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Total Quality Management and Productivity of Steel Threading Firm in Port Harcourt

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ABSTRACT

Organizational productivity refers to the ability of an organization to effectively utilize its resources to achieve its goals and objectives efficiently. It is a measure of how efficiently an organization utilizes its inputs (such as labor, capital, technology, and materials) to produce desired outputs (products or services) within a given time frame. Productivity is essential for meeting customer demands and expectations. Pipe threading firms in Port Harcourt are likely to serve clients in the oil and gas industry, where timely completion of projects is crucial. A productive organization can deliver services promptly, meet project deadlines, and ensure customer satisfaction.

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Introduction

Organizational productivity refers to the ability of an organization to effectively utilize its resources to achieve its goals and objectives efficiently. It is a measure of how efficiently an organization utilizes its inputs (such as labor, capital, technology, and materials) to produce desired outputs (products or services) within a given time frame. Productivity is essential for meeting customer demands and expectations. Pipe threading firms in Port Harcourt are likely to serve clients in the oil and gas industry, where timely completion of projects is crucial. A productive organization can deliver services promptly, meet project deadlines, and ensure customer satisfaction.

In a competitive business environment, productivity plays a significant role in gaining a competitive edge. Highly productive pipe threading firms can offer faster turnaround times, cost-effective services, and high-quality outputs. This can attract more customers and help the organization outperform its competitors. Productivity is directly linked to cost efficiency. By maximizing productivity, organizations can optimize the use of resources, reduce waste, and minimize operational costs. This can lead to improved profitability and financial sustainability for pipe threading firms in Port Harcourt. Total Quality Management (TQM) is a management approach that focuses on continuous improvement, customer satisfaction, and the involvement of all employees in the quality enhancement process.

TQM encompasses several dimensions, including management commitment, output quality assurance, and continuous improvement, which have a direct impact on organizational productivity in terms of turnaround time, efficiency, and utilization. Management commitment is a critical dimension of TQM that involves the dedication and involvement of top-level management in quality improvement initiatives. When management demonstrates a strong commitment to quality, it sets the tone for the entire organization and encourages employees to prioritize quality in their work. This commitment can lead to improved productivity by fostering a culture of quality consciousness, motivating employees to perform at their best, and allocating resources effectively to support quality initiatives (Juran & Godfrey, 1999).

Output quality assurance is another important dimension of TQM that focuses on ensuring the delivery of high-quality products or services to customers. By implementing quality control measures, organizations can detect and correct defects or errors before the final output reaches the customer. This dimension directly impacts organizational productivity by reducing rework, minimizing customer complaints, and improving the overall efficiency of production processes (Oakland, 2014). Continuous improvement, also known as Kaizen, is a fundamental principle of TQM that emphasizes the ongoing effort to enhance processes, products, and services. This dimension involves the identification of areas for improvement, the implementation of corrective actions, and the monitoring of results to ensure sustained progress. Continuous improvement contributes to organizational productivity by optimizing processes, reducing waste, and increasing efficiency over time (Deming,2000).

TQM practices can lead to reduced turnaround time, which refers to the time taken to complete a process or deliver a product/service. By eliminating bottlenecks, streamlining workflows, and enhancing quality control, organizations can achieve faster turnaround times, resulting in increased productivity. TQM improves efficiency by eliminating waste, improving process flows, and promoting standardization. By focusing on quality improvement and reducing errors or defects, organizations can achieve higher levels of efficiency in their operations, ultimately increasing productivity. TQM emphasizes the optimal utilization of resources, including human resources, technology, and materials. Through effective resource allocation and utilization, organizations can maximize productivity by ensuring that resources are utilized to their full potential and avoid unnecessary downtime or

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inefficiencies.

The productivity of pipe threading firms in Nigeria has emerged as a critical concern in the current business landscape. Low organizational productivity can lead to inefficiencies, missed deadlines, increased costs, and reduced customer satisfaction. Understanding the factors contributing to poor organizational productivity in pipe threading firms is essential for identifying areas of improvement and implementing strategies to enhance productivity levels.

Poor organizational productivity directly affects the financial performance of pipe threading firms. Inefficient processes, longer turnaround times, and increased rework lead to higher costs, lower profitability, and reduced competitiveness (Dike & Aghimien, 2019). Inadequate productivity can also result in missed project deadlines, leading to potential financial penalties and loss of future business opportunities (Ndubisi et al., 2020).

