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Assessing the Impact of Quality Management Systems on Production Efficiency: A Case Study of a Manufacturing Company in Cavite

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***Abstract*: This study examines the impact of Quality Management Systems (QMS) on production efficiency in a manufacturing company in Cavite, Philippines. A descriptive-correlational quantitative research design was employed using survey data collected from 30 engineers and supervisors. Statistical analysis was conducted using SPSS to evaluate the relationship between QMS implementation and production efficiency indicators such as defect rate, machine downtime, and output performance. The results revealed a high level of QMS implementation and a statistically significant moderate positive correlation ($r = 0.572$, $p < 0.01$) between QMS and production efficiency. These findings indicate that effective implementation of QMS practices contributes to improved operational performance. The study recommends strengthening employee training, enhancing preventive maintenance systems, and adopting real-time monitoring tools to further optimize production efficiency.**

***Keywords*: Quality Management System (QMS), Productivity, Efficiency.**

1. Introduction

A. Background of the Study

The Quality Management Systems (QMS) are essential in modern manufacturing, as companies strive to improve product quality, reduce waste, and increase operational efficiency. Implementing a QMS leads to some significant benefits for the organization. With standardized processes comes consistency, and with continual improvement, you can deliver an exceptional product or service. This involves not only the standardization of production processes but also the systematic application of preventive measures (King et al., 2017; Kotsanopoulos & Arvanitoyannis, 2017; Panghal et al., 2018). Efficient processes result in fewer rejected products, less material wasted, and fewer instances of rework. This helps reduce the overall cost of production. For example, by reducing product defects or service failures, companies can significantly lower the cost increases caused by quality issues (Palanisamy & Palanichamy, 2025). The QMS process is designed to collect data and help you use it to make informed decisions. It quickly highlights any inefficiencies and drawbacks in your processes, with systems in place to help you improve them. Lean manufacturing and Six Sigma are two widely used methods. The former is committed to reducing waste and improving efficiency, while the latter focuses on reducing defect rates and process variability. The combination of the two – Lean Six Sigma – provides a powerful tool for addressing both horizontal and vertical issues in business processes (Sodhi, 2023). Manufacturers are expected to comply with the regulatory standards of their industries. By building these into your QMS, you can avoid legal repercussions and fines.

For companies in the Eurasian region, obtaining multiple quality system certifications (such as ISO 9001; ISO 14001, and OHSAS 18001) can further optimize corporate operational efficiency. Specifically, when enterprises hold all three of the above certifications, their production efficiency tends to increase; conversely, the withdrawal of these certifications may hinder the improvement of production efficiency (Hernandez-Vivanco & Bernardo, 2023).

Despite the adoption of QMS, many manufacturers still encounter challenges such as high defect rates, machine downtime, production delays, and variability in process execution. These operational issues raises questions about how effectively QMS are implemented and whether it truly contributes to improving production efficiency.

Production efficiency is a critical performance indicator for manufacturing organizations, as it directly affects cost, productivity, and market responsiveness. It involves not only producing more output but doing so with minimal errors, optimal use of resources, and reduced operational interruptions. Understanding how Quality Management Systems (QMS) influences these areas is vital for identifying gaps in current practices and developing strategies to enhance overall performance.

This study focuses on a manufacturing company in Cavite to assess the extent to which QMS implementation affects production efficiency. By analyzing the relationship between these two important variables, the research aims to provide insights that can guide managers, quality practitioners, and engineers in strengthening QMS practices and improving operational results. The findings may also serve as a reference

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for other manufacturing firms seeking to optimize their quality systems and enhance productivity.

B. Theoretical Framework

The study refers to a range of theoretical frameworks which can be used to illustrate how a quality management system is important and how it impacts production efficiency.

A quality management system (QMS) can be expressed as the organizational structure, procedures, processes, and resources required to implement quality management. Early systems concentrated on the outcomes of an industrial product production line, using simple statistics and random sampling. By the 20th century, labor inputs were typically the costliest inputs in most industrialized societies, so the focus was shifted to team cooperation and dynamics, especially the early development of problems via continuous improvement cycles. According to Pfeifer (2004) the necessary characteristics of QMS are summarized in Table 1.

