operating in an integrated manner at several stages of the production process and at several levels of the supply chain [...], enabling self-sufficient production, integrated operations, decentralized decisions, minimal human intervention" (Castelo-Branco *et al.*, 2019). The technologies, devices, and processes in Industry 4.0 include the Internet of Things (IoT), Cyber-Physical Systems (CPS), autonomous robots, visualization technologies (virtual and augmented reality), cloud computing, blockchain technology, big data analytics, additive manufacturing, and digital twins (Tao *et al.*, 2019). The arrival of digital transformation has caused the overall transformation using digital integration and intelligent engineering has taken a big step towards futuristic technology. The concept of Industry 4.0 brings many positive changes but brings challenges in many areas, especially in production, communication, and human resources management.

Recent management research shows a growing interest in and emphasizes the importance of an organization's ability to adapt and change the way it does business, improve the skills of its employees and continuously adapt technology in its day-to-day business operations (Nguyen and Luu, 2020). The research addresses social,

psychological, or ethical factors in companies operating in an era of digital transformation. The key role of human capital as a success factor for organizations seems to be widely accepted today. The importance of, among others, leadership, commitment to work, shaping the relationship between the employee and the superior based on mutual respect, involvement, and co-responsibility, or motivation, is also recognized.

Appropriate conditions, support, and approach to employees make the staff become partners, they feel satisfaction from their work and better identify with the company they work for, having a sense of co-responsibility for the achieved results. Satisfied employees can add value to their work and to the whole enterprise, which in turn can translate into a competitive advantage. Employees' job satisfaction in small and medium production companies operating in Industry 4.0 conditions, despite initiated research in this area, constitutes an empirically poorly understood area.

This article aims to explore and identify the configuration of the various, selected factors that lead to employee job satisfaction in Polish SMEs. The empirical research used qualitative comparative analysis using fuzzy sets (fs/QCA), to investigate the link between employee job satisfaction and selected factors, such as inclusive leadership, organizational justice, work engagement, and perceived organizational support. There is a research gap concerning selected factors about achieving job satisfaction of employees, i.e., there is no research indicating which configurations of selected factors simultaneously influence and allow achieving job satisfaction in SMEs in the era of Industry 4.0. This research is part of a larger study on employee job satisfaction in the Fourth Industrial Revolution.

The selection of factors for this study was based on a critical analysis of the literature. The article consists of a few sections, where first a brief review of the literature on the set of determinants, i.e. selected variables affecting employees' job satisfaction, is made. In the second part, the research methodology (fuzzy set Qualitative Comparative Analysis) is discussed. The next part presents the results of empirical research. The last part includes a discussion and conclusions.

2. Theoretical Background

As mentioned earlier, one of the management areas affected by the changes associated with digital transformation is human resource management, where achieving employee satisfaction is an important aspect. In general, job satisfaction reflects positive feelings about the performance of assigned duties and refers to the degree to which people like their jobs (Hirschfeld, 2000; Ellickson and Logsdon, 2002). Taking after Herzberg's Theory, satisfying self and motivational needs in the process of developing one's potential is very important (Ashari *et al.*, 2021), where it is these needs that can motivate people to work with full commitment and to perform at their best (Rosnee *et al.*, 2021).

With this value of job satisfaction, an individual will feel confident and will be enthusiastic about every job they undertake. Job satisfaction has also been described as an emotional or expressive response to work (Buitendach and De Witte, 2005) and as an employee's individual feelings and emotions about his or her job and attitudes toward various work realities (Spector, 1997). Undoubtedly, which includes confirmed by numerous studies in this area, many factors influence the achievement of employees' job satisfaction. These include those selected for this study: inclusive leadership, organizational justice, work engagement, and perceived organizational support.

Inclusive leadership (IL) was first introduced by Nembhard and Edmondson (2006) and defined as "the words and actions of a leader or leaders that indicate an invitation and recognition of the contributions of others. Hassan and Jiang (2019) argue that inclusive leadership ensures that subordinates are valued for their contributions, regardless of where they are in the organizational hierarchy. Inclusive leadership, which is considered the core of relational leadership (Hollander, 2007) is also defined as "leaders who demonstrate openness, accessibility, and availability in their interactions with followers" (Carmeli *et al.*, 2010, p. 250).

