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Critical Factors for the Effective Implementation of the 5S Method in a Manufacturing Company: A Network Thinking Methodology Approach

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Abstract:

Purpose: *The purpose of this article is to present the results in the identification of the factors that influence the effective use of the 5S method in the area of production in a manufacturing company. The critical factors identified based on the network thinking methodology were analysed. The study tried to show that the critical factors strongly influence other elements, but at the same time are subject to strong influences themselves.*
Design/Methodology/Approach: *This article uses triangulation of methods. First, the network thinking methodology was used, which made it possible to look at the problem from different perspectives, analyse the factors occurring in the network, and determine the types and strength of interactions of the parts constituting the whole. This methodology was supplemented with an in-depth individual interview, which was conducted with people responsible for production in a selected production company in the furniture industry. The whole was complemented by two surveys conducted using the CAWI method among production employees of the same company. The selection of the sample was random.*
Findings: *The results show how the selected critical factors (method of implementing the 5S method, employee participation and effectiveness of the 5S method) influence the effective implementation of the 5S method in the surveyed manufacturing company.*
Practical implications: *5S practices are the first step in improvement, i.e., full implementation of a lean production system in an enterprise. They create new standards of staff conduct and foundations for implementing further tools. They lead to achieving the long-term goal of increasing efficiency and thus increasing the value of the enterprise. Based on the research conducted, critical factors contributing to the effective implementation of the 5S method in a manufacturing company were indicated.*
Originality /Value: *The presented results complement extensive research conducted around the world on the effective implementation of the 5S method in the area of production in the enterprise. The study aimed to fill the research gap in this area.*

Keywords: *5S, network thinking methodology, employee involvement, process maturity assessment (CMMI).*

JEL codes: *L23, M11, O32, C65.*

Paper type: *Research article.*

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1. Introduction

Lean Management is largely based on minimalism, striving for harmony and order, and eliminating all waste. It is therefore not surprising that one of its tools is a set of rules aimed at maintaining an orderly, well-organised, and safe work environment, i.e., the 5S method. This method is probably one of the most frequently implemented Lean Management tools in enterprises. 5S is not only about the perfect organisation of the workplace.

This is the basis for the changes introduced in the company. It is a management philosophy whose primary goal is to visually organise the workplace to facilitate the identification and elimination of waste, based on employee ideas. It is the organisation of workplaces so that they are ergonomic, comfortable, adapted to employees, and work takes place with minimal effort, safe, and efficient.

However, it is not always possible to successfully implement and maintain the 5S system in the enterprise. There may be many reasons. The aim of the article is to indicate - based on the network thinking methodology - the critical factors of implementing the 5S method in the production area in a manufacturing company.

Critical factors are those that strongly influence other elements but at the same time are themselves subject to strong influences. These factors included three: the method of implementing the 5S method and employee involvement and the effectiveness of the 5S method.

2. Literature Review

The method starts every improvement programme (Makwana and Patange, 2022). It is the cornerstone of the Lean Manufacturing system (Shahriar *et al.*, 2022). The 5S method was invented by Hiroyuki Hirano in Japan in the 1980s (Hirano, 1995). Ho, Cicmil, and Fung (1995) consider it an industrial technique that distinguishes an organisation from others. This method is a tool that supports the analysis of processes that occur in the workplace. Its result is effective organisation of the workplace, simplification of the work environment, elimination of losses related to shortages and failures, improvement of quality and safety (Rizkya *et al.*, 2020).

The 5S pillars: Sorting (*Seiri*), Simplifying Access (*Seiton*), Sweeping (*Seiso*), Standardisation (*Seiketsu*), and Self-Discipline (*Shitsuke*) ensure the development and maintenance of a productive workplace (Hirano, 1995). In the daily work routine, companies maintain organisation and order and are essential for the smooth and efficient flow of tasks (Makwana and Patange, 2022).

Therefore, the 5S method is a process of reorganising the entire enterprise in order to improve various aspects of its operations, but above all, the safety and quality of work at the workplace.

Shahriar *et al.* (2022) claim that the task of an effectively implemented 5S system is to reduce the company's losses, which usually arise as a result of generally understood waste (muda). The aim of activities in every process in the company should be added value, i.e., what the customer is ready to pay for; otherwise the company will be faced with a "muda", i.e., a loss and an increase in costs.

Khan and Siddiqui (2017) indicate that the implementation of the 5S method brings positive changes in the organisation, for example, cost reduction in processes, increase in process efficiency and effectiveness, reduction of waste (muda) and improvement of safety. Their research shows the threats when implementing 5S in an enterprise. They also point out that it takes approximately 3-4 months for each organisation to completely implement 1S, 2S, and 3S (Khan and Siddiqui, 2017).

