**International Journal of Academic Management Science Research (IJAMSR)**
**ISSN: 2643-900X**
**Vol. 9 Issue 2 February - 2025, Pages: 202-210**

# Structural Empowerment and Maintenance Culture: Enhancing Operational Efficiency in the Cement Manufacturing Industry in North-Central, Nigeria

**Dr. Sunday Musa Onalo[1] Dr. Emmanuel Yusuf Attah[2] Zekeri Momoh[3]**

Department of Business Administration, Veritas University, Abuja, Nigeria[1&2]
Department of Political Science, Karl Kumm University, Vom, Plateau State, Nigeria[3]

***Abstract:*** *This study explores the impact of structural empowerment on maintenance culture and operational efficiency in selected cement manufacturing firms in North-Central Nigeria. Given the critical role of effective maintenance in manufacturing performance, the study investigates how organizational structures that provide access to resources, information, and growth opportunities influence employee engagement in maintenance activities. A quantitative research approach was adopted, utilizing structured questionnaires to collect data from 300 employees across cement manufacturing firms in Kogi and Benue States. The study employed descriptive and inferential statistical methods to analyze the data, including mean, standard deviation, and regression analysis. Findings revealed that structural empowerment significantly enhances maintenance culture, leading to increased equipment availability, reduced downtime, and improved overall productivity. Employees with greater access to resources and training demonstrated higher levels of involvement in maintenance activities, positively impacting organizational performance. Based on these findings, the study recommends that cement manufacturing firms invest in empowerment structures, including continuous training, provision of necessary resources, and improved information flow, to enhance employee participation in maintenance processes. Strengthening these empowerment structures is crucial for fostering a proactive maintenance culture and sustaining long-term operational efficiency.*

**Keywords:** Structural empowerment, maintenance culture, operational efficiency, employee

## Introduction

Globalization and economic turbulence have intensified pressure on manufacturing firms to operate efficiently while meeting the dynamic demands of customers. Production costs are often closely linked to maintenance-related activities, including maintenance labor and costs, as well as losses incurred due to production downtime (Blanchard, 1997). To survive in today's highly competitive business environment, organizations must embrace product diversification, integrate state-of-the-art international product features, ensure high quality, and maintain lower costs. Additionally, they must adopt faster and more efficient research and development (R&D) processes (Ahuja & Khamba, 2008). Omar (2007) emphasizes that an effective maintenance strategy significantly enhances production efficiency and overall business performance. One of the most widely recognized maintenance strategies adopted by manufacturers to maintain competitiveness in a demand-driven market is Total Productive Maintenance (TPM). This innovative approach optimizes equipment effectiveness, minimizes breakdowns, and fosters autonomous maintenance through the active involvement of the entire workforce. Since its introduction a few decades ago, TPM has gained widespread acceptance across multiple industries, proving its effectiveness in improving operational performance (Omar, 2007). Total Productive Maintenance (TPM) is a unique Japanese philosophy developed based on productive maintenance concepts and methodologies (Awolusi, 2012). It was first introduced in 1971 by Nippon Denso Co. Ltd., a supplier to Toyota Motor Company, Japan. TPM is a simple yet highly efficient management and maintenance strategy that reduces labor and time spent on equipment maintenance (Omar, 2007). Unlike traditional maintenance approaches, TPM is a multi-tier system that integrates maintenance responsibilities across all organizational departments rather than limiting them to the maintenance team alone (Wikipedia, 2018).

Induswe (2013) describes TPM as a crucial strategic tool that optimizes equipment reliability and ensures efficient plant asset management through employee involvement and empowerment. It fosters collaboration between manufacturing, maintenance, and engineering functions, enhancing overall organizational efficiency. When effectively implemented, TPM benefits all sections of a business by improving productivity, reducing downtime, and enhancing operational performance (Induswe, 2013). At its core, total productivity is a fundamental measure of organizational performance. Amah (2006) defines productivity as the efficiency and effectiveness with which resources (inputs) are utilized to produce goods (outputs) that meet societal demands in the long term. High productivity results from a balanced approach to economic resource utilization, waste reduction, and performance optimization. In Dangote Cement manufacturing firms, for instance, productivity is maximized through the implementation of preventive and focused maintenance strategies, ensuring efficient use of raw materials while minimizing waste. Amah (2006) further asserts that productivity must balance economic, social, technical, and environmental objectives to drive sustainable improvements in manufacturing operations.