Openness refers to the degree to which leaders are receptive and encourage subordinates to share ideas and opinions. Accessibility and availability refer to the degree to which leaders listen to and meet the needs of subordinates and the availability of leaders (Carmeli *et al.*, 2010). Studies have shown that inclusive leadership is significantly associated with job satisfaction Zhang *et al.* (2018).

Organizational justice (OJ) is defined as organizational members' perceptions of the justice that exists or takes place in the institutional environment (Sembiring *et al.*, 2020). Employees who perceive that organizational justice is present in the workplace are more likely to use collaborative styles such as integrating, obliging, and compromising. The literature on organizational justice shows that higher levels of perceived justice are generally associated with more positive attitudes and behaviors at work (Lind and Tyler, 1988). Organizational justice consists of three dimensions: distributive justice, procedural justice (Folger and Konovsky, 1989), and interactional justice (Bies and Moag, 1986).

The first of these, distributive justice is the degree to which all employees are treated the same under a given policy, regardless of gender, age, race, ethnicity, or other demographic characteristics, when it comes to distributing rewards as a result of contributions to the organization. Colquitt *et al.* (2001) found that distributive justice is an important predictor of job satisfaction. The second, procedural justice, is the degree to which the rules and procedures set forth by the policy are followed in all cases in which they are applied (Greenberg, 1990). The third, interactional justice, the third dimension, is the degree to which affected employees are treated with dignity and respect (Bies and Moag, 1986).

Masterson *et al.* (2000) found that procedural and interactional justice are related to job satisfaction; however, it is a stronger predictor of job satisfaction than interactional justice. Moreover, Zainalipour *et al.* (2010) found that there is a significant positive relationship between job satisfaction and organizational justice.

Recent years have seen a significant increase in research on work engagement (WE) (Bakker and Albrecht, 2018). Employees who feel engaged at work are enthusiastic about their work, feel energized, and perform better on assigned tasks. Schaufeli *et al.* (2002) defined work engagement as "a positive, satisfying, work-related state of mind associated with work that is characterized by energy, dedication, and preoccupation." According to Lu *et al.* (2016), work engagement consists of individual dimensions and job satisfaction is the outcome of these dimensions. Work engagement is strongly correlated with job satisfaction. Work engagement has been shown to influence high job satisfaction (Keyko *et al.*, 2016). According to Karanika-Murray *et al.* (2015), employees who are strongly and positively engaged in their work and demonstrate energy and dedication to their work consequently obtain job satisfaction.

Perceived organizational support (POS) refers to employees' perceptions of the extent to which the employer values their contribution and concern for their well-being (Rhoades and Eisenberger, 2002). Perceived organizational support as a resource in an organization may encourage employees to generate a number of positive emotions based on support and understanding from colleagues and superiors as well as affirmation of their skills. Research has shown that perceived organizational support is associated with greater organizational creativity, increased job satisfaction, better customer focus, work efficiency, and reduced rotation intentions (Ibrahim *et al.*, 2016). Research by Kurtessis *et al.* (2017) also confirms that perceived organizational support is positively related to desired work outcomes, such as increased levels of organizational commitment, job satisfaction, and employee productivity.

3. Data and Method

This empirical study explores and identifies which configurations of the chosen factors, such as inclusive leadership, organizational justice, work engagement, and perceived organizational support simultaneously affect employee job satisfaction in Polish small and medium enterprises in the Industry 4.0 era. Studies using qualitative comparative analysis (QCA) methods have been successfully carried out in many types of research in the field of social sciences, also concerning job satisfaction (Douglas *et al.*, 2020; Kwiotkowska and Gębczyńska, 2021; Gębczyńska, 2021). Fuzzy set Qualitative Comparative Analysis (fs/QCA), used in this research, can find common conditions that may explain the selected outcome (Ragin and Fiss, 2008). This method determines whether selected factors can simultaneously or individually lead to job satisfaction in chosen enterprises.