The ISO9000 family of standards, published originally in 1987, was revised in 1994 and last time in December 2000. The revised ISO9000:2000 is based on eight quality management principles (Topferand Gunther, 2003; Dey, 2002). The success of quality management plans requires the determination of the advantages of the performance of the plans. The barriers are dedicated to three general fields. If the measurements are reduced and elimination of the barriers is not performed within the organization, applying and keeping quality management system is getting difficult and sometimes it is impossible. It is often difficult to define the quality barriers and quality limitations in five fields are categorized as follows, (Hawaks et al., 1996).

- The support of management of quality
- The relation between the staffs and managers
- Communication
- Being the victim of the changes
- Management isolation

The impact of quality management systems on production efficiency, utilizing the ISO 9001, one of the primary benefits of ISO 9001 is its ability to streamline processes and improve operational efficiency. The standard requires organizations to define, control, and continually improve their processes, ensuring that resources are used effectively, waste is minimized, and productivity is maximized.

- *Process Optimization:* ISO 9001 helps identify inefficiencies in workflows and processes, enabling businesses to make data-driven decisions to optimize performance.
- *Consistency and Standardization:* The standardization of processes reduces variations, leading to consistent quality and better control over operations.
- *Continual Improvement:* The focus on continual improvement drives organizations to regularly review and enhance their processes, ensuring that operational efficiency is always improving.

Productivity expresses as a relationship between the quantity of goods and services produced by a business or an economy and the quantity of labor, capital, energy, and other resources needed to produce the goods and services (Worrell et al., 2001). The results of the activities performed to improve productivity are stated in four perspectives, which include cost reduction, decreased process startup, increased quantity, and quality improvement. There are also five strategies to reach productivity stated in Table 2.

All productivity strategies are based on organizational strategic models, which were first stated by Edward Deming and Fig. 1 demonstrates details of the relationships among them.

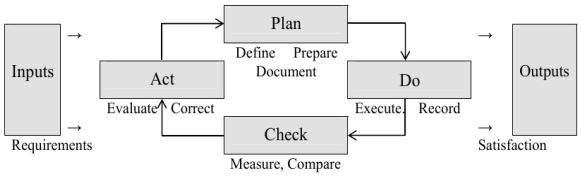

Fig. 1. Edward Deming PDCA diagram

C. Scope, Delimitation, and Limitation

This study focuses on assessing the impact of the QMS on production efficiency in a selected manufacturing company located in Cavite. It examines the level of Quality Management Systems (QMS) implementation in the organization, and it

Table 1
Characteristic of Quality Management Systems (QMS) (Pfeifer, 2004)

Characters	Definition
Objective	Customer satisfaction through high quality products
Strategy	Arranging business processes according to requirements of standards
Management	Listing of management responsibilities
Organization	Process owner; management representative (responsible for QMS)
Regarded resources	Human resources, infrastructure and work environment
Training	Required, but not specified
Project Management	PDCA (model for continuous improvement, voluntary)
Process approach	Model of a process-based QMS No specification
Documentation	Listing of requirements

Table 2
Five productivity strategies

Strategy	Definition
Plan	It means a conscious act, a guide (or collection of them) to encounter a condition
Map	It means a kind of arrangement to overcome the rival
Pattern	A pattern of actions that can be completely new or pre-defined
Position	The analysis of the position by which we view the issue (the position of the organization in the external environment)
Perspective	Mental attitudes of the organization's strategies (inside the organization)

covers QMS components, including document control, process standardization, corrective and preventive actions (CAPA), internal audits, and employee awareness of QMS practices. The study evaluates production efficiency using key performance indicators such as defect rate, machine downtime, production output, and cycle time.

The study is limited to organizations that actively implement a quality management system. It focuses solely on the impact of the quality management system on production efficiency rather than technical product testing.