A key pillar of TPM is employee training and empowerment, which ensures that workers acquire the necessary skills to operate machinery efficiently and detect errors early, thereby reducing maintenance costs and preventing production breakdowns. Employees

are trained to work independently with minimal supervision, fostering a proactive maintenance culture within the organization. Dangote Cement, for example, integrates **safety, health, and environmental (SHE)** measures to create a secure workplace while minimizing the environmental impact of production processes. Wakjira and Singh (2012) highlight that SHE initiatives play an essential role in promoting workplace safety, targeting zero accidents, zero health hazards, and zero fire incidents. By prioritizing safety and environmental sustainability, Dangote Cement enhances job satisfaction and productivity among workers.

Additionally, planned maintenance strategies help manufacturing firms optimize spare parts inventory, reduce maintenance costs, and improve plant reliability, ultimately ensuring continuous machine availability. **Quality maintenance** focuses on eliminating defects through stringent quality control measures, ensuring that only high-quality products reach the market. Employee training programs further contribute to defect reduction by enhancing workers' ability to maintain quality standards.

Similarly, focused maintenance strategies aim to eliminate losses by implementing preventive maintenance techniques. Many African manufacturing firms operate below optimal levels, not necessarily due to raw material shortages but because of frequent equipment failures resulting from inadequate maintenance practices. In Nigeria, for instance, Dangote Cement and other manufacturing firms face economic, socio-cultural, and political challenges that hinder optimal production and contribute to higher operational costs. Given these challenges, this study examines the impact of structural empowerment on the maintenance culture and operational efficiency of selected cement manufacturing firms in North-Central Nigeria. The research explores how organizational empowerment structures, including access to resources, information, and opportunities for growth, influence employees' engagement in maintenance practices and contribute to improved productivity and reduced operational losses.

## Literature Review

### Conceptual Review: Total Productive Maintenance (TPM) and Performance

Total Productive Maintenance (TPM) is a widely recognized approach to optimizing equipment effectiveness, reducing breakdowns, and integrating maintenance into the daily operations of an organization. Nakajima (1989) defined TPM as an innovative maintenance approach aimed at maximizing equipment effectiveness through autonomous maintenance, operator involvement, and continuous improvements. Kilpatrick (2003) emphasized that TPM employs proactive and progressive maintenance methodologies, integrating knowledge from operators, equipment vendors, and engineering personnel to enhance machine performance. This leads to reduced downtime, improved utilization, increased throughput, and enhanced product quality. Similarly, Farajpour-Khanaposhtani and Hayati (2015) described TPM as an inclusive method involving all organizational levels to improve the effectiveness of production equipment. They noted that TPM integrates preventive maintenance with total quality management, focusing on employees, processes, and equipment.

TPM is commonly defined as a maintenance philosophy designed to integrate equipment maintenance into the manufacturing process (Vorne, 2023). Its goal is to eliminate losses tied to equipment inefficiencies and maximize production capacity with minimal unplanned downtime. BhadSury (2013) echoed this perspective, emphasizing that TPM optimizes equipment effectiveness and eliminates breakdowns while involving the entire workforce. TPM is a strategic tool for enhancing manufacturing performance by improving production facilities (Ahuja, 2009). It is recognized as a set of methodologies and practices designed to maximize manufacturing productivity through continuous improvement efforts. Witt (2006) viewed TPM as a communication mechanism that fosters collaboration between operators, maintenance engineers, and management. Herd (2012) added that TPM establishes a company-wide maintenance system encompassing preventive and improvement-related maintenance to eliminate waste and inefficiencies. Oakland (2000) further elaborated that TPM revolutionizes enterprise-wide management, impacting marketing, personnel, finance, and production. He described TPM as a philosophy aimed at meeting customer expectations through efficient resource management.

McCanes (2006) positioned TPM as a process-oriented approach that aligns production with market needs, focusing on efficient resource utilization and customer satisfaction. Baarie (2000) supported this view, describing TPM as a structured system for exceeding customer expectations through organization-wide participation in improvement initiatives. Venkatesh (2009) categorized TPM as a continuous improvement program that enhances production efficiency, employee morale, and job satisfaction.