Low productivity negatively impacts customer satisfaction levels in pipe threading firms. Delays in project completion, errors, and subpar quality due to poor productivity can result in dissatisfied customers (Efe & Mustafa, 2016). Unmet customer expectations and reduced service quality can lead to customer complaints, negative word-of-mouth, and loss of business to competitors (Ndubisi et al., 2020). Low productivity hampers the competitive positioning of pipe threading firms in the Nigerian market. Inefficiencies and delays can result in missed business opportunities, reduced market share, and loss of potential clients (Uwadiegwu et al., 2020). Competitors with higher productivity levels can offer faster turnaround times, better service quality, and cost-effective solutions, thereby gaining a competitive advantage.

Despite the recognized significance methods of enhancing organizational productivity (increasing workers' pay, motivation, etc.), there is still poor productivity of pipe threading firms in Port Harcourt, Nigeria (Deming, 2020). Furthermore, there is a dearth of empirical research investigating the relationship between TQM practices and productivity specifically within the context of pipe threading firms operating in Port Harcourt. This knowledge gap hinders the ability of these firms to optimize their productivity levels and fully leverage the potential benefits of TQM principles.

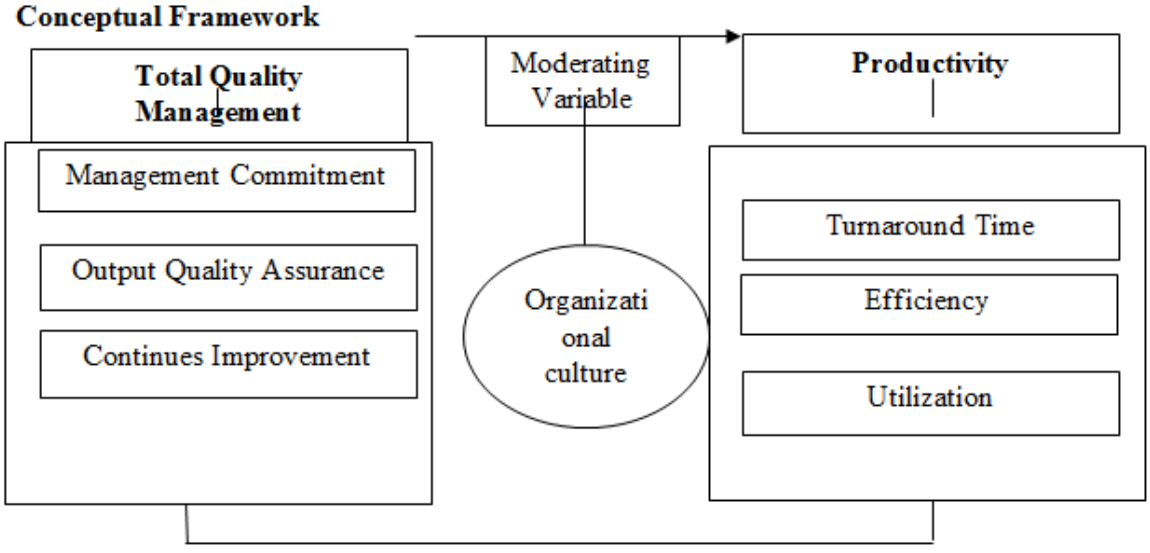

Figure 1: Conceptual Framework of Total Quality Management and Productivity

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The study aims to examine the impact of total quality management and productivity of pipe threading firm in Port Harcourt with the following hypotheses formulated.

H_{O1}: There is no significant relationship between management commitment and turnaround time of pipe threading firm in Port Harcourt.

H_{O2}: There is no significant relationship between management commitment and efficiency of pipe threading firm in Port Harcourt.

H_{O3}: There is no significant relationship between management commitment and utilization of pipe threading firm in Port Harcourt.

H_{O4}: There is no significant relationship between output quality assurance and turnaround time of pipe threading firm in Port Harcourt.

H_{O5}: There is no significant relationship between output quality assurance and efficiency of pipe threading firm in Port Harcourt.

H_{O6}: There is no significant relationship between output quality assurance and utilization of pipe threading firm in Port Harcourt.

H_{O7}: There is no significant relationship between continuous improvement and turnaround time of pipe threading firm in Port Harcourt.

H_{O8}: There is no significant relationship between continuous improvement and efficiency of pipe threading firm in Port Harcourt.

H_{O9}: There is no significant relationship between continuous improvement and utilization of pipe threading firm in Port Harcourt.

H_{O10}: Organizational culture does not significantly moderate the relationship between total quality management and productivity of pipe threading firm in Port Harcourt.