The idea of assessing process maturity comes from the concepts of TQM (Total Quality Management) and BPM (Business Process Management). They were the premise for Watts Humphrey to develop one of the first comprehensive approaches to process maturity assessment in 1989 (Humphrey, 1989), and this contributed to the development of the first Capability process maturity assessment model.

Maturity Model (CMM) by Software Engineering Institute / Carnegie Mellon University (Humphrey, 1995). Initially, CMM was used only in software development companies, but in the following years more general versions were created for other industries, and the model itself was called CMMI, where "I" stood for integrated (Hammer, 2007).

According to Harmon (2008) and Kalinowski (2011), the basic goal of the model and at the same time the assumption that underlies the assessment of process maturity is the statement that organisations in which managers understand the principles of the process approach and systematically manage them are able to respond to changing requirements customers and goals defined at the organisational level more effectively and faster.

Mielcarek (2017) and Harkawat, Dadhich, Goswami (2023) believe that the process maturity assessment serves as a tool allowing the description and analysis of the current state of the organisation (as-is state) and establish the target level of implementation of the process approach (to-be state). Depending on the stage of development of the organisation and the requirements, the process maturity assessment may perform the following functions (de Bruin *et al.*, 2005; Van Looy, Rosemann, and Bandara, 2024):

- descriptive - used for ongoing evaluation of processes taking into account the indicated criteria,
- improvement (prescriptive) - the assessment allows for the identification of the target level of process maturity, including the development of a road map containing the necessary improvement actions,

– comparative - the assessment allows you to compare your own changes in various time series and changes against the background of other organisations based on reference models.

The CMMI model introduces the concept of maturity levels (Table 1) in order to find the best way to improve processes in the organisation (Bayona-Oré and Hostos, 2022). Khraiwesh (2020) argues that it is important to adopt the CMMI model to ensure organisational survival and develop an effective strategy, while Amer et al. (2022) argue that CMMI should be used to address aspects of quality and process maturity.

Table 1. *Levels of organisational process maturity based on Spanyi 2004; Bitkowska et al., 2011; Kalinowski, 2011; Szewczyk, 2018.*

Maturity level	General characteristics
Level 1: Initial chaos, random, disorganised processes	Unpredictability (temporary modification of processes), high dependence on the capabilities of individual employees; Process effectiveness can only be predicted at the individual project level, not across the entire organisation.
Level 2: Repetitive, partially organised processes	Practice and experimentation to seek the ability to repeat actions within processes. Obtaining the opportunity to improve processes and document their main parameters.
Level 3: Standardisation: processes organised and identified but not measured	Design work within the processes is standardised, stable, and repeatable.
Level 4: Processes managed based on metrics	The use of process efficiency measurements enables the identification of threats and taking effective actions to correct structural adjustments
Level 5: Processes continuously improved	Continuous process improvement and optimisation are achieved both by improving current process configurations and introducing new implementation methods and technologies.

Source: *Own study.*

The network thinking methodology (Probst and Gomez, 1991) allows you to look at the problem from different perspectives, analyse the factors occurring in the network, and determine the type and strength of the interaction of all components (Butlewski *et al.*, 2020; Tyagi *et al.*, 2023; Grima *et al.*, 2023; 2020).

Therefore, it allows for a better understanding of the entire system and its individual parts. According to Deming (2000), 'the system should have a specific purpose – it should generate value, or result'. In this sense, a system should be understood as a relationship between various elements in a network.

According to Kubiak (2020), when talking about improving the operation of an enterprise as a system, it is necessary to carefully examine its processes, identify

connections between individual elements, their boundaries, relations with the environment, processes taking place in the system, and feedback to maintain the system in a state of dynamic balance with the environment.

The authors of the network thinking methodology developed in the late 1980s are three scientists from Switzerland: Peter Gomez, Hans Urlich and Gilbert JB Probst (Probst and Gomez, 1989). This methodology is a concept of looking at the problems occurring in the enterprise from various aspects and a method that allows for a better understanding of the mechanisms taking place in the organisation and to solve them more easily.

It is based on the assumptions of general systems theory (Bertalanffy, 1968) and allows for a holistic view of the problem with an extensive structure (Ragin - Skorecka *et al.,* 2019). The name of the methodology refers directly to the network and its characteristic feature is that it creates a coherent whole, where all elements are necessary to conduct a complete analysis. The name of the methodology also refers to the concept of thought, i.e., something elusive that cannot be seen (Grzelczak, Borowiec, and Górny, 2013; Borowiec, 2019).