Nakajima (1988) highlighted that TPM maximizes equipment effectiveness by promoting planned maintenance through small group activities. Willmott (1994) emphasized TPM's role in maintaining and improving production system integrity through equipment, processes, and employees. TPM is a lean manufacturing strategy that integrates preventive, corrective, and predictive maintenance while ensuring maximum equipment efficiency (Ahuja and Kamba, 2008). TPM aims for zero unplanned downtime, zero defects, zero machine capacity losses, and zero accidents, optimizing asset utilization while maintaining employee morale and job satisfaction (Eti, Ogaji, and Probert, 2004). Performance, in this context, is the productivity relationship between input and output (Ebhote, 2015). Several researchers (Ardishvili, 1998; Delmar, 1997) identified key performance indicators, including assets, employment,

market share, output, and profitability. Wiklund (1999) suggested that growth is a more effective performance measure than financial indicators.

Performance assessment involves measuring an organization's actual output against its intended goals (Richard, 2009). Organizational performance is complex and often measured through indicators such as quality, productivity, job satisfaction, and managerial effectiveness. The literature emphasizes the multidimensionality of performance, as discussed in accounting (Callen, 1991), finance (Henri, 2004), and management (Venkatraman and Ramanujam, 1986). Richard (2009) categorized organizational performance into financial performance, product market performance, and shareholder returns. Mahapatro (2011) defined organizational performance as the ability of an organization to fulfill its mission through effective management and governance. Managers play a crucial role in improving workplace performance through cost reduction, service enhancement, and productivity improvements. Farnham and Pimlott (1979) observed that performance improvement requires both managerial and specialist efforts to achieve strategic goals.

**Empirical Review**

The relationship between TPM and performance has been widely studied, though it remains a subject of debate. Onyebuchi (2017) examined TPM and performance in plastic manufacturing companies in Anambra State, finding that maintenance training positively affects organizational performance. Konecny and Thun (2011) analyzed the impact of TPM and Total Quality Management (TQM) on plant performance, concluding that these practices, supported by HR strategies, significantly enhance performance. Perera (2016) explored the effect of TPM practices on textile and apparel manufacturing, revealing a positive correlation between TPM and manufacturing efficiency. Alsyouf (2009) investigated Swedish industry maintenance practices and found that ineffective planning and scheduling hindered maintenance performance, suggesting a need for wider adoption of TPM and reliability-centered maintenance (RCM). Graisa and Al-Habaibeh (2011) studied maintenance challenges in Libya's cement industry, finding that a lack of training and TPM strategies contributed to low productivity. Bagshaw and George (2015) examined facility management in Nigerian manufacturing firms, establishing a positive link between facility maintenance and organizational effectiveness. Ukpabio, Oyebisi, and Siyanbola (2016) investigated the impact of innovation on SME performance in Ogun State, revealing that product innovation positively affects firm performance when supported by employee training. Terziovski (2010) studied innovation practices in Australian SMEs, concluding that training on innovation enhances competitive advantage and firm growth. Olayinka and Oluwafemi (2012) analyzed TPM implementation in Nigerian beverage manufacturing, demonstrating that planned maintenance improves equipment effectiveness by over 50%. Chiekezie, Nzewi, and Odekina (2017) examined preventive maintenance in Benue State, finding that it significantly improves product quality and reduces machine breakdown costs. This study thus identifies a knowledge gap regarding the impact of TPM on the performance of selected manufacturing firms in North Central Nigeria. Further research is necessary to address this gap and provide insights into how TPM practices can enhance manufacturing efficiency in the region.

**Theoretical Framework**

This study is anchored on Kanter's Theory of Structural Power in Organizations (1993), which asserts that both formal and informal power within a workplace provide access to organizational structures that empower workers. According to Kanter, empowerment within an organization is determined by two key structures: the structure of opportunity and the structure of power.

- The structure of opportunity refers to organizational attributes that enable employees to grow and develop in their roles. Kanter emphasizes that when organizations provide opportunities for growth, it positively influences employee motivation, productivity, commitment, and engagement.
- The structure of power enables workers to mobilize resources within an organization. Kanter identifies three primary sources of structural power:
    - Information: Access to necessary knowledge and communication essential for work.
    - Resources: Availability of people, money, equipment, and supplies required for effective job performance.
    - Support: Feedback, coaching, and assistance received from management, peers, and others.

These empowerment structures contribute to employees' ability to achieve organizational goals successfully. Conger and Kanungo (1988) further argue that empowerment is a fundamental component of managerial and organizational effectiveness. According to their perspective, empowerment entails:

- Providing employees with opportunities for career growth and mobility.
- Granting employees access to resources and information necessary for performing their duties.
- Allowing employees to exercise decision-making autonomy in their responsibilities.