External factors such as government regulations, industry-specific challenges, and economic fluctuations are beyond the scope of the study. The research does not cover individual case studies of specific organizations but provides a general industry-wide analysis.

D. Significance of the Study

This study provides valuable insights into how the implementation of QMS influences production efficiency in a selected manufacturing company in Cavite. The findings will benefit several groups, each in meaningful ways.

- Manufacturing Company (Management and Executives) - The results of this study will help the company's leadership assess whether their current QMS practices are effectively contributing to improved production performance. It will also guide decision-makers in identifying areas that need additional resources or improvement initiatives. By understanding the relationship between QMS and production efficiency, management can create more strategic plans to strengthen quality systems, reduce operational losses, and increase competitiveness.
- Quality Assurance and Production Departments - Quality engineers, supervisors, and production staff will benefit through clearer insights into how QMS influences daily operations. The study can serve as a basis for refining process documentation, enhancing corrective and preventive actions (CAPA), and improving compliance to standard operating procedures. This may lead to fewer defects, shorter cycle times, and smoother production flow.
- Industry and Other Manufacturing Firms - The research can serve as a reference for other manufacturing companies in Cavite and similar industrial zones. By demonstrating how QMS influences production efficiency, the study can encourage other organizations to adopt or improve their QMS practices. It may also contribute to industry-wide quality improvements and operational best practices.
- Academic Community and Future Researchers - This study contributes to the body of knowledge on quality management and operations management, specifically in the Philippine manufacturing context. It may serve as a reference for students, educators, and researchers conducting related studies on QMS, production efficiency, and industrial management. Future researchers may also use the findings to compare different companies, industries, or QMS maturity levels.

2. Methodology

A. Study Design

This study employed a descriptive-correlational quantitative research design. A survey method was used to assess the level of QMS implementation and its impact on production efficiency. The correlational approach was applied to determine the relationship between QMS implementation and production efficiency, as well as to examine the strength and direction of this relationship.

1) Locale of the Study

This study was conducted in a selected one (1) manufacturing company located in Cavite. The company was selected due to the current situation to assess the quality management system level and its impact on production efficiency.

These organizations were chosen based on their size, reputation, and established processes for maintaining quality in production.

Data collection was conducted within the premises of the organizations, where employees from engineers and supervisors participated in the survey.

The study was carried out, and permission for participation was granted by the management of each organization involved. By focusing on the specific locations, the study aims to gather relevant insights, providing a comprehensive understanding of the quality management system's impact on production efficiency.

2) Population and Sample of the Study

The population and sample in this research comprised engineers and supervisors in the selected manufacturing in Cavite. The population comprised twenty (20) engineers and ten (10) supervisors. These individuals were chosen as the target population due to their influence on the organization's commitment to the quality system.

The researchers utilized a purposive sampling method to ensure that both engineers and supervisors were represented proportionally within the 30-person sample. This approach helped capture a diverse range of insights regarding the impact of the quality management system on production efficiency.

B. Data Analysis

To assess the level of QMS implementation within the organization and its impact on production efficiency, the primary research instrument used in this study was a structured survey questionnaire, and it was validated by experts. This tool was developed based on relevant literature and aligned with the research objectives to gather quantitative data from the selected respondents.

The questionnaire consisted of three main parts: Part I is the demographic profile of the respondents based on age, gender, job position, and length of service in the organization. Part II is the Level of QMS implementation (Likert Scale) includes a series of statements designed to measure employees' general understanding of document control, process standardization,

corrective and preventive actions, internal quality audit, employee awareness, and training, while Part III measures the production efficiency, which includes defect rate, machine downtime, and production output. Respondents were asked to rate each statement using a 5-point Likert Scale, where 1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree and 5 – Strongly Agree.

1) Data Collection Procedure

This study employed a systematic data collection procedure to assess the level of quality management system implementation and its impact on production efficiency. The procedure was carefully designed to ensure accurate, reliable, and ethical data gathering. The researchers provided informed consent along with the survey questionnaires to engineers and supervisors. After obtaining their permission to participate in the study, the researchers distributed the survey questionnaires for them to complete. A maximum of thirty (30) minutes was allocated for respondents to complete the survey.