The network thinking methodology is based on the paradigm of a holistic, systemic approach to the problem. It consists of six interrelated phases (Probst and Gomez, 1991; Ulrich and Probst, 1990; Gomez and Probst, 1995):

1. Setting goals and modelling the problem situation.
2. Impact analysis.
3. Recognising and interpreting the possibility of changing the situation.
4. Explaining the possibilities of managing change.
5. Strategy and action planning.
6. Putting the solution to the problem into practice.

The network thinking methodology is not a sequential method but an interconnected cycle, which means that each step can influence the others (Nikravan et al., 2018), with these individual steps being interconnected and contributing to problem solving within the iterative process (Pilz and Zenner, 2017). Using this methodology allows you to discover various limitations and barriers that occur in the decision-making process (Piekarczyk, 2016). According to this methodology, mistakes often made in solving problems are simple cause-and-effect logic and analysing problems in isolation (Eurich, Weiblen, and Breitenmoser, 2014).

3. Research Methodology

The article uses a triangulation of methods (Bans-Akutey and Tiimub, 2021). First, the network thinking methodology was used, which gave the opportunity to look at the problem from different perspectives and allowed the analysis of factors occurring

in the network of connections and the determination of the types and strength of impact of individual factors constituting the whole. The aim of the investigation was to find the most important factors influencing the effective implementation of the 5S method in the production area of a manufacturing company. The article presents selected elements of the network thinking methodology , namely setting goals and modelling the problem situation, as well as analysing impacts.

The first step is to identify the problem, where the word "problem" is not used in the colloquial sense, which has a negative connotation but means the difference between the desired and the actual situation. To ensure that all issues are considered, they should be analysed from different perspectives (Nikravan *et al.,* 2018). On this basis, a list of key factors defining the problem is obtained, i.e., the so-called influencing factors, which are then combined into a network of connections.

In the second step, after defining the key factors, their interconnections must be determined to move from a list of independent elements to an integrated whole. According to Probst and Gomez (1991), at the beginning, connections between individual factors are established in order to step by step create the so-called networked whole.

This process takes place in two stages. First, the relationships are analysed element by element, and these relationships have different properties: they have direction (one element affects the other, but the reverse may not occur), degree of impact (it may be a strengthening, stabilising, or soothing effect), duration (short-term, medium or long term) and intensity (low, medium, or high impact).

The dependencies are summarised in the so-called influence matrix, which shows all the connections between all elements. The intensity of impact is then determined, indicating how strongly a given element is influenced by all the others (passive sum) and how strongly the element influences the others (active sum).

Finally, based on the above assessments and using the influence matrix, an intensity map is prepared, dividing the factors into active, passive, critical, and lazy. Using this tool allows you to observe what factors exist in a given situation. According to Probst and Gomez (1991), if active and critical factors predominate, it means that it is possible to influence the situation through these elements. In contrast, when passive and lazy factors dominate, the possibilities for interference are much smaller. In this article, only critical factors will be studied.

The network thinking methodology was supplemented with an in-depth individual interview, which was conducted with people responsible for production (the head of production and shift leaders and foremen) in a selected production company in the furniture industry. The whole was complemented by survey research conducted using the CAWI method (Computer Assisted Web Interview) among production employees of five production areas of the same enterprise in March 2023 (113

people) and partially repeated in March 2024 (104 people). The case study method was also used.

