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RESEARCH ARTICLE

Analysis Of 5S Work Culture Implementation: The Role Of Leadership And Employee Engagement On Business Performance In The Manufacturing Industry

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Abstract: This study examines the implementation of the 5S work culture in PT XYZ International, focusing on the roles of leadership commitment and employee involvement in enhancing business performance. The 5S principles—sorting, organizing, cleaning, standardizing, and sustaining discipline—are analyzed to identify critical factors influencing their effectiveness. Using Structural Equation Modeling-Partial Least Squares (SEM-PLS), data were collected from 100 respondents through questionnaires and analyzed to evaluate relationships between variables. The results indicate that leadership commitment and employee involvement significantly influence the implementation of the 5S work culture, accounting for 33.1% of the variation in business performance. However, suboptimal employee adherence to 5S principles remains a challenge, impacting the overall effectiveness of the work culture. Key findings highlight areas for improvement in technical and social aspects, with actionable recommendations proposed to enhance 5S implementation and business outcomes. This study contributes to understanding the integration of 5S principles in Indonesian manufacturing companies and offers insights for similar organizations aiming to optimize their operational efficiency.

Keywords: 5S Work Culture, Leadership Commitment, Employee Involvement, Business Performance, SEM-PLS

1. Introduction

The 5S work culture is a systematic movement emphasizing sorting, organizing, cleaning, maintaining, and standardizing workplace conditions to enhance efficiency and organization (Osada, 2000). This concept comprises five Japanese principles: *Seiri* (organization), *Seiton* (tidiness), *Seiso* (cleanliness), *Seiketsu* (standardization), and *Shitsuke* (discipline). In Japan, the 5S work culture has had a significant positive impact on companies, such as Toyota, which successfully penetrated the global market and emerged as a strong competitor against major automotive companies from the United States and other countries (Stefanic & Hegedic, 2012).

The success of the 5S work culture has also attracted attention from companies in Europe and Africa. Previous studies suggest that the implementation of 5S is influenced by social factors, such as the relationships between employees and leadership, and technical factors, including the application of 5S principles within the organization (Psomas et al., 2014;



Bortolotti et al., 2015). A study conducted in Tanzania by Bwemelo & Gordian (2014) demonstrated that employees in small and medium enterprises (SMEs) were willing to adopt the 5S work culture, provided there was strong teamwork. This aligns with Gupta & Jain's (2015) assertion that successful 5S implementation relies on collective efforts within a team.

In Indonesia, the adoption of the 5S work culture is relatively new and has not yet been fully implemented. One example of a company applying the 5S principles, adapted into the 5R culture (*Ringkas, Rapi, Resik, Rawat, Rajin*), is PT XYZ International, a pulp manufacturing company. Despite this, the company still faces challenges such as high product defect rates and suboptimal workplace organization. Additionally, ineffective communication between employees and management further hampers the effective implementation of 5R.

Addressing these issues, this study aims to analyze the roles of leadership commitment and employee involvement in the implementation of the 5S work culture and its impact on business performance in manufacturing companies. PT XYZ International was selected as the case study due to its adoption of the 5R culture, the absence of prior evaluations using SEM-PLS, and its relatively high product defect rates. SEM-PLS is employed as the research method because it allows for the modeling of relationships between variables and the identification of dominant variables requiring improvement. This study is expected to contribute to enhancing the implementation of 5S work culture in the Indonesian manufacturing sector.

2. Literature Review

2.1 Industry and Manufacturing Industry

The term *industry* refers to an economic activity focused on processing raw materials or semi-finished goods into more valuable finished goods (Kartasapoetra, 1987). Industries are categorized based on their scale into small, medium, and large, determined by the workforce size (Karim, 2011). Within this classification, the *manufacturing industry* emphasizes the transformation of raw materials into finished products, often involving machinery to produce large volumes of goods that meet standardized specifications (BPS, 2021).