Fs/QCA can be used for contextual analysis, where the dependence of causal relationships on contextual conditions is explored (Mas-Verdú *et al.*, 2015). Fs/QCA is a diversity-oriented approach that proposes various alternative paths to understand the outcome construct and is well suited to observe stochastic but complex (small-n) phenomena (Henik, 2015). The fs/QCA method was developed for small sample sizes, where the number of cases is too large for traditional qualitative analysis, yet too small for many of the usual statistical analyses, such as ten to fifty cases (Fiss, 2011; Ragin and Fiss, 2008). However, this method can also be applied to large data sets (Cooper and Glaesser 2010).

The first step of fs/QCA analysis, is calibration, i.e., the transformation of data into fuzzy sets, during which values of variables are operationalized as membership scores within predefined sets and are obtained through calibration (Ragin and Fiss, 2008; Meuer, 2014). This step involves determining whether a condition is fully in the set (1), fully out of the set (0), or at the point of maximum ambiguity (0.5) (Ragin and Fiss, 2008). The fuzzy set membership scoring technique used expresses the degree to which the instances belong to the set, and the obtained membership scores allow for the analysis of subset relations, where mainly two aspects, consistency and coverage, are analyzed (Ragin, 2006).

Consistency indicates how closely subsets of conditions and outcomes are related and refers to the degree to which cases share conditions or combinations of conditions. Coverage indicates the importance of conditions to the outcome and if the degree of coverage is low, this indicates several paths (combinations of conditions) leading to the same outcome (Ragin, 2009; Schneider and Wagemann, 2012). The second step in the fs/QCA method is the construction of the truth table, where fuzzy set results are used to construct the data matrix as a truth table with 2k rows to handle Boolean algebra (Ragin, 2009).

Fs/QCA analyses whole combinations of conditions simultaneously instead of comparing individual variables and in the next step, the truth table reduction is performed using the Quine-McCluskey algorithm. The overall consistency of the solution indicates the degree to which the subset relation holds for sufficiency. Total solution coverage refers to the joint validity of all causal paths. The unique coverage of causal conditions is similar to the calculation of the unique R-square in regression analysis in that it illustrates the relative importance of each pathway by measuring the degree of the empirical relevance of a particular cause or causal combination to explain an outcome, thus providing a logical reduction of statements (Ragin and Fiss, 2008).

The next step involves the analysis of necessary conditions to determine whether a condition is necessary to cause an outcome. A condition is necessary when its consistency score exceeds a threshold value of 0.9 (Schneider *et al.*, 2010). No necessary conditions were found in this study. The final step is to conduct a

sufficient conditions analysis to determine which conditions or combinations of conditions are sufficient to cause a given outcome.

The data for this research was collected using a questionnaire. The total data collection period was from September to mid-December 2021. The data was collected from small and medium-sized manufacturing companies located in southern Poland that implement and use Industry 4.0 solutions. To identify and precisely select the research sample, a questionnaire was developed, which consisted of two main parts. The first part contains questions about the implementation of 5 selected Industry 4.0 solutions, that is Cyber-Physical Systems, Network Communications, Big Data, Cloud Computing and Virtualization, and Simulation.

The respondents were asked to indicate on a scale from 1 to 5 the level of use and implementation of each of the solutions mentioned, where: (1) means that the solution has not been implemented yet; (2) means that the solution is at an early stage of implementation; (3) means that the solution is implemented and applied, but only in certain areas; (4) means that the solution is fully implemented and used in almost the entire organization; (5) means that the solution is implemented and widely used.

Only those entities that achieved level 3 and higher in each of the solutions mentioned were selected for further research. The second part of the questionnaire included four scales (inclusive leadership, organizational justice, work engagement, and perceived organizational support) in the form of statements that respondents referred to on a five-point Likert scale, defining their level of agreement/disagreement. All item loadings are greater than 0.7, and a comprehensive review of the relevant literature confirms the validity of the scales (Table 1). From a psychometric perspective, a single, holistic, single-item measure of job satisfaction was used. The use of single-question measures to operationalize this construct (Cronbach's alpha = 0.929) compares favorably with the use of multi-question measures (Dolbier *et al.*, 2005).