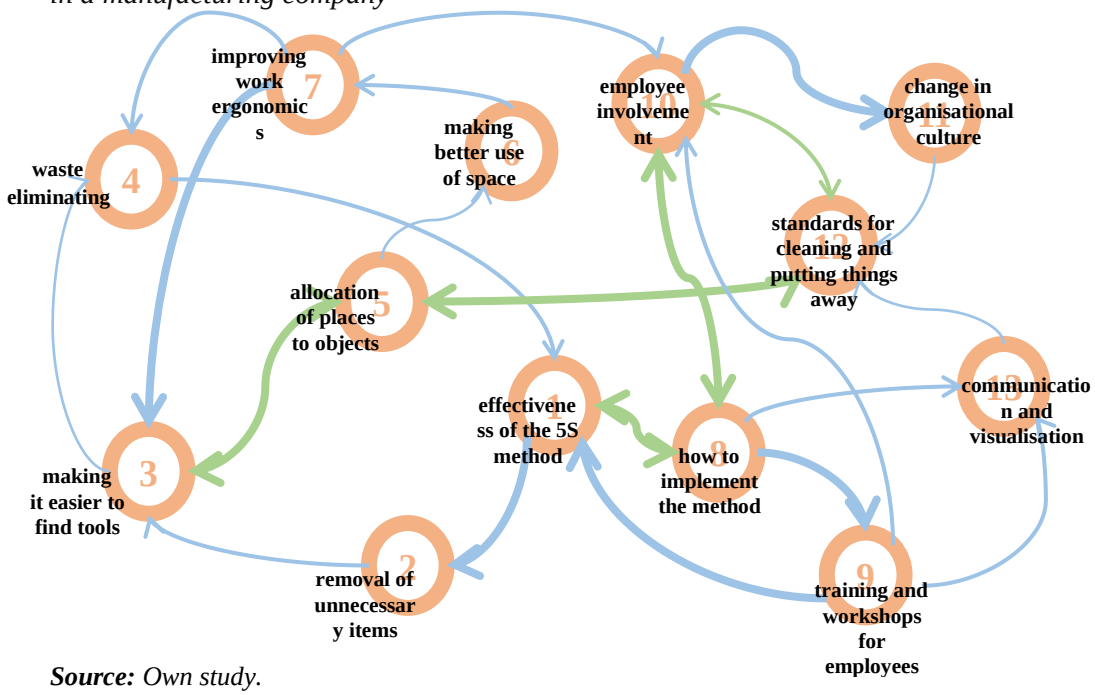
4. Research Results and Discussion

To determine the factors important for the effective implementation of the 5S method in a manufacturing company, first of all, the network thinking methodology was used. First, a network of dependencies was created (Figure 1), in which 13 factors that made up the network were identified and the connections between individual factors were analysed in three approaches (Table 2):

- type of impact: IR - bidirectional (B) or unidirectional (U) and R - unidirectional (+) or unidirectional (-),
- intensity of impact: I on a four-level scale, where 0 - no impact, 1 - low intensity, 2 - high intensity and 3 - very high intensity of impact,
- impact time: T in the time horizon, where S - short-term horizon, M - medium-term and L - long-term.

The selection of factors for the network to be created was based on expert experience as a result of individual interviews conducted with the head of production of the examined production company.

Figure 1. *Network of dependencies for the effective implementation of the 5S method in a manufacturing company*



Source: *Own study.*

After preparing a network of relationships for the problem examined of effective implementation of the 5S method in a manufacturing company, a summary table was developed for the factors of the network of relationships (Table 2). The central (middle) column contains 13 factors - network elements (Figure 1). The left part of the table contains the factors that influence the analysed factor (influencing factors - OD), while the right side contains those that are influenced by a given factor (factors subject to influence - PD).

Table 2. *Network factors and their influence for the effective implementation of the 5S method in a manufacturing company*

OD	IR	R	AND	T	Factors	PD	R	AND	T
8	B	+	3	M	**1. effectiveness of the 5S method**	**8**	+	3	L
4	AT	+	2	L		**2**	+	3	S
9	AT	+	3	S					
1	AT	+	3	S	**2. removal of unnecessary items**	**3**	+	2	S
5	B	+	3	S	**3. making it easier to find tools**	**5**	+	2	M
2	AT	+	2	S		**4**	+	1	M
7	AT	+	3	M					
3	AT	+	1	M	**4. elimination of waste**	**1**	+	2	L
7	AT	+	2	M					
3	B	+	2	S	**5. allocation of places to objects**	**3**	+	3	S
12	B	+	3	S		**12**	+	1	M
						6	+	1	S
5	AT	+	1	S	**6. making better use of space**	**7**	+	2	M
6	AT	+	2	M	**7. improving work ergonomics**	**3**	+	3	M
						4	+	2	M
						10	+	2	M
1	B	+	3	L	**8. how to implement the method**	**1**	+	3	M
10	B	+	3	M		**10**	+	3	M
						9	+	3	S
						13	+	2	M
8	AT	+	3	S	**9. training and workshops for employees**	**1**	+	3	S
						10	+	2	S
						13	+	2	S
8	B	+	3	M	**10. employee involvement**	**8**	+	3	M
12	B	+	2	M		**12**	+	1	M
7	AT	+	2	M		**11**	+	3	L
9	AT	+	2	S					
10	AT	+	3	L	**11. change in organisational culture**	**12**	+	1	L
5	B	+	1	M	**12. standards for cleaning and putting**	**5**	+	3	S
10	B	+	1	M		**10**	+	2	M
11	AT	+	1	L					

13	AT	+	1	S	**things away**				
8	AT	+	2	M	**13. communication and visualisation**	**12**	+	1	S
9	AT	+	2	S					

Source: *Own study.*

Based on the summary table of network factors (Table 1), an influence matrix was developed (Table 3), to which the impact intensity values were transferred (column I in Table 1). The resulting values show activity (sum of A) and reactivity (sum of P).