2.2 Human Resources and Workplace Environment

Human resources are vital assets for an organization's success, comprising stakeholders such as employees, consumers, investors, and communities, all working in synergy to drive business operations (Ingham & Ulrich, 2016). Employee productivity significantly impacts organizational performance, necessitating a conducive workplace environment. A workplace environment, classified into physical and psychological dimensions, influences employees' performance through tangible resources and intangible factors like mental well-being (Sutrisno, 2009; Wursanto, 2009).

2.3 Employee Performance and Productivity

Employee performance refers to measurable, concrete outputs achieved by employees in their roles (Sedarmayanti, 2007). Performance measurement ensures employees align with organizational goals and meet targets within the stipulated time (Wibowo, 2007). Productivity, on the other hand, measures the efficiency of resource utilization to generate outputs that add value to the organization. High productivity reflects timely task completion without compromising quality (Yalley & Sekhon, 2014; Palvalin et al., 2017). Factors influencing productivity include financial resources, technology, human resources, and raw materials, with human resources often playing the most critical role (Prakash et al., 2017).

2.4 Business Performance



Business performance evaluates how effectively an organization utilizes its resources to achieve its objectives. Performance is influenced by external factors like industry characteristics and internal factors such as leadership style, organizational culture, and HR policies (Daft, 2000; Abujarad, 2010). Metrics for assessing business performance include productivity, cost, quality, delivery, flexibility, employee morale, and safety (Sahoo, 2019).

2.5 5S Work Culture

The 5S work culture, originating from Japan, is a systematic approach encompassing sorting (*Seiri*), organizing (*Seiton*), cleaning (*Seiso*), standardizing (*Seiketsu*), and sustaining discipline (*Shitsuke*) to improve workplace efficiency and reduce waste (Osada, 2000; Randhawa & Ahuja, 2017). This methodology, aligned with continuous improvement principles, minimizes waste and operational costs while enhancing organizational performance (Gupta & Jain, 2015). Successful implementation requires strong leadership commitment and stakeholder synergy.

2.6 Social and Technical Factors in 5S Implementation

The implementation of 5S is influenced by social factors, such as leadership, organizational culture, and employee empowerment, and technical factors, including tools and techniques for execution (Bortolotti et al., 2015; Gadenne & Sharma, 2009). These factors are interdependent in lean management systems, highlighting the need for comprehensive integration (Shah & Ward, 2007; Mårtensson & Snyder, 2018). Previous studies emphasize the importance of top management commitment and employee competency in achieving 5S effectiveness (Ram et al., 2015).

2.7 Benefits of 5S Work Culture

The 5S work culture improves product and process quality standards, reduces operational costs, and enhances process performance. It fosters organizational discipline through detailed control measures, creating a safe and efficient work environment (Hirano, 1995; Liker & Hoseus, 2008). Continuous improvement under 5S reduces non-value-added activities, promoting efficiency and safety (Randhawa & Ahuja, 2018).

2.8 Structural Equation Modeling - Partial Least Squares (SEM-PLS)

SEM-PLS is a statistical tool for modeling relationships between latent variables, suitable for small sample sizes or non-normally distributed data (Monecke & Leisch, 2012; Sarwono & Narimawati, 2015). SEM-PLS provides insights into variable interdependencies and identifies dominant factors influencing outcomes. Despite its benefits, SEM-PLS has limitations, including potential multicollinearity and estimation bias (Gye-Soo, 2016). Key analyses within SEM-PLS include outer model validation, inner model testing, and hypothesis evaluation, providing robust insights into the relationships between variables (Ghozali & Latan, 2015; Juliandi, 2018).

3. Research Method and Materials

The research was conducted at PT XYZ International, a manufacturing company selected based on specific criteria, including its status as a legally established corporation (e.g., PT, CV, or Firma) and its implementation of the 5S or 5R work culture. The study involved the company's employees as research subjects. This location was chosen because it met the necessary specifications and had not previously been evaluated for its 5S or 5R implementation using the SEM-PLS method.