Table 1. Scales measurement

Factors	Adapted from	Cronbach Alpha
Inclusive leadership (IL)	Carmeli et al. (2010) and Javed et al. (2018), was measured by 9-items from	0.88
Organizational justice (OJ)	Rahim et al. (2001), was measured by 11-items	0.89
Work engagement (WE)	Schaufeli et al. (2006), was measured by 17-items	0.83
Perceived organizational support (POS)	Eisenberger et al. (1997), was measured by 8-items	0.91

Source: Own study.

Survey questionnaires were distributed to 93 entities, of which 61 met the accepted conditions regarding the level and degree of implementation and use of Industry 4.0 solutions. A total of 382 questionnaires completed by employees of these SMEs were received. After excluding incomplete questionnaires, the data for analysis includes 333 valid questionnaires, which represents a response rate of 87.17%.

4. Results

The results of the empirical research conducted using the fs/QCA method indicate three configurations of factors leading to job satisfaction of employees of small and medium-sized manufacturing enterprises implementing solutions and operating in Industry 4.0 conditions. Table 2 presents these three solutions and their statistics, which are sufficient for the result, using the notation of Ragin and Fiss (2008).

Table 2. Configurations of factors that lead to job satisfaction in manufacturing SMEs

Factors	Configurations		
	Conf. 1a	Conf.1b	Conf. 2
Inclusive leadership	●	●	
Organizational justice	●	●	
Work engagement	●		●
Perceived organizational support	⊖	●	●
Consistency	0,93	0,88	0,79
Raw coverage	0,41	0,29	0,22
Unique coverage	0,06	0,04	0,02
Solution consistency	0,85		
Solution coverage	0,63		
Note: big full circles (●) indicate the presence of a core casual condition; small full circles (●) indicate the presence of a peripheral causal condition; while barred circles (⊖) indicate a condition's absence; the blank cell is “don’t care” condition.			

Source: Own study.

The columns of Table 2 represent the configuration of causal conditions with their corresponding raw coverage, unique coverage, and solution consistency, while the numbers at the bottom represent the consistency of the solution as a whole.

Following Ragin (2009) consistency measures the degree to which cases sharing a given condition agree in displaying an outcome; raw coverage measures the overall coverage of a combination that may overlap with other combinations; unique coverage refers to coverage uniquely due to a combination; solution consistency measures the degree to which membership in the solution (the set of solution terms)

is a subset of membership in the outcome and solution coverage refers to the combined coverage of all combinations leading to the outcome.

The fs/QCA 3.0 software provides the output that consists of a complex solution, a parsimonious solution, and an intermediate solution. In this study, the parsimonious and intermediate solutions were interpreted (Fiss, 2011). Full big circles (●) indicate the presence of a core condition, small full circles (●) indicate the presence of a peripheral causal condition, while barred circles (⊖) indicate a condition's absence. The blank cell is "don't care" condition. The resulting solutions are named Conf. 1a, Conf. 1b and Conf. 2, represent alternative causal combinations or prescriptions for the outcome (Ragin, 2009).

The results with different job satisfaction solutions have good consistency (0.85) and solution coverage (0.63). The overall solution for job satisfaction in manufacturing SMEs implies first-order equifinality of solutions (Conf. 1 and Conf. 2). The neutral permutations within solution Conf.1 (Conf.1a and Conf.1b) imply second-order equifinality. Three configurations of selected factors lead to job satisfaction.

Configuration Conf.1a indicates that combining inclusive leadership with organizational justice (as the core conditions) and with work engagement (as the peripheral conditions) without perceived organizational support lead to employee job satisfaction in selected entities. Configuration Conf.1b implies that inclusive leadership with organizational justice (as the core conditions) and with perceived organizational support (as the peripheral conditions) yield the same job satisfaction as in configuration Conf. 1a. Finally, configuration Conf. 2 indicates that combining work engagement (core condition) with perceived organizational support (peripheral conditions) lead to job satisfaction.