Table 3. *Influence matrix for the effective implementation of the 5S method in a manufacturing company*

Factors	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**ΣA**
1	X	3						3						**6**
2		X	2											**2**
3			X	1	2									**3**
4	2			X										**2**
5			3		X	1						1		**5**
6						X	2							**2**
7			3	2			X			2				**7**
8	3							X	3	3			2	**11**
9	3								X	2			2	**7**
10								3		X	3	1		**7**
11											X	1		**1**
12					3					2		X		**5**
13												1	X	**1**
Σ P	**8**	**3**	**8**	**3**	**5**	**1**	**2**	**6**	**3**	**9**	**3**	**4**	**4**	

Source: *Own study.*

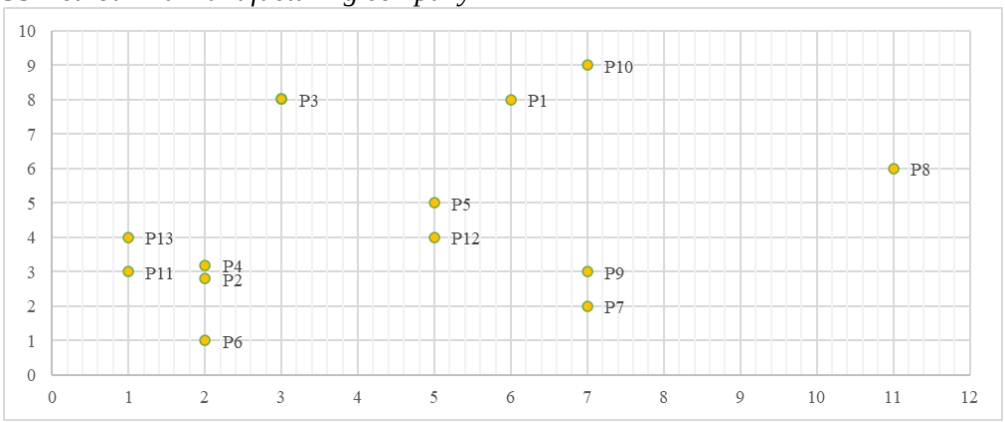
However, matrix analysis does not allow distinguishing groups of factors. The position of the factor in the selected category results from the values of the parameters A (activity) and P (reactivity) on the intensity map (Figure 2).

The intensity map (Figure 2) was created as a two-dimensional graph, where A values (activity) for each factor were placed on the horizontal axis and P values (reactivity) on the vertical axis. The dots and numbers mark the place of each factor defined in the network of connections. The following factors turned out to be critical factors that strongly influence other elements, but are also subject to strong influence themselves: the effectiveness of the 5S method (1), the method of implementing the 5S method (8) and employee involvement (10).

Active factors that have a very strong impact on other elements, but are not influenced by themselves, are: improvement of work ergonomics (7) and training and workshops for employees (9). Passive factors that have a small impact on others

but are itself subject to strong influence turned out to be: making it easier to find tools (3) and assigning places to objects (5), while the remaining factors are lazy factors, i.e., those that have a weak impact on other elements, but they themselves are subject to only weak influences.

Figure 2. *Intensity map and types of factors for the effective implementation of the 5S method in a manufacturing company*



Source: *Own study.*

The network thinking methodology was carried out to define groups of factors influencing the effective implementation of the 5S method in a manufacturing company. Next, a survey was conducted among the company's production employees on the assessment of individual groups of factors. This article will describe the research results concerning only a selected group of factors - critical factors, i.e. those that strongly influence other elements, but at the same time are themselves subject to strong influence. These factors included three: the method of implementing the 5S method and employee involvement and the effectiveness of the 5S method.

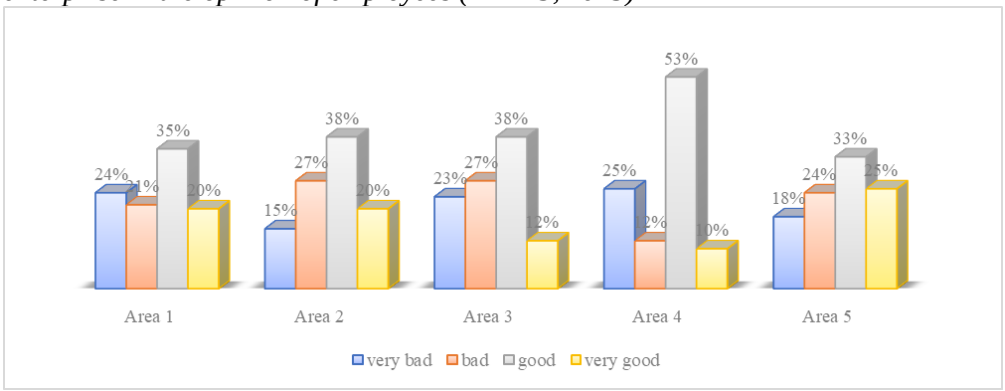
5. How to Implement the 5S Method in the Enterprise

Implementing the 5S method in the surveyed manufacturing company began at the beginning of 2022 in area 4 (pilot area). At the end of 2022, the 5S method had already been implemented in all production areas of the company. During the survey, employees were asked how they assessed the implementation of the 5S method in the company (Figure 3 - survey results in March 2023 and Figure 4 - March 2024).