Kanter (1993) defines power as the "ability to mobilize resources to get things done." She asserts that power is "on" when employees have access to critical resources such as information, support, and opportunities. Conversely, power is "off" when these resources are unavailable, making effective work impossible (Greco, Laschinger, & Wong, 2006; Laschinger et al., 2001, 2004).

Kanter also highlights that power structures within organizations emerge from both formal and informal systems. Jobs that provide visibility, flexibility in task execution, and are central to the organization's overall purpose tend to offer greater formal power. The relevance of this theory to the present study lies in its emphasis on opportunity and resource accessibility as key factors influencing performance. The opportunity to grow within an organization—such as through training—enhances employee capability, which can translate into improved machine availability. Moreover, when employees are equipped with the necessary resources and information, they are more likely to take an active role in the maintenance process, ultimately contributing to improved productivity and organizational efficiency.

## Methodology

### Research Design and Population

This study adopted a descriptive research design **t**o examine the relationship between employee empowerment and machine availability in a cement manufacturing company operating in Kogi and Benue States, Nigeria**. A** quantitative approach was used for statistical analysis, complemented by a qualitative component through interviews with supervisors and managers. The study population comprised 1,200 employees**,** including machine operators, maintenance technicians, and supervisors/managers in the production and maintenance departments. Stratified random sampling was used to ensure fair representation across these categories. The sample size was determined using Yamane's formula**,** yielding 300 participants**.**

### Data Collection and Analysis

### Primary and Secondary Data Collection

Data were collected through structured questionnaires and semi-structured interviews with 15 supervisors and managers**.** The questionnaire included Likert-scale questions assessing access to empowerment structures and their impact on machine availability. Secondary data, such as maintenance logs, training records, and company policies**,** were also reviewed. Before full deployment, a pilot study with 30 participants tested the questionnaire's clarity and reliability. Data were collected physically and electronically**,** with interviews conducted in person and via Zoom.

### Data Analysis

- Descriptive Statistics (mean, standard deviation, frequency) summarized the responses.
- Pearson's Correlation examined relationships between empowerment and machine availability.
- Regression Analysis determined the strength of the impact of empowerment on machine availability.
- Thematic Analysis was used to interpret interview responses.

All quantitative analyses were conducted using SPSS, and Cronbach's Alpha confirmed the reliability of the questionnaire.

### Ethical Considerations and Study Limitations

Ethical approval was obtained from the company's management, and participants provided informed consent. Confidentiality was ensured through anonymized responses, and participation was voluntary. Key study limitations included response bias**,** mitigated by anonymity, and time constraints**,** which were managed through flexible interview scheduling. While findings were specific to the cement industry in Kogi and Benue States**,** they offer insights applicable to similar industrial settings.

## Findings and Results

This section presents the analyzed data collected from employees and supervisors in the cement manufacturing company operating in Kogi and Benue States, Nigeria. The results highlight key aspects of employee empowerment and machine availability through statistical analysis and qualitative insights.

### 1. Response Rate and Demographics

A total of 300 questionnaires were distributed, and 276 were completed and returned, yielding a 92% response rate. Additionally, 15 supervisors and managers participated in qualitative interviews.

**Table 1: Demographic Characteristics of Respondents**

| Demographic Variable | Categories | Frequency (n = 276) | Percentage (%) |
|---|---|---|---|
| **Gender** | Male | 210 | 76.1 |
| | Female | 66 | 23.9 |
| **Age Group** | 20–30 years | 68 | 24.6 |

| Demographic Variable | Categories | Frequency (n = 276) | Percentage (%) |
|---|---|---|---|
| | 31–40 years | 115 | 41.7 |
| | 41–50 years | 70 | 25.4 |
| | Above 50 years | 23 | 8.3 |
| **Job Position** | Machine Operator | 140 | 50.7 |
| | Maintenance Technician | 85 | 30.8 |
| | Supervisor/Manager | 51 | 18.5 |
| **Years of Experience** | Less than 5 years | 72 | 26.1 |
| | 6–10 years | 98 | 35.5 |
| | 11–15 years | 65 | 23.6 |
| | Above 15 years | 41 | 14.9 |

Source: Authors' own study

The data shows that 76.1% of respondents were male, reflecting the male-dominated nature of the cement industry. The largest age group was 31–40 years (41.7%), indicating that most employees were in their mid-career stage. More than 50% of respondents were machine operators, followed by 30.8% maintenance technicians.