Conceptual Review

Total Quality Management

Total Quality Management (TQM) is a management approach that emphasizes the continuous improvement of quality in all aspects of an organization's operations. It involves a comprehensive and integrated set of principles, practices, and techniques aimed at achieving customer satisfaction, enhancing organizational performance, and fostering a culture of quality consciousness among employees. TQM is rooted in the philosophy that quality is not a separate department or a one-time activity but a fundamental aspect of every organizational function. It requires the involvement of all employees at all levels of the organization and encourages them to actively participate in quality improvement initiatives.

One of the fundamental aspects of TQM is customer focus. TQM recognizes the importance of understanding customer needs, expectations, and preferences. By actively listening to customer feedback, conducting market research, and engaging in dialogue with customers, organizations can align their products and services to meet customer requirements (Sallis, 2014). This customer-centric approach helps organizations build stronger relationships with customers, improve customer satisfaction, and gain a competitive advantage in the marketplace.

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Dimensions of Total Quality Management

Management commitment: Management commitment is a crucial dimension of Total Quality Management (TQM) that emphasizes the dedication and active involvement of top-level management in promoting and implementing quality improvement initiatives throughout the organization. Management commitment sets the foundation for a culture of quality and provides the necessary resources, support, and guidance for the successful implementation of TQM practices (Juran & Godfrey, 1999). Management commitment requires leaders to articulate a clear vision for quality and communicate it effectively to all employees. Leaders must demonstrate a strong belief in the value of quality, set high-quality standards, and promote a shared understanding of the organization's quality goals and objectives (Oakland, 2014).

Management commitment includes the development of quality policies and strategies that guide the organization's approach to quality management. These policies outline the organization's commitment to quality, set specific objectives, and provide a framework for implementing TQM principles throughout the organization (Oakland, 2014).

Output Quality Assurance: Output Quality Assurance is an essential dimension of Total Quality Management (TQM) that focuses on ensuring the delivery of high-quality products or services to customers. It involves implementing effective quality control measures throughout the production or service delivery process to detect and address defects or errors before the final output reaches the customer (Oakland, 2014).

Output Quality Assurance focuses on preventing defects or errors from occurring in the first place. This involves identifying potential sources of defects, analyzing root causes, and implementing measures to eliminate or mitigate those causes (Oakland, 2014). By proactively addressing potential issues, organizations can reduce the likelihood of defects and improve overall output quality.

Continues Improvement: Continuous improvement, also known as Kaizen, is a fundamental concept within Total Quality Management (TQM) that emphasizes the ongoing effort to enhance processes, products, and services within an organization. It involves a systematic and incremental approach to improvement, with the goal of achieving higher levels of quality, efficiency, and effectiveness over time (Deming, 2000). Continuous improvement begins with identifying areas that require improvement. This can be done through various means, including feedback from customers, employees, and stakeholders, data analysis, process mapping, and performance metrics (Oakland, 2014). By identifying problem areas, organizations can focus their improvement efforts on the most critical areas for enhancement.

Productivity

Organizational productivity refers to the measure of an organization's efficiency and effectiveness in utilizing its resources to achieve its goals and objectives. It is the ability of an organization to maximize output and generate desired outcomes while minimizing resource utilization (Drucker, 1999). Improving organizational productivity is essential for organizations to remain competitive, achieve sustainable growth, and deliver value to stakeholders. By enhancing output quantity, quality, resource utilization, turnaround time, and efficiency, organizations can optimize their performance, increase profitability, and improve their market position.

Measures of Productivity

Turnaround Time: Turnaround time refers to the duration or period it takes for an organization to complete a specific process or deliver a product or service to the customer. It measures the time taken

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from the initiation of a process or request to its final completion or delivery. Turnaround time is a critical aspect of organizational productivity as it directly impacts customer satisfaction, operational efficiency, and overall performance. In the context of manufacturing or service organizations, turnaround time includes the time taken to process customer orders from the initial request to order confirmation, scheduling, production, and final delivery. Efficient order processing ensures timely fulfillment of customer requirements (Cheng et al., 2020).

Efficiency: Efficiency is a concept that measures the ability of an organization to accomplish its goals and objectives with the optimal utilization of resources. It focuses on achieving maximum output or results with the minimum input of resources, such as time, money, materials, and labor. Efficiency is a critical aspect of organizational productivity and is closely linked to cost-effectiveness and resource optimization. Efficiency can be evaluated through various metrics, such as the ratio of output to input or the comparison of actual output against the planned or expected output. Organizations strive to improve efficiency by identifying and eliminating waste, streamlining processes, and optimizing resource allocation (Drucker, 1999).