The assessment of the implementation of the 5S method in the surveyed company was best in the case of area 4 - a positive assessment was given by 60% of the surveyed employees (53% "good" and 10% "very good"). It is hard to be surprised by such answers. The employees in area 4 felt distinguished and appreciated because this department was the starting point for the pilot implementation of the method in

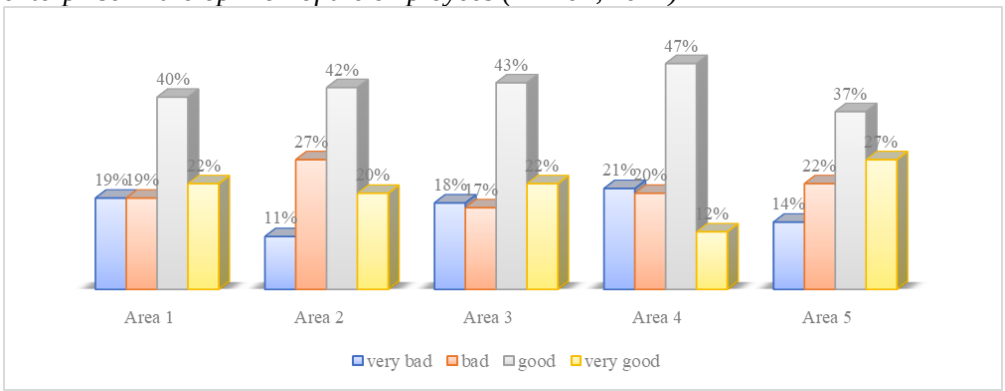
the company. The pilot area often later becomes a reference area. Taking a holistic look at the results of the research conducted in all five production areas in the first stage of implementation, one can see a consensus of opinions. Most employees assessed the implementation of the 5S method positively - an average of 39% indicated "good" (from 33% in area 5 to 38% in areas 2 and 3 and 53% in area 4) and an average of 17% indicated "very good" (from 10% in area 4 to 25% in area 5).

Figure 3. *First assessment of the method for implementing the 5S method in the enterprise in the opinion of employees (N=113, 2023)*



Source: *Own study.*

Figure 4. *Re-assessment of the method of implementing the 5S method in the enterprise in the opinion of the employees (N=104, 2024)*

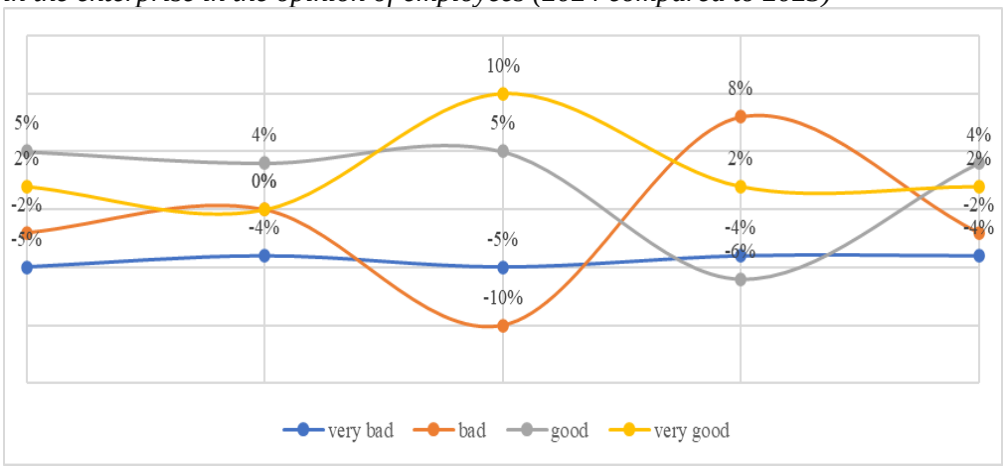


Source: *Own study.*

After a year of operation of the 5S method in all five production areas of the company, another survey was conducted among the same employees. Once again, most employees assessed the implementation of the 5S method positively - an average of 42% indicated "good" (from 37% in area 5 to 47% in area 4) and an average of 21% indicated "very good" (from 12% in area 4 to 27% in area 5). The value of positive responses increased from an average of 57% of responses in 2023 to an average of 62% in 2024.

The evaluation of the method to implement the 5S method in the case of pilot area 4 is interesting. Only 59% of the respondents gave a positive assessment in the following year - compared to 63% of the respondents' employees in the previous year. A detailed summary of the assessments of the method of implementing the 5S method from the next two years is presented in Figure 5.