**2. Employee Empowerment and Access to Resources**
Employees rated their access to information, support, resources, and training opportunities on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

**Table 2: Employee Perception of Empowerment Structures**

| Empowerment Factor | Mean (M) | Standard Deviation (SD) | Description |
|---|---|---|---|
| Access to Information | 3.94 | 0.87 | High |
| Availability of Resources | 3.51 | 1.02 | Moderate |
| Management Support | 3.87 | 0.91 | High |
| Opportunities for Training | 3.76 | 1.05 | High |

Source: Authors' own study

The results indicate that employees had high access to information (M = 3.94) and management support (M = 3.87), suggesting that communication and feedback from supervisors were available. However, availability of resources (M = 3.51) received a lower rating, indicating some difficulty in obtaining necessary materials, equipment, and spare parts.

**3. Relationship Between Empowerment and Machine Availability**
A Pearson correlation analysis examined how different empowerment factors influenced machine availability.

**Table 3: Correlation Between Empowerment and Machine Availability**

| Variable | Machine Availability |
|---|---|
| Access to Information | **r = 0.72**, $p < 0.01$ |
| Availability of Resources | **r = 0.65**, $p < 0.01$ |
| Management Support | **r = 0.69**, $p < 0.01$ |
| Opportunities for Training | **r = 0.71**, $p < 0.01$ |

Source: Authors' own study

The analysis shows a strong positive relationship between empowerment and machine availability, with correlation values ranging from 0.65 to 0.72 ($p < 0.01$). Among the factors, access to information ($r = 0.72$) had the highest correlation, highlighting its crucial role in ensuring machine efficiency. Employees who had timely access to operational data and technical guidelines were better able to prevent breakdowns and optimize machine performance.

**4. Regression Analysis: Predicting Machine Availability**
A multiple regression analysis was conducted to determine how well empowerment factors predicted machine availability.

**Table 4: Regression Analysis Results**

| Predictor Variable | β (Beta) | t-Value | p-Value |
|---|---|---|---|
| Access to Information | **0.34** | 5.92 | **<0.001** |
| Availability of Resources | **0.28** | 4.85 | **<0.001** |
| Management Support | **0.32** | 5.41 | **<0.001** |
| Opportunities for Training | **0.30** | 5.23 | **<0.001** |
| **$R^2 = 0.68$**, $F(4,271) = 72.6$, $p < 0.001$ | | | |

Source: Authors' own study

The regression model explained 68% ($R^2 = 0.68$) of the variance in machine availability, confirming that employee empowerment played a significant role in maintaining operational efficiency. Among the predictors, access to information ($\beta = 0.34$, $p < 0.001$) had the strongest influence, reinforcing the importance of proper knowledge flow in industrial settings.

**5. Qualitative Findings from Interviews**
Interviews with 15 supervisors and managers provided additional insights:

- Supervisors highlighted that limited access to spare parts led to frequent delays in machine repairs.
- Managers observed that trained employees showed greater initiative in machine maintenance and fault detection.
- Maintenance heads emphasized that employees who felt empowered were more proactive in preventing breakdowns.

These observations align with the quantitative results, reinforcing the importance of training, access to resources, and managerial support in improving machine performance.

**Discussion**
This section examines the findings in relation to existing literature and the study's theoretical framework. The results demonstrate that employee empowerment plays a crucial role in enhancing machine availability in the cement manufacturing industry. Key aspects such as access to information, resources, management support, and training opportunities were found to significantly impact machine efficiency and operational performance. The discussion delves into each factor and explains how the findings align with or differ from previous research.

**1. Employee Empowerment and Machine Availability**
The study confirmed that employee empowerment is strongly linked to machine availability. A high correlation was found between access to information, resources**,** management support, training opportunities, and machine efficiency ($r > 0.65$, $p < 0.01$)**.** This aligns with Kanter's (1993) Structural Power Theory**,** which emphasizes that employees perform optimally when given the necessary tools, knowledge, and authority. Previous studies by Laschinger et al. (2001, 2004) also support this finding, stating that when employees have access to crucial organizational structures, they are more committed, engaged, and efficient in their roles**.** In this study, machine operators and maintenance staff who had access to vital information, materials, and training displayed higher productivity and initiative in preventing breakdowns**.** Furthermore, the regression analysis ($R^2 = 0.68$, $p < 0.001$**)** demonstrated that empowerment factors predicted 68% of the variance in machine availability**,** further validating the importance of these workplace structures.