Utilization: Utilization refers to the degree to which resources, such as human capital, equipment, facilities, or materials, are effectively and efficiently employed to achieve organizational goals. It measures the extent to which resources are utilized to their full capacity and potential in delivering goods, services, or completing tasks. Maximizing utilization is crucial for optimizing organizational productivity and performance. Efficient utilization of equipment and facilities involves ensuring that physical assets are operating at their maximum capacity and efficiency. This includes minimizing downtime, reducing idle time, and optimizing scheduling and maintenance practices. Proper utilization of equipment and facilities improves operational efficiency and reduces costs (Meredith & Shafer, 2019). Optimizing utilization enables organizations to achieve several benefits. It enhances productivity, reduces waste, improves cost-effectiveness, and increases operational efficiency. Efficient utilization of resources also contributes to improved customer satisfaction, shorter lead times, and enhanced competitiveness (Meredith & Shafer, 2019).

Organizational Culture

Organizational culture refers to the shared beliefs, values, norms, attitudes, and behaviors that characterize an organization. It represents the collective mindset and identity of an organization and influences how employees perceive and interpret the organizational environment. Organizational culture plays a crucial role in shaping employee behavior, decision-making, and overall organizational performance. Organizational culture reflects the shared beliefs and values that guide employee attitudes and behaviors within the organization. These beliefs and values shape the organization's identity, purpose, and priorities. They provide a framework for decision-making and set the standards for what is considered acceptable or unacceptable behavior (Schein, 2010).

Organizational culture establishes norms and behavioral expectations that govern employee conduct. These norms define how employees interact, communicate, and collaborate with one another. They influence work ethics, teamwork, and the overall work environment within the organization (Cameron & Quinn, 2011). Organizational culture has a profound impact on employee attitudes, behaviors, and performance. A positive and strong culture that aligns with organizational goals and values can enhance employee motivation, job satisfaction, and engagement. It fosters a sense of belonging, a shared purpose, and a supportive work environment (Denison, 1990).

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Theoretical Review

The RBV theory was initially propounded by Jay Barney in 1991. Barney introduced this theory as an alternative to the traditional industry-based view of strategy, which primarily emphasized external factors such as market conditions and industry structure. The resource-based view (RBV) theory is a strategic management framework that focuses on the role of internal resources and capabilities in achieving sustainable competitive advantage. The RBV theory suggests that an organization's unique resources and capabilities, when properly leveraged, can create a competitive edge that is difficult for competitors to replicate (Barney, 1991).

The theory assumes that resources differ in terms of their nature, level, and strategic value. Not all resources are equally valuable or rare. The theory assumes that resources cannot be easily transferred or replicated across organizations, contributing to sustained competitive advantage. The theory suggests that an organization's resource base is the outcome of past decisions and investments, and it takes time and effort to develop and accumulate resources.

The RBV theory is relevant to understanding the impact of TQM and productivity in pipe threading firms in Port Harcourt. By applying RBV theory, the focus can be placed on the unique resources and capabilities that pipe threading firms possess, such as skilled workforce, advanced machinery, and quality management systems. These resources, when effectively managed and aligned with TQM practices, can contribute to sustained competitive advantage and improved productivity. The RBV theory encourages organizations to identify and leverage their core resources and capabilities to enhance productivity and achieve superior performance. In the context of pipe threading firms, the theory highlights the importance of assessing and leveraging resources such as skilled labor, technological capabilities, and efficient production processes to drive productivity gains through the implementation of TQM principles.

Empirical Review

Bonventure et al. (2014) carried out a study on Top Management Commitment Towards Implementation of Total Quality Management (TQM) in Construction Companies in Nakuru County-Kenya. Their study sought to determine the factors influencing implementation of TQM in construction companies in Nakuru County. Questionnaires and structured questionnaires involving the participation of over 15 construction companies were used as the main tools for this study. The findings of this study revealed that Top Management Commitment is a critical factor affecting the implementation of TQM in construction companies in Nakuru County. The study thus recommends that construction industry sector give this factor special consideration when developing their TQM approaches. The study further recommends that studies be done to explore other factors other than top management commitment affecting the implementation and success of TQM.

Smith (2019) undertook a study on Enhancing Organizational Productivity through Output Quality Assurance: A Case Study of Manufacturing Firms in New York. The objective of this study was to examine the relationship between output quality assurance practices and organizational productivity in the manufacturing sector. The population of interest included manufacturing firms operating in New York. A sample of 100 manufacturing firms was selected using stratified random sampling, ensuring representation from various sub-sectors and company sizes. The study adopted a mixed-methods approach, combining both quantitative and qualitative data. A survey questionnaire was used to collect quantitative data on output quality assurance practices and organizational productivity. Additionally, in-depth interviews were conducted with a subset of firms to gain deeper insights into the implementation

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and impact of output quality assurance practices. Descriptive statistics were used to analyze the survey data, including measures of central tendency and variability. Qualitative data from interviews were analyzed using thematic analysis to identify key themes and patterns. The study found a significant positive correlation between the level of output quality assurance practices and organizational productivity in the manufacturing firms. Firms that implemented robust output quality assurance measures demonstrated higher levels of productivity, as measured by output quantity, output quality, and customer satisfaction. The qualitative analysis revealed that effective output quality assurance practices led to improved process efficiency, reduced rework, and better alignment with customer requirements.