Figure 5. *Summary of the evaluation of the method of implementing the 5S method in the enterprise in the opinion of employees (2024 compared to 2023)*



Source: *Own study.*

For extreme values ("very bad" and "very good") the trend of change is correct. For the "very bad" answer, in the five areas of the company surveyed, there was a 4-5% year-on-year decline in negative responses. However, for the "very good" answer, there was an increase in positive responses by 2% year-on-year. These results show a good trend, as the initial extreme values and opinions gradually smooth out.

There are interesting results for two sections: area 4 and area 3. For pilot area 4, there was a change in mood: the number of responses to "bad" increased by 8%, and the number of responses to "good" decreased by 6%. These results may indicate a decrease in enthusiasm among employees for the newly implemented concept ("they told us to do it"). The respondents also pointed out lack of management support, decreased motivation, and insufficient communication and clarification of doubts.

The research results for area 3 are even more interesting, where the number of indications for "bad" (a decrease by 10%) translated into "very good" indications (an increase also by 10%). The reason for such a change in this area of production was the introduction of an employee suggestion system. Foremen and managers were primarily involved in the implementation and maintenance of this system. This contributed to an increase in employee involvement and the elimination of one of the most common losses (muda) - underutilization of employee potential.

6. Involvement of Company Employees

The first three elements of the 5S method are intended to introduce law and order in the workplace, while the remaining two are guidelines for actions that aim to maintain and improve this system. Implementation of individual elements of 5S, showing the involvement of employees of the examined enterprise in the process of implementing the method, taking into account Deming's PDCA cycle (Shewhart, 1939, republished 1986; Isniah, Purba, Debora, 2020) is presented in Table 4.

Table 4. *Relationship of 5S elements and elements of the PDCA cycle in the enterprise studied*

Elements of PDCA	5S elements
Plan Establish goals and necessary processes	The first action to implement the 5S method in the studied enterprise was to plan and prepare activities in accordance with the 5S principles. It included both the preparation of employees and the appointment of the lead and evaluators. The company's management was aware that according to Le Chatelier's rule of contradiction the employees did not like changes. Therefore, it was decided to start the implementation process with training for employees, showing how the 5S principles work. These trainings were carried out in all areas of the company. Then, one of the areas (area 4 - technical department) was selected for pilot implementation of the 5S method. An implementation plan was developed and the available resources (human, material, technological, financial, information, etc.) were verified.
Do Implement new processes	In a selected area of the company (area 4), the rules for implementing the 5S method have been established: criteria for the actions taken have been established, responsibilities for specific groups of employees have been defined, and specific people have been assigned to specific work in a given area. As part of the first step (1S - selection), all items, devices, and tools were assessed in terms of their usefulness at the workplace, and then those that were unnecessary, useless, or redundant were eliminated (marked in red). In the second step (2S - systematicity), things, devices, and tools were arranged in the right way, and the visual techniques used (shadow boards) allow for greater employee efficiency by shortening the time of searching for the necessary items. There are three job groups in the selected area of the company (technical department). The first are the stations where mechanical repairs are made. A shadow board was created, which contains selected and necessary tools for this position. All are easily accessible above the workbench, allowing the mechanic to work ergonomically and effectively. The next group of positions are electrical repair stations. Next to the workbench is a cabinet containing the necessary tools. Each shelf in the wardrobe is labelled, and each tool has its own place, which makes the electrician's work easier and faster. The last group of positions are the locksmith positions. The devices are placed on the workbench, and the tools and equipment (shadow board) are placed above the table. The necessary personal protective equipment is located in an easily accessible, described place close to the workplace.