**2. Access to Information as a Key Factor**
Among all empowerment factors, access to information had the highest correlation with machine availability ($r = 0.72$, $\beta = 0.34$, $p < 0.001$)**.** Employees who received regular updates on maintenance schedules, operating procedures, and machine conditions demonstrated better efficiency and proactive maintenance behavior**.** This finding supports Greco, Laschinger, & Wong (2006), who argued that timely access to information enhances employees' ability to make informed decisions, increasing workplace efficiency. It also aligns with Conger & Kanungo (1988)**,** who emphasized that empowered employees should have full knowledge of their tasks to perform effectively. However, qualitative responses from supervisors revealed that some employees still lacked access to real-time data on machine performance**,** leading to delays in detecting potential failures. This suggests that improving communication channels and information-sharing mechanisms can further enhance machine uptime.

**3. Availability of Resources and Machine Performance**

The study found that availability of resources was rated moderately (M = 3.51) and had a significant but slightly lower correlation with machine availability **(**r = 0.65, β = 0.28, p < 0.001**)**. Employees reported that while tools, spare parts, and equipment were generally accessible, occasional shortages or delays affected maintenance efficiency**.** This finding is consistent with Kim & Lee (2011)**,** who found that resource constraints in manufacturing environments hinder operational effectiveness. Supervisors in this study confirmed that spare part shortages often led to longer repair times, reducing machine uptime.

To mitigate this issue, organizations should consider:

- Enhancing supply chain efficiency to ensure critical spare parts are always available.
- Investing in predictive maintenance systems to anticipate resource needs in advance.
- Empowering employees to request materials proactively, rather than waiting for formal approval processes that could delay repairs.

**4. The Role of Management Support**

Management support was another highly rated factor (M = 3.87, r = 0.69, p < 0.01)**,** indicating that employees who received guidance, encouragement, and coaching were more likely to take ownership of machine maintenance. This aligns with Deci & Ryan's (2000) Self-Determination Theory**,** which suggests that employees perform better when they receive positive reinforcement from leaders. Managers and supervisors who provide regular feedback and recognition help employees feel valued**,** increasing motivation and engagement in maintenance activities. However, qualitative responses from some employees suggested that support was inconsistent across departments**.** Some teams received adequate guidance**,** while others felt neglected or excluded from decision-making**.** Addressing this inconsistency through standardized leadership training and clearer communication policies could enhance overall performance.

**5. Training Opportunities and Employee Initiative**

Training opportunities had a strong influence on machine availability (r = 0.71, β = 0.30, p < 0.001)**.** Employees who received frequent training were more knowledgeable about preventive maintenance, troubleshooting, and safety protocols**.** This finding is consistent with Blanchard et al. (2011)**,** who argued that continuous training enhances employee competence and job satisfaction**.** Supervisors in this study confirmed that trained employees exhibited more confidence and took proactive steps in maintaining equipment**,** reducing unexpected failures.

Despite this, some employees noted that training programs were not always accessible to all workers**,** with some sessions limited to senior staff or specific teams**.** Expanding training initiatives across all levels of the workforce could further optimize machine efficiency and reduce maintenance delays**.**

**6. Practical Implications for Cement Manufacturing**

The study's findings have several implications for cement manufacturers and similar industries:

i. **Enhancing Information Flow**
   - Implementing real-time digital tracking systems to provide instant updates on machine performance.
   - Encouraging open communication between machine operators, technicians, and management.

ii. **Improving Resource Management**
   - Developing an automated inventory system to track spare parts and materials efficiently.
   - Allowing employees to request critical resources with minimal bureaucratic delays**.**

iii. **Strengthening Management Support**
   - Conducting leadership training for supervisors to ensure consistent and equitable support for all teams.
   - Establishing structured feedback systems where employees can report challenges and receive timely assistance.

iv. **Expanding Training Programs**
   - Implementing on-the-job training and workshops for all staff, not just senior employees.
   - Encouraging cross-functional learning**,** where machine operators and technicians share knowledge and best practices.

**7. Alignment with Theoretical Framework**

This study was grounded in Kanter's Theory of Structural Power (1993)**,** which emphasizes that access to information, resources, and support creates an empowered workforce**.** The findings strongly support this framework, as employees with greater access to these empowerment structures demonstrated:

- Higher engagement in maintenance activities.
- Greater initiative in solving machine-related issues.
- Stronger commitment to improving operational efficiency.