2) Ethical Considerations for the Analysis of the Study

Ethical considerations are vital in ensuring the integrity and credibility of any research study.

Firstly, obtaining informed consent is essential. Before conducting the survey, it is necessary to inform and explain the study to the target respondent, and it is necessary for their willingness to answer, including the freedom to withdraw at any time without penalty. To ensure confidentiality and anonymity, any information provided in the survey questionnaire will be handled with strict confidentiality, and personal identifiers will be removed to prevent the disclosure of individual identities. All collected data will be accurately recorded, securely stored, and preserved to maintain its integrity and prevent unauthorized alterations. Furthermore, researchers bear the responsibility for the ethical use of research findings, ensuring that results are reported honestly and applied in ways that benefit society without causing harm. By adhering to these ethical principles, researchers uphold the integrity of their work and contribute positively to the advancement of knowledge and social well-being.

C. Data Analysis

The responses from the survey were analyzed by calculating the percentage and frequency using SPSS. Since this study identified frequency and percentage for each item in the questionnaire, the interpretation of these findings was based on Alkharusi (2022) suggestion for interpreting the composite source using the average.

Table 3
Interpretation table of score

Interval	Interpretation
1 - 1.80	Strongly Disagree
1.8 - 2.61	Disagree
2.62 - 3.42	Neutral
3.43 - 4.23	Agree
4.24 - 5.04	Strongly Agree

3. Results and Discussion

In this section, all data gathered were discussed to address the questions associated with this study.

Of all 30 respondents, their demographics were found to be 50 % (n=15) female, and 50% (n=15) male. In terms of their ages, the majority of respondents are 63.3% (n=19) were aged 26 - 35 years old, followed by 23.3% (n=7) were aged 36-45 years old, 13.3% (n=4) were aged 18-25 years old. Furthermore, the researchers aimed to distinguish the respondents' length of service in the organization, and it was found out that most of the respondents have 4-6 years' experience which is 30% (n=9), followed by 20% (n=6) have 1-3 years and 7-10 years' experience, 16.7% (n=5) have more than 10 years' experience and 13.3% (n=4) have less than a year experience.

A. Level of Quality Management System Implementation

After the analysis of the summary of employees' responses (Table 4), the result shows 4.20 (agreed) for document accessibility, 4.23 (agreed) for document availability, 4.03 (agreed) for clear and uniform procedures, 3.93 (agreed) for SOP compliance, 3.87 (agreed) for standard and consistent tasks, 3.80 (agreed) the defects are carefully investigated, 3.93 (agreed) for the corrective and prevented actions are being implemented, 4.00 (agreed) that employees are aware on quality issues, 4.37 (strongly agreed) for regular internal audits, 4.37 (strongly agreed) for audit findings closure, 4.03 (agreed) for internal audit cooperation of each team member and 3.70 (agreed) that every employee is responsible for maintaining quality standard.

The findings indicate that respondents perceive defect identification and resolution processes as effective (M = 3.93), suggesting that QMS practices contribute to improved quality control. Furthermore, respondents agreed that quality checks

Table 4
Level of Quality Management Systems (QMS) implementation

	Responses	Mean	Std. Deviation
Document Accessibility	30	4.20	0.61
Document Availability	30	4.23	0.57
Clear and uniform procedures	30	4.03	0.67
SOP compliance	30	3.93	0.69
Standard and consistent tasks	30	3.87	0.86
Defects are carefully investigated	30	3.80	0.76
Corrective actions implementation	30	3.93	0.69
Employee awareness on quality issues	30	4.00	0.53
Conduct regular internal audits	30	4.37	0.72
Audit findings closure	30	4.37	0.67
Internal audit cooperation	30	4.03	0.61
Employee's awareness of QMS	30	3.70	0.75
Employee training for QMS	30	3.67	0.66
Employee's responsibility in maintaining the quality standard	30	4.40	0.62