A preliminary survey was conducted to identify critical issues related to the 5S work culture in the company. This involved direct observations and interviews to collect data, which were then analyzed using tools such as Pareto diagrams, check sheets, and fishbone diagrams. Based on the preliminary findings, a questionnaire was developed to measure variables such as leadership commitment, employee involvement, technical aspects of 5S, and business

performance. The questionnaire was designed using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) and adapted from prior research.

Data collection comprised two main sources: primary and secondary data. Primary data were gathered through observations, questionnaire distribution, and direct interviews with employees. The sample size was set at 100 respondents, exceeding the minimum requirement of 20 respondents recommended for SEM-PLS analysis, ensuring the reliability and validity of the data. Secondary data were obtained from related studies, including theses, journals, and proceedings, to support the analysis and interpretation of findings.

Data processing began with statistical tests for questionnaire validation and reliability using SPSS software. Subsequently, the conceptual model was tested using Smart PLS 3.0 software, which facilitated the evaluation of relationships between variables through outer and inner model testing. The processed data were then analyzed to generate insights, which formed the basis for discussion and interpretation.

The results of the analysis were detailed in the discussion section, highlighting key findings and their implications. These findings were used to formulate concise and clear conclusions and actionable recommendations. The recommendations were aimed at improving the implementation of 5S at PT XYZ International and providing insights for similar companies and stakeholders.

Several tools supported the research process to ensure efficiency and systematic execution. Microsoft Excel was used for questionnaire design and data compilation, Microsoft Word for documentation, Draw.io for creating research flow diagrams, SPSS for statistical analysis, and Smart PLS 3.0 for modeling relationships between variables. These tools facilitated a structured approach, aligning with the research objectives and ensuring a robust analysis.

4. Results and Discussion

Based on the hypothesis testing results, it was determined that both the outer model and inner model hypotheses were accepted. This indicates that the developed model accurately represents the company's current conditions. In other words, the model demonstrates similar characteristics to the actual state of the company.