By strengthening these empowerment structures, organizations can enhance machine availability, reduce breakdowns, and improve overall productivity**.**

**8. Limitations and Future Research Directions**

While the study provides **valuable insights**, certain limitations should be noted:

1. Limited Generalizability – The research focused on one cement company in Nigeria**,** meaning findings may not be universally applicable to other industries. Future research should include multiple companies for broader comparisons.
2. Self-Reported Data – Some findings were based on employee perceptions, which may introduce bias. Future studies could incorporate real-time machine performance data to complement survey responses.
3. Cross-Sectional Design – This study captured a single time frame**,** whereas a longitudinal study could better track changes in empowerment and machine efficiency over time.

**Conclusion and Recommendations**

This study examined the impact of employee empowerment on machine availability in a cement manufacturing company operating in Kogi and Benue states, Nigeria. The findings revealed that access to information, availability of resources, management support, and training opportunities significantly influenced machine uptime and maintenance efficiency. Employees who had greater access to these empowerment structures demonstrated higher levels of initiative, efficiency, and engagement in maintaining equipment, leading to improved machine performance and reduced breakdowns. The study affirmed that when workers are provided with the necessary tools, knowledge, and managerial backing, they become more proactive in addressing maintenance issues, thereby enhancing overall plant productivity. However, some challenges, such as inconsistent access to training and occasional resource shortages, were noted as areas that require attention to sustain the improvements in machine availability.

To enhance employee empowerment and improve machine availability, it is essential to strengthen the communication channels within the organization. A transparent system that ensures timely dissemination of information on maintenance schedules and operational requirements should be established. Providing real-time access to machine performance data can further equip employees with the necessary knowledge to make informed maintenance decisions. Management should also improve resource planning and procurement strategies to minimize delays in obtaining spare parts and essential maintenance materials. Implementing an automated inventory system can help monitor stock levels and prevent shortages that could hinder machine efficiency. Additionally, allowing employees to have greater autonomy in requesting critical resources can reduce bureaucratic delays that often disrupt maintenance activities.

Another crucial recommendation is the need to enhance management support and leadership involvement in empowering employees. Supervisors and managers should receive specialized training to understand their role in fostering an environment where employees feel valued and supported. A structured feedback system should be developed to enable workers to voice concerns, suggest improvements, and receive timely responses from management. A collaborative leadership approach, where decision-making is shared, can lead to better engagement and improved maintenance practices.

Training and capacity development programs should be expanded to ensure that all employees, regardless of their job levels, receive adequate technical knowledge and hands-on experience in machine maintenance. Continuous professional development through technical workshops, mentorship programs, and cross-functional learning initiatives will enhance employees' competence and efficiency in handling maintenance responsibilities. Organizations should also consider incorporating preventive and predictive maintenance strategies, moving away from reactive maintenance approaches. A reward and recognition system that encourages proactive maintenance practices can motivate employees to take ownership of machine performance and contribute to reducing equipment downtime.

Further research should explore the impact of employee empowerment on machine availability in multiple cement manufacturing companies to improve the generalizability of findings. A longitudinal study tracking the long-term effects of empowerment initiatives on machine performance could provide deeper insights into sustained improvements. Future studies could also integrate real-time machine performance data to complement survey responses, offering a more objective assessment of machine.

**References**

Conger, J. A., & Kanungo, R. N. (1988). The empowerment process: Integrating theory and practice. *Academy of Management Review, 13(3)*, 471-482.

Kanter, R. M. (1977). *Men and Women of the Corporation*. New York: Basic Books.

Kanter, R. M. (1993). *Men and Women of the Corporation*. New York: Basic Books.

Laschinger, H. K. S., Finegan, J., Shamian, J., & Wilk, P. (2001). Impact of structural and psychological empowerment on job strain in nursing work settings: Expanding Kanter's model. *Journal of Nursing Administration, 31(5),* 260-272.

Laschinger, H. K. S., Finegan, J. (2005). Empowering nurses for work engagement and health in hospital settings. *Journal of Nursing Administration, 35(10),* 439-449.

Laschinger, H. K. S., & Havens, D. S. (1996). Staff nurse work empowerment and perceived control over nursing practice: Conditions for work effectiveness. *Journal of Nursing Administration, 26(9),* 27-35.

Laschinger, H. K. S., Wong, C., & Greco, P. (2006). The impact of staff nurse empowerment on person-job fit and work satisfaction: A cross-sectional study. *International Journal of Nursing Studies, 43(5),* 673-684.