Table 5
Level of production efficiency

	Responses	Mean	Std. Deviation
Defects were identified resolved quickly	30	3.93	0.69
Quality checks can reduce defects	30	4.10	0.61
Regular maintenance activity	30	3.87	0.63
Equipment problems are being addressed	30	3.70	0.60
Production targets achieved	30	3.93	0.74
Output levels meet the company's expectations	30	3.70	0.60

Table 6
Correlation of QMS and production efficiency

		QMS	Production Efficiency
QMS	Correlation Coefficient	1	**.572****
	p < 0.01		
	N	30	30
Production Efficiency	Correlation Coefficient	**.572****	1
	p < 0.01		
	N	30	30

help reduce defects (M = 4.10), indicating the effectiveness of preventive quality measures. Regular maintenance activities (M = 3.87) and the ability to address equipment problems (M = 3.70) also contribute to maintaining production efficiency, although these areas show opportunities for further improvement. Additionally, production targets are generally achieved (M = 3.93), and output levels meet company expectations (M = 3.70), reflecting a satisfactory level of operational performance. Overall, these results suggest that while QMS implementation supports production efficiency, further improvements in equipment management and process optimization are necessary.

B. Correlation between QMS Implementation and Production Efficiency

The researcher used Spearman's rho non-parametric tests in SPSS over the Pearson correlation due to the nature of the data and distribution assumption to determine the relationship between the QMS and production efficiency.

The result shows a moderate positive relationship (0.572) found between QMS and production efficiency, suggesting that the company's focus on standardized tasks (mean = 3.87) and careful defect investigation (mean = 3.80) is yielding results. These findings mirror the theoretical benefits of Lean Six Sigma discussed earlier, where the combination of waste reduction and defect control provides a powerful tool for process optimization. The fact that respondents agreed that quality checks actively reduce defects (mean = 4.10) indicates that the company is moving toward the 'Zero Defect' goal typical of high-maturity quality systems.

While Spearman's rho of 0.572 confirms a significant moderate positive relationship, it also suggests that production efficiency is a multifaceted variable influenced by factors beyond the QMS. As noted in the study's delimitations, external factors such as economic fluctuations and industry-specific challenges play a role in operational outcomes. Furthermore, the 'Neutral' to 'Agree' ratings in equipment problem addressing (3.70) suggest that physical infrastructure and machine maintenance—separate from the procedural nature of QMS—are critical contributors to the remaining variance in efficiency levels.

4. Summary and Conclusion

A. Summary of Findings

The results of the study show that the level of QMS implementation is highly described in documentation control, process standardization, implementation of corrective and preventive actions, internal audits, and employees' awareness of quality standards. The impact of the QMS is significant in enhancing productivity efficiency, as results show that the proper implementation of the QMS can improve productivity efficiency.

B. Conclusion

The study concludes that the effective implementation of QMS significantly enhances production efficiency in manufacturing operations. The identified moderate positive correlation confirms that structured quality management practices contribute to improved operational outcomes. The findings highlight the importance of process standardization, internal audits, and employee awareness in achieving efficiency. However, further improvements in employee training and equipment maintenance are necessary to maximize production performance. Strengthening these areas will enable organizations to sustain continuous improvement and maintain competitiveness in the manufacturing industry.

C. Recommendations

Based on the findings of the study, several recommendations are proposed to enhance the effectiveness of QMS and improve production efficiency. The organization should strengthen its QMS training programs by implementing continuous and specialized training sessions to deepen employees' understanding of quality standards and practices. It is also recommended to reinforce preventive maintenance systems to reduce equipment downtime and improve operational reliability. Additionally, the adoption of real-time monitoring tools for defect detection and process performance is encouraged to enable faster decision-making and immediate corrective actions. Improving the implementation of corrective and preventive actions (CAPA) and fostering greater employee involvement in quality initiatives are also essential to sustain continuous improvement. These measures will help the

organization optimize production processes, minimize inefficiencies, and achieve higher levels of operational performance.

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