Johnson (2020) undertook a study on The Impact of Total Quality Management on Organizational Productivity: A Case Study of Service Organizations in Singapore. The objective of this study was to investigate the relationship between Total Quality Management (TQM), with a specific focus on the dimensions of Continual Improvement and Management Commitment, and organizational productivity, measured by Turnaround Time and Utilization, in service organizations in Singapore. The population of interest included service organizations across various sectors in Singapore, such as healthcare, banking, and telecommunications. A purposive sampling technique was employed to select a sample of 150 service organizations. This study utilized a mixed-methods approach, incorporating both quantitative and qualitative data. A survey questionnaire was administered to collect quantitative data on TQM practices, Continual Improvement, Management Commitment, and organizational productivity indicators. Additionally, semi-structured interviews were conducted with a subset of organizations to gather qualitative insights into the implementation and impact of TQM practices. Quantitative data were analyzed using statistical techniques, including correlation analysis and regression analysis, to examine the relationships between TQM dimensions, organizational productivity, and the mediating role of Continual Improvement and Management Commitment. Qualitative data from interviews were analyzed using thematic analysis to identify key themes and patterns. The study found a positive correlation between TQM, Continual Improvement, and organizational productivity indicators of Turnaround Time and Utilization.

Methodology

Research Design:

The study adopted a correlational research design.

Population of the Study:

The population of the study comprised of 3,432 employees of 53 selected pipe threading firm in Port Harcourt. The selection was based on their existence for more than ten years in the area of the study. The selection was obtained from the list of regulated pipe fitting/threading firms in the Nigerian Upstream Petroleum Regulatory Commission (2022).

Sample Size and Sampling Technique:

The simple random sampling procedure was adopted. Random sampling is a way of selecting a sample of observations from a population in order to make inferences about the population. The Taro Yamane's formula was used to determine the sample size for the study and a total sample size of 360 was obtained.

Instrument for Data Collection:

The instrument for data collection in the study was a questionnaire. The instrument was validated by two experts in Ignatius Ajuru University of Education.

Validity Test:

the study adopted the face and content validity. The instrument was reviewed by two experts in measurement and evaluation, University of Port Harcourt. The experts reviewed the instrument in construct and content. The instrument was adjusted with the guidelines of the experts.

Reliability of the Instrument:

The reliability of the instrument was determined using Cronbach's Alpha and a reliability coefficient of 0.89 was obtained.

Administration of the Instrument:

The researcher personally administered the questionnaire to the respondents in their respective organization with the aid of staff as research assistant. The use of a research assistants in the distribution of the instrument is because they are familiar with the environment, management and staff as well as their levels more than the researcher. As such, a combination of the researcher and the assistant facilitated the actualization of the researcher's objectives. The questionnaires were collected immediately they are filled.

Method of Data Analysis:

The hypotheses were tested using the Spearman Rank Correlation at 0.05 significant level while the partial correlation is used to test for the moderating effect of the moderating variable. The rule for acceptance or rejection of the hypotheses is if sig = $p > 0.05$ the hypothesis is rejected; and if sig = $p \leq 0.05$ the hypothesis is accepted.

Data Presentation, Analysis, Results and Findings

A total 360 copies of the questionnaire were distributed to the 53 selected pipe threading firms in Port Harcourt, Rivers State, Nigeria. 344 copies of the questionnaires were appropriately filled and returned while 16 were not returned or properly filled.

Bivariate Data Analysis

Ten (10) hypotheses were raised and the spearman rank correlation was used to measure the significance of hypothesized variables.

Hypothesis 1

H_{O1}: There is no significant relationship between management commitment and turnaround time of pipe threading firm in Port Harcourt.

Table 1: Correlation Between Management Commitment and Turnaround Time

			Management Commitment	Turnaround Time
Spearman's rho	Management Commitment	Correlation Coefficient	1.000	.234**
		Sig. (2-tailed)	.	.000
		N	344	344

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	Turnaround Time	Correlation Coefficient	.234**	1.000
		Sig. (2-tailed)	.000	.
		N	344	344
**. Correlation is significant at the 0.01 level (2-tailed).				