Spreitzer, G. M. (1995). Psychological empowerment in the workplace: Dimensions, measurement, and validation. *Academy of Management Journal, 38(5),* 1442-1465.

Spreitzer, G. M., Kizilos, M. A., & Nason, S. W. (1997). A dimensional analysis of the relationship between psychological empowerment and effectiveness, satisfaction, and strain. *Journal of Management, 23(5),* 679-704.

Thomas, K. W., & Velthouse, B. A. (1990). Cognitive elements of empowerment: An "interpretive" model of intrinsic task motivation. *Academy of Management Review, 15(4),* 666-681.

Ahuja, I. P. S., & Khamba, J. S. (2008). Total productive maintenance: Literature review and directions. *International Journal of Quality & Reliability Management, 25(7),* 709–756.

Amah, E. (2006). *Human Resource Management.* Port Harcourt: Amethyst Publishers.

Brah, S. A., & Chong, W. K. (2004). Relationship between total productive maintenance and performance. *International Journal of Production Research, 42(12),* 2383–2401.

Budjahi, A. S. (2016). Total productivity management and organizational performance in the manufacturing industry in Rwanda. *Journal of Business and Management, 21(3),* 11-19.

Callen, J. E. (1991). Perception and information. *Annual Review of Psychology, 38(3),* 61–90.

Chiekezie, O. M., Nzewi, H. N., & Odekina, F. (2017). Maintenance culture and performance of selected manufacturing firms in Benue State, Nigeria. *Archives of Business Research, 5(3),* 128-141.

Conger, J. A., & Kanungo, R. N. (1988). The empowerment process: Integrating theory and practice. *Academy of Management Review, 13(3),* 471-482.

Ebhote, O. (2015). Conflict management: Managerial approach towards improving organizational performance. *International Review of Social Sciences and Humanities, 9(1),* 51–60.

Greco, P., Laschinger, H. K. S., & Wong, C. (2006). Leader empowering behaviors, staff nurse empowerment, and work engagement/burnout. *Nursing Leadership, 19(4),* 41–56.

Kanter, R. M. (1993). *Men and women of the corporation.* New York: Basic Books.

Laschinger, H. K. S., Finegan, J., Shamian, J., & Wilk, P. (2001). Impact of structural and psychological empowerment on job strain. *Journal of Nursing Administration, 31(5),* 260–272.

Laschinger, H. K. S., Wong, C., & Greco, P. (2006). The impact of staff nurse empowerment on person-job fit and work satisfaction. *Journal of Nursing Administration, 36(5),* 252-261.

Mfowabo, N. (2006). *The impact of TPM on the manufacturing performance at the Colt Section of Daimler Chrysler in the Eastern Cape, South Africa.* [Master's thesis, Nelson Mandela Metropolitan University].

Oakland, J. S. (2000). *Total productivity management with cases.* New Delhi: Butterworth-Heinemann – A Division of Reed Educational and Professional Publishing Limited.

Onyebuchi, K. (2014). Total productivity maintenance and performance of selected plastic manufacturing companies in Anambra State. *EPRA International Journal of Economic and Business Review, 5(2),* 1–26.

Richard, S. (2009). *Organizational behaviours: Concepts, controversies, and applications* (4th ed.). New Jersey: Prentice Hall.

Spreitzer, G. M. (1995). Psychological empowerment in the workplace: Dimensions, measurement, and validation. *Academy of Management Journal, 38(5),* 1442–1465.

Terziovski, M. (2010). Innovation practice and its performance implications in small and medium enterprises (SMEs) in the manufacturing sector: A resource-based view. *Strategic Management Journal, 31(8),* 892-902.

Thomas, K. W., & Velthouse, B. A. (1990). Cognitive elements of empowerment: An "interpretive" model of intrinsic task motivation. *Academy of Management Review, 15(4),* 666-681.

Tsang, A. H. C., & Chan, P. K. (2000). TPM implementation in China: A case study. *International Journal of Quality & Reliability Management, 17(2),* 144-157.

Udofia, E. P. (2012). *Applied statistics with multivariate methods.* Enugu: Immaculate Publications Ltd.

Ukpabio, M. G., Oyebisi, T. O., & Siyanbola, O. W. (2016). Effects of innovation on performance of manufacturing SMEs in Nigeria: An empirical study. *Obafemi Awolowo University, Ife, Nigeria.*

Zikmund, W. G. (2003). *Business research methods* (7th ed.). London: Thompson South Western Publication.