5. Discussion and Conclusion

This study confirms that different configurations of variables such as inclusive leadership, organizational justice, work engagement, and perceived organizational support can lead to the same outcomes i.e., employee job satisfaction in manufacturing SMEs during digital transformation.

The research found three configurations of factors. The first two configurations include two, the same core conditions from the parsimonious solution which is: inclusive leadership and organizational justice. The first of these configurations, in addition to the core conditions listed, includes work engagement with the absence of perceived organizational support. The second configuration, apart from the two core conditions, includes perceived organizational support as a peripheral intermediate solution. The last, third configuration of factors contains one core condition, work engagement and perceived organizational support as a peripheral intermediate solution.

First configuration Conf. 1a, indicates that leaders who demonstrate openness, accessibility, and availability in their interactions with followers and organizational members' perceptions of the justice that exists or takes place in the institutional environment with an employee's positive state of mind that is associated with work that is characterized by energy, dedication, and preoccupation, but without perceived organizational support i.e., employees' perceptions of the extent to which the employer values their contribution and concern for their well-being lead to job satisfaction in small and medium enterprises operating in Industry 4.0 conditions.

The second configuration Conf. 1b, indicates that the capacity to manage and lead a group of people efficiently while respecting their uniqueness in an empathetic, bias-free way with a focus on how employees judge the behavior of the organization and with employees' perceptions of the extent to which the employer values their contribution and concern for their well-being lead to employee job satisfaction in SMEs during digital transformation era.

The third configuration Conf. 2, where work engagement is a core condition, indicates that a sense of involvement in the work of employees and thus an enthusiastic attitude to work and perceived organizational support which may generate a number of positive emotions based on support and understanding from colleagues and superiors lead to employee job satisfaction in manufacturing small and medium SMEs operating in Industry 4.0 conditions.

This study contributed to expanded knowledge of the factors associated with job satisfaction in SMEs during the Industry 4.0 era by outlining three configurations of factors that create solutions explaining the job satisfaction of employees. Despite conducting research on job satisfaction in SMEs in connection with inclusive leadership, organizational justice, work engagement and perceived organizational support, none of them analyzed simultaneously the influence of these factors on job satisfaction. The presented results provide practical implications for owners and managers of these entities.

This paper makes the following theoretical and methodological contributions to the literature on job satisfaction. First, this study used the fs/QCA method and confirmed that different factors combine to create alternative configurations to achieve job satisfaction. Applying fs/QCA to explore the different configurations leading to job satisfaction is an important contribution to the literature.

Second, the contribution of this research is to understand how different solutions can lead to the same outcome. Another important contribution is the findings in Table 2, which show that two configurations include two, the same core conditions (inclusive leadership and organizational justice) that lead to high job satisfaction in manufacturing SMEs during digital transformation.

The third solution - configuration Conf. 2 includes one core causal condition (work engagement). The results of empirical research highlight the key role of inclusive leadership, organizational justice, and work engagement that lead to higher job satisfaction in SMEs during the Industry 4.0 era.

In summary, the arrival of digital transformation has caused the overall transformation using digital integration and intelligent engineering has taken a big step towards futuristic technology. The concept of Industry 4.0 brings many positive changes but brings challenges in many areas, especially in production, communication, and human resources management. It is worth recognizing and investigating how to obtain employee job satisfaction during the digital transformation, therefore, the research sample was selected based on the degree of implementation and application of Industry 4.0 solutions. Satisfied employees can add value to their work and to the whole enterprise, which in turn can translate into a competitive advantage.

This research is subject to several limitations. First, the overall sample size is rather low. The second limitation relates to the data source. The data in this study come from a limited research sample - Polish SMEs located in southern Poland operating in Industry 4.0, which may reduce the generalizability of the results. Future research should extend the analysis to larger samples and other entities and countries or regions.

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