The spearman correlation revealed a statistically reliable relationship between the management commitment and turnaround time and *p > 0.05* at 23.4%**.** Therefore, the null hypothesis was rejected and an alternative hypothesis was formulated which states that;

H_{A1}: There is a significant relationship between management commitment and turnaround time of pipe threading firm in Port Harcourt.

Hypothesis 2

H_{O2}: There is no significant relationship between management commitment and efficiency of pipe threading firm in Port Harcourt.

Table 2: Correlation Between Management Commitment and Efficiency

			Management Commitment	Efficiency
Spearman's rho	Management Commitment	Correlation Coefficient	1.000	.601**
		Sig. (2-tailed)	.	.000
		N	344	344
	Efficiency	Correlation Coefficient	.601**	1.000
		Sig. (2-tailed)	.000	.
		N	344	344
**. Correlation is significant at the 0.01 level (2-tailed).				

The spearman correlation revealed a statistically reliable relationship between the management commitment and efficiency and *p > 0.05* at 60.1%**.** Therefore, the null hypothesis was rejected and an alternative hypothesis was formulated which states that;

H_{A2}: There is a significant relationship between management commitment and efficiency of pipe threading firm in Port Harcourt.

Hypothesis 3

H_{O3}: There is no significant relationship between management commitment and utilization of pipe threading firm in Port Harcourt.

Table 3: Correlation Between Management Commitment and Utilization

			Management Commitment	Utilization
Spearman's rho	Management Commitment	Correlation Coefficient	1.000	.693**
		Sig. (2-tailed)	.	.000
		N	344	344
	Utilization	Correlation	.693**	1.000

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		Coefficient		
		Sig. (2-tailed)	.000	.
		N	344	344
**. Correlation is significant at the 0.01 level (2-tailed).				

The spearman correlation revealed a statistically reliable relationship between the management commitment and utilization and $p > 0.05$ at 69.3%**.** Therefore, the null hypothesis was rejected and an alternative hypothesis was formulated which states that;

H_{A3}: There is a significant relationship between management commitment and utilization of pipe threading firm in Port Harcourt.

Hypothesis 4

H_{O4}: There is no significant relationship between output quality assurance and turnaround time of pipe threading firm in Port Harcourt.

Table 4: Correlation Between Output Quality Assurance and Turnaround Time

			Output Quality Assurance	Turnaround Time
Spearman's rho	Output Quality Assurance	Correlation Coefficient	1.000	.624**
		Sig. (2-tailed)	.	.000
		N	344	344
	Turnaround Time	Correlation Coefficient	.624**	1.000
		Sig. (2-tailed)	.000	.
		N	344	344
**. Correlation is significant at the 0.01 level (2-tailed).				

The spearman correlation revealed a statistically reliable relationship between the output quality assurance and turnaround time and $p > 0.05$ at 62.4%**.** Therefore, the null hypothesis was rejected and an alternative hypothesis was formulated which states that;

H_{A4}: There is a significant relationship between output quality assurance and turnaround time of pipe threading firm in Port Harcourt.

Hypothesis 5

H_{O5}: There is no significant relationship between output quality assurance and efficiency of pipe threading firm in Port Harcourt.

Table 5: Correlation Between Output Quality Assurance and Efficiency

			Output Quality Assurance	Efficiency
Spearman's rho	Output Quality Assurance	Correlation Coefficient	1.000	.655**
		Sig. (2-tailed)	.	.000
		N	344	344
	Efficiency	Correlation Coefficient	.655**	1.000

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		Sig. (2-tailed)	.000	.
		N	344	344
**. Correlation is significant at the 0.01 level (2-tailed).				

The spearman correlation revealed a statistically reliable relationship between the output quality assurance and efficiency and $p > 0.05$ at 65.5%**.** Therefore, the null hypothesis was rejected and an alternative hypothesis was formulated which states that;

H_{A5}: There is a significant relationship between output quality assurance and efficiency of pipe threading firm in Port Harcourt.

Hypothesis 6

H_{O6}: There is no significant relationship between output quality assurance and utilization of pipe threading firm in Port Harcourt.

Table 6: Correlation Between Output Quality Assurance and Utilization

			Output Quality Assurance	Utilization
Spearman's rho	Output Quality Assurance	Correlation Coefficient	1.000	.501**
		Sig. (2-tailed)	.	.000
		N	344	344
	Utilization	Correlation Coefficient	.501**	1.000
		Sig. (2-tailed)	.000	.
		N	344	344
**. Correlation is significant at the 0.01 level (2-tailed).				