	In the next step (3S - cleaning), the rules for maintaining order and cleanliness at work stations were established: cleaning should take place every day (5-10 minutes before the end of the shift). A cleanliness corner was designated (shadow boards were also used here) and places were designated for individual waste bins. The department was divided into parts, and it was clearly defined who was responsible for cleanliness in a given part. This allowed us to easily find people responsible for any noncompliances in a given area of the workshop. In the next step (4S - standardisation), the conditions for continuous, daily maintenance of the previous steps were determined. Simple, transparent procedures, standards, and instructions have been established that must be followed by every employee. The process of creating standards took place with the participation of all employees affected by them. The rules applicable in a given area and the checklists were defined. Each of the three types of stations has a workbench and a tool cabinet. Their content has been standardised and strictly defined. The list of tools is the same for a given type of position. Each wardrobe has descriptions of individual shelves and drawers. The introduction of standardisation and instructions was crucial due to the department's shift work and the nature of the analysed area of the company.
Check Monitor and measure processes and report results	After implementing the 5S method in the first pilot area (area 4), implementation began throughout the entire company (five areas in total). The managers of the individual areas played an important role in the implementation work. Their activity and commitment translated into the successful implementation of the 5S method in the company. The last step (5S - self-discipline) aims to follow all the previous principles of the 5S method. This step is intended to develop the standards developed in employees and permanently integrate them into the life of the company. Managers of individual areas of the company were (and are) responsible for introducing improvements as part of continuous improvement. They can be proposed by all employees, regardless of their position. This allows employees to actively participate in process improvement. Managers are also responsible for systematically assessing progress in applying the 5S principles, as well as for rewarding employees (awarding prizes and bonuses).
Action Take continuous process improvement actions	Implementing the 5S method in an enterprise is not a completed process, it requires continuous setting of new standards in work processes. Based on the results and observations achieved, new standards must be established and developed that will allow the improvement of the 5S concept. The desire to maintain the changes implemented in the examined enterprise at the highest level requires the introduction of verification audits. Every day, upon handover, the shift leader is obliged to check the compliance of tools on shadow boards and the completeness of tool cabinets (daily audit). A monthly internal audit identifies areas where there are non-compliances or require improvement. Periodic refresher training is also an important aspect.

Source: *Own study.*

Due to the participation of employees in the process of implementing the 5S method in a selected area, the company managed to meet all 5S assumptions.

- 1S - selection - employees and foremen selected the tools most needed at the workplace (using red cards),
- 2S - regularity - employees are obliged to place tools in designated places (shadow boards),
- 3S - cleaning - designated places force tools to be put away,
- 4S - standardisation - employees and foremen provide a set of tools for the next work shift (full - without any defects - shadow board),
- 5S - self-discipline - developing the habit of following the rules and guidelines mentioned above to maintain the workplace among employees.

7. The Effectiveness of the 5S Method in the Enterprise

In the company studied, the 5S method was implemented in all five production areas, and the implementation process was systematised and organised. In the first period, great emphasis was placed on training (workshops) for employees (production and managers) to involve everyone in the implementation of 5S.

An integrated system was also created - places for recording documents, standards, a 5S implementation standard and a path for the entire company. It was determined how to create and what job standards should look like. The first 5S workshops were conducted in all production departments, and the form and frequency of 5S audits were defined. Audits of the implementation status in all areas are carried out quarterly (Table 5).

Table 5. *Maturity levels of the implementation of the 5S method in the surveyed enterprise based on 5S audits*

Period		Maturity level
Year 2023	1st quarter	0.1
	2nd quarter	0.4
	3rd quarter	0.7
	4th quarter	1.4
Year 2024	1st quarter	2.8

Source: *Own study.*

Table 5 shows the journey the company has travelled. In subsequent periods, an increase can be observed in the evaluation of the implementation and operation of the 5S method in the company examined. A result of 2.8 for the first quarter of 2024 means that the state is assessed as almost advanced (compare Table 1): level 2 - repetitive, partially organised processes, and level 3 - standardisation: processes organised and identified, but not measured. This bodes well for the future.

When assessing the effectiveness of the implementation and functioning of the 5S method in an enterprise, it is worth paying attention to two more aspects. The first is the implementation cost, which is generally low. It may include the purchase of cleaning tools, colourful stickers, paints, tapes, boards, containers, etc.

In return, you receive clean, tidy, and well-organised workstations. The second aspect is to change the way employees think. They become more open to changes and participate in process modelling, looking for possible ways of improvement themselves. This statement can be reversed: the condition for full implementation of the 5S method is the real involvement of everyone in the implementation process, both management and other employees.

In Chinese, the word "crisis" ("weiji") consists of two characters: the first indicates danger or threat, the second indicates the beginning of a new path or opportunity (https://mitsmr.pl, published 14 July 2020). Crises contain danger and threaten the current situation. But they also force you to act. And because of this, they become an opportunity.

8. Conclusions

Takashi Osada in "The 5S's: Five keys to Total Quality Environment" (1991) wrote that "if you manage to implement the 5S principles, you can succeed in anything. A company that is good at 5S will also be good at other practices. A company that cannot implement the 5S principles will not be able to perform other tasks required of a competitive company.

The 5S system is one of the basic Lean Management tools. Their use allows you to improve the organisation of work stations and introduce permanent rules of conduct and work that allow you to achieve higher productivity. The 5S system also allows employees to participate in company matters and use their knowledge and skills in the continuous improvement process (KAIZEN).

The implementation of 5S principles requires the involvement of all employees, but does not involve large implementation costs, which means that this system can translate into achieving higher profitability and efficiency. The implementation of 5S is one of the few moments in an employee's professional life when he has a real impact on his workplace and the way it will be organised. Making employees aware of this freedom and the possibility of real influence on their environment makes it much easier to overcome resistance to change.

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