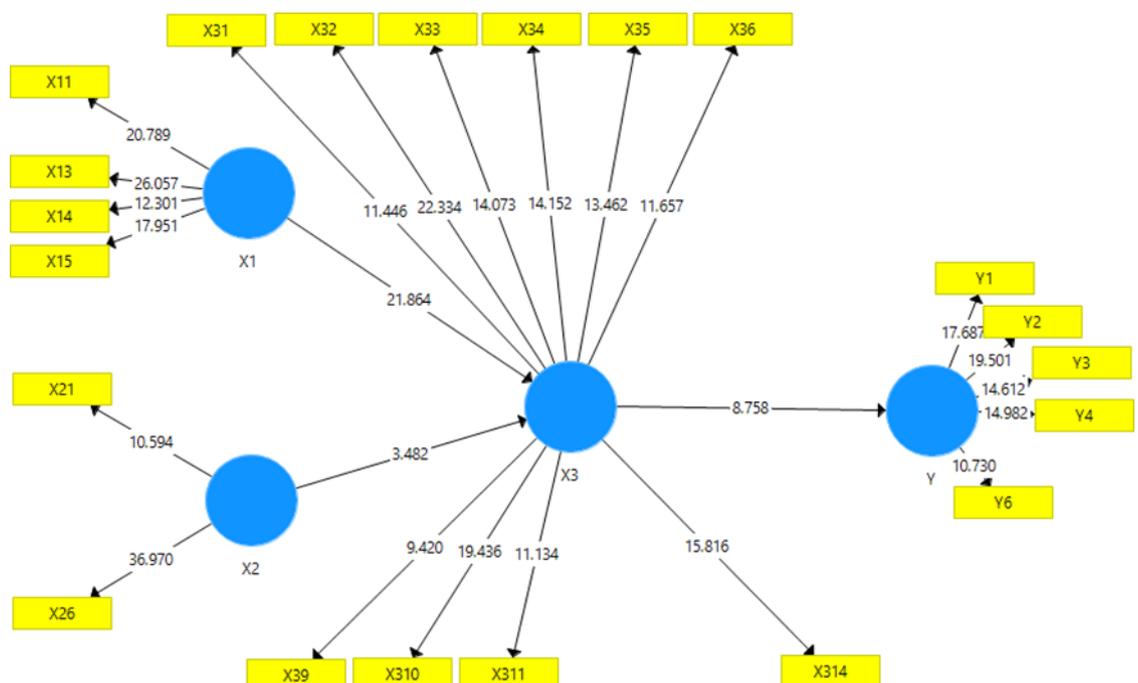


Figure 1: the Final Bootstrapping Model

The R-Square value for X3, which is 92.4%, shows that leadership commitment and employee involvement significantly influence the level of 5S implementation in the company. This means that higher participation from leaders and employees results in a higher level of 5S implementation. Meanwhile, the R-Square value for Y, which is 33.1%, indicates that leadership and employee involvement in implementing 5S account for 33.1% of the company's business performance. This suggests that the influence and contribution of leadership commitment and employee involvement in the 5S implementation moderately impact business performance.

In the leadership commitment variable, two indicators (X12 and X16) showed weak effects ($\text{sign} < 0.7$): the ability to overcome communication barriers in 5S (weak) and conducting 5S evaluations (moderate). In the employee involvement variable, four indicators (X22, X23, X24, X25) showed weak effects: teamwork in implementing 5S (substantial), responsibility for workplace tidiness (substantial), active participation in improving 5S practices (moderate), and responsibility for workplace cleanliness (moderate). Similarly, in the 5S implementation variable, five indicators (X37, X38, X312, X313, X315) demonstrated weak effects: individual cleanliness responsibility (substantial), maintenance of facilities (substantial), improvement of initial 3S standards (substantial), enhancing 5S practices through regular meetings (moderate), and follow-up on 5S improvements (moderate). Lastly, for the business performance variable, one indicator (Y5), effective space utilization (moderate), showed weak effects.

From this analysis, it can be inferred that while leadership is committed to implementing 5S, employee awareness and engagement, particularly in the aspects of sanitize (*resik*), standardize (*rawat*), and sustain (*rajin*), remain low. This aligns with field observations where management supports 5S adaptation by providing technical resources (e.g., banners, labels) and financial backing, such as constructing new buildings to optimize space utilization. However, employees exhibit a lack of adherence to 5S principles, such as only using personal protective equipment during inspections, leaving work areas dirty until others take the initiative to clean, handling materials with ink-stained hands, leaning or sitting on materials, opening packaging carelessly, and failing to maintain organized work areas and facilities. These behaviors negatively impact both the quality and quantity of production. Quality issues include defects such as dirt, tears, and cuts on materials or products, which are frequently found across nearly all production machines, as observed in the checksheet recapitulation.

Based on this analysis, the suboptimal impact of 5S implementation on business performance, which accounts for only 33.1%, is primarily due to employees' lack of concern for 5S implementation. The remaining business performance is likely influenced by other factors not examined in this study, such as supplier relations, financial management, and others. Therefore, the recommended course of action is to improve the technical aspects of the eliminated indicators (with $\text{sign} < 0.7$), including X12, X16, X22, X23, X24, X25, X37, X38, X312, X313, and X315. Strengthening these aspects can increase the contribution of 5S implementation to business performance, enabling the company to achieve more optimal results in the future.

5. Conclusion

The relationship and influence of leadership commitment and employee involvement in the implementation of 5S on the company's business performance are both positive and significant. This indicates that greater participation from both leaders and employees leads to a higher level of 5S implementation, which in turn results in improved business performance. The modeling results further identified dominant and non-dominant factors in the form of indicators. Dominant indicators include X11, X13, X14, X15, X21, X26, X31, X32, X33, X34, X35, X36, X39, X310, X311, and X314, which demonstrate strong contributions to the effectiveness of 5S implementation. Conversely, non-dominant indicators such as X12, X16, X22, X23, X24, X25, X37, X38, X312, X313, and X315 exhibit weaker influence, suggesting areas where improvements can be made to enhance the overall effectiveness of 5S and achieve even better business performance.

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