The spearman correlation revealed a statistically reliable relationship between the output quality assurance and utilization and $p > 0.05$ at 50.1%**.** Therefore, the null hypothesis was rejected and an alternative hypothesis was formulated which states that;

H_{A6}: There is a significant relationship between output quality assurance and utilization of pipe threading firm in Port Harcourt.

Hypothesis 7

H_{O7}: There is no significant relationship between continuous improvement and turnaround time of pipe threading firm in Port Harcourt.

Table 7: Correlation Between Continuous Improvement and Turnaround Time

			Continuous Improvement	Turnaround Time
Spearman's rho	Continuous Improvement	Correlation Coefficient	1.000	.508**
		Sig. (2-tailed)	.	.000
		N	344	344
	Turnaround Time	Correlation Coefficient	.508**	1.000
		Sig. (2-tailed)	.000	.

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		N	344	344
**. Correlation is significant at the 0.01 level (2-tailed).				

The spearman correlation revealed a statistically reliable relationship between the continuous improvement and turnaround time and $p > 0.05$ at 50.8%**.** Therefore, the null hypothesis was rejected and an alternative hypothesis was formulated which states that;

H_{A7}: There is a significant relationship between continuous improvement and turnaround time of pipe threading firm in Port Harcourt.

Hypothesis 8

H_{O8}: There is no significant relationship between continuous improvement and efficiency of pipe threading firm in Port Harcourt.

Table 8: Correlation Between Continuous Improvement and Turnaround Time

			Continuous Improvement	Efficiency
Spearman's rho	Continuous Improvement	Correlation Coefficient	1.000	.616**
		Sig. (2-tailed)	.	.000
		N	344	344
	Efficiency	Correlation Coefficient	.616**	1.000
		Sig. (2-tailed)	.000	.
		N	344	344
**. Correlation is significant at the 0.01 level (2-tailed).				

The spearman correlation revealed a statistically reliable relationship between the continuous improvement and efficiency and $p > 0.05$ at 61.6%**.** Therefore, the null hypothesis was rejected and an alternative hypothesis was formulated which states that;

H_{A8}: There is a significant relationship between continuous improvement and efficiency of pipe threading firm in Port Harcourt.

Hypothesis 9

H_{O9}: There is no significant relationship between continuous improvement and utilization of pipe threading firm in Port Harcourt.

Table 9: Correlation Between Continuous Improvement and Utilization

			Continuous Improvement	Utilization
Spearman's rho	Continuous Improvement	Correlation Coefficient	1.000	.529**
		Sig. (2-tailed)	.	.000
		N	344	344
	Utilization	Correlation Coefficient	.529**	1.000
		Sig. (2-tailed)	.000	.
		N	344	344
**. Correlation is significant at the 0.01 level (2-tailed).				

The spearman correlation revealed a statistically reliable relationship between the continuous improvement and utilization and $p > 0.05$ at 52.9%**.** Therefore, the null hypothesis was rejected and an

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alternative hypothesis was formulated which states that;

H_{A9}: There is a significant relationship between continuous improvement and utilization of pipe threading firm in Port Harcourt.

Multivariate Analysis

Hypothesis 10

Table 10: Moderating Effect of Organizational Culture on the Relationship Between Total Quality Management and Productivity

Control Variables			Total Quality Management	Productivity	Organizational Culture
-none-[a]	**Total Quality Management**	Correlation	1.000	.702	.421
		Significance (2-tailed)	.	.000	.000
		Df	0	343	343
	Productivity	Correlation	.702	1.000	.645
		Significance (2-tailed)	.000	.	.000
		Df	343	0	343
	Organizational Culture	Correlation	.421	.645	1.000
		Significance (2-tailed)	.000	.000	.
		Df	343	343	0
Organizational Culture	**Total Quality Management**	Correlation	1.000	.682	
		Significance (2-tailed)	.	.000	
		Df	0	342	
	Productivity	Correlation	.682	1.000	
		Significance (2-tailed)	.000	.	
		Df	342	0	
a. Cells contain zero-order (Pearson) correlations.					

The results revealed that in Hypotheses H_{O10}, the relationship between total quality management and productivity is strong and significant with a correlation coefficient of 0.702. With the introduction of organizational culture, the correlation coefficient becomes 0.682 signifying that organizational culture significantly moderates the relationship between total quality management and productivity.

Findings

The findings of the study indicate a significant relationship between management commitment, output quality assurance, continuous improvement, and various dimensions of organizational productivity, including turnaround time, efficiency, and utilization of pipe threading firms in Port Harcourt.

Regarding management commitment, the study confirms that when top-level management demonstrates a strong commitment to quality and the implementation of Total Quality Management (TQM) practices, it positively affects organizational productivity. This finding is consistent with previous research that

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highlights the critical role of management commitment in driving TQM implementation and its subsequent impact on productivity (Ahire et al., 1996; Antony et al., 2002).

Similarly, the study highlights the importance of output quality assurance in relation to organizational productivity. When pipe threading firms effectively implement quality control measures and ensure the delivery of high-quality products/services, it positively impacts turnaround time, efficiency, and utilization. This finding aligns with prior research emphasizing the positive influence of output quality assurance on productivity outcomes (Garvin, 1984; Sallis, 2014).

The study also emphasizes the significance of continuous improvement in driving organizational productivity. When pipe threading firms prioritize and actively engage in continuous improvement initiatives, it positively affects turnaround time, efficiency, and utilization. This finding is in line with previous literature that emphasizes the role of continuous improvement in enhancing productivity and operational performance (Dahlgaard et al., 2008; Oakland, 2014).

Lastly, the study reveals that organizational culture moderates the relationship between total quality management and productivity in pipe threading firms. This suggests that the influence of TQM practices on productivity outcomes is contingent upon the prevailing organizational culture (Deming, 2000; Schein, 2010).

Conclusion and Recommendations

Conclusion

This study examined the impact of Total Quality Management (TQM) practices, including management commitment, output quality assurance, and continuous improvement, on the productivity of pipe threading firms in Port Harcourt. The findings of the study revealed significant relationships between these TQM dimensions and various aspects of organizational productivity, namely turnaround time, efficiency, and utilization.

The study affirmed the importance of management commitment in driving TQM implementation and its subsequent impact on productivity. When top-level management demonstrates a strong commitment to quality and TQM practices, it positively influences the productivity outcomes of pipe threading firms. Similarly, the study highlighted the significance of output quality assurance, emphasizing that when firms effectively implement quality control measures, it positively affects turnaround time, efficiency, and utilization. Moreover, the study underscored the role of continuous improvement in driving organizational productivity, indicating that firms that prioritize and engage in continuous improvement initiatives experience improvements in the aforementioned productivity dimensions.

Additionally, the study found that organizational culture moderates the relationship between TQM and productivity. This highlights the importance of fostering a supportive and quality-oriented organizational culture to maximize the benefits of TQM implementation and its impact on productivity outcomes.

These findings have practical implications for pipe threading firms, as they can guide organizational efforts in adopting TQM practices and developing strategies to improve productivity. By placing emphasis on management commitment, output quality assurance, and continuous improvement, firms can enhance their operational efficiency, reduce turnaround time, optimize resource utilization, and ultimately improve their competitive position in the market.

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However, it is important to acknowledge the limitations of this study. The research was conducted in a specific geographical context (Port Harcourt) and focused on pipe threading firms, which may limit the generalizability of the findings. Future research should consider broader samples and investigate additional dimensions of TQM and productivity to further enhance our understanding of the topic.

Recommendations

Based on the findings of the study, the following were recommended;

1. Pipe threading firms should ensure that top-level management actively participates in quality improvement initiatives, provides necessary resources and support, and sets high-quality standards to enhance turnaround time.
2. Pipe threading firms should involve top-level management in quality enhancement processes and allocating resources effectively to support quality initiatives. Implementing effective quality control measures and streamlining processes can also contribute to improved efficiency.
3. Pipe threading firms should emphasize management commitment by adopting lean management practices and implementing efficient scheduling and planning processes can also contribute to improved utilization.
4. Pipe threading firms should focus on improving output quality assurance practices by implementing robust quality control measures, conducting regular inspections and audits, and providing feedback loops to identify and address defects or errors at the earliest stages of production to reduce turnaround time.
5. Pipe threading firms should focus on implementing quality control measures that minimize defects and rework, optimize production processes to reduce waste and unnecessary steps, and enhance coordination and communication among different teams to enhance efficiency.
6. Pipe threading firms should emphasize output quality assurance by regular monitoring and evaluation of resource usage can also help identify areas for improvement and optimization of resource utilization
7. Pipe threading firms should streamline processes, eliminating non-value-added activities, and promoting cross-functional collaboration can also contribute to faster turnaround times.
8. Pipe threading firms should implement lean management principles, such as value stream mapping and waste reduction techniques, can also contribute to improved efficiency.
9. Pipe threading firms should encourage employees to identify and implement resource optimization strategies, provide training and tools for analyzing resource usage, and establish mechanisms for monitoring and evaluating resource utilization.
10. Pipe threading firms should focus on developing a positive and quality-oriented organizational culture to leverage the full potential of Total Quality Management (TQM) practices.

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