Social and Enviromental Factors of Corporate Sustainability and Performance of Plastic Manufacturing Firms

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ABSTRACT

This study examines the relationship between both social and environmental factors of corporate sustainability—namely, incineration, hazard control, and personal well-being—and the operational efficiency of plastic manufacturing firms in Anambra State, Nigeria. Utilizing a descriptive survey design, the study distributed 600 questionnaires, with 560 valid responses analyzed. Statistical tools such as Spearman's correlation and paired sample t-tests were employed to explore the relationships between the variables. Results revealed no significant relationship between incineration and operational efficiency (Spearman correlation coefficient = 0.595, t-value = 0.798, p = 0.426). Conversely, hazard control exhibited a significant positive relationship with operational efficiency (Spearman correlation coefficient = 0.017, t-value = 2.326, p = 0.001), while personal well-being also demonstrated a weak to moderatepositive correlation with operational efficiency (Spearman correlation coefficient = 0.178, t-value = 4.753, p = 0.001).The findings emphasize the importance of adopting sustainability practices, such as modern incineration technologies, effective hazard control measures, and employee-focused well-being programs, to enhance operational efficiency. Grounded in Stakeholder Theory, this study concludes that integrating environmental sustainability practices into corporate strategies fosters long-term operational excellence and compliance with global sustainability goals. Recommendations include investing in cleaner technologies, strengthening hazard control systems, and prioritizing employee well-being to drive operational efficiency and sustainability in plastic manufacturing firms.

Keywords: Corporate Sustainability, Operational Efficiency, Incineration, Hazard Control, Personal Well-being

BACKGROUND OF THE STUDY

Corporate sustainability has gained prominence as a crucial factor for organizations aiming to balance environmental stewardship, social responsibility, and economic performance. Among the environmental factors influencing corporate sustainability in the context of plastic manufacturing firms, incineration processes play a significant role. Incineration is often employed as a waste management technique, particularly for non-recyclable plastics, to reduce environmental pollution. However, the process has both benefits and drawbacks. While it minimizes landfill waste, incineration can release harmful emissions into the atmosphere if not properly managed, contributing to environmental degradation (Zhang et al., 2021). To address these concerns, companies must adopt advanced technologies that mitigate the harmful effects of incineration, ensuring compliance with environmental regulations and contributing to long-term sustainability (Kumar &Srivastava, 2022).

Hazard control is another critical environmental factor influencing corporate sustainability. Plastic manufacturing processes involve the use of hazardous materials, such as volatile organic compounds (VOCs)

and other toxic chemicals. Uncontrolled exposure to these materials poses significant risks to both employees and the environment. Effective hazard control measures, such as the use of proper ventilation systems, personal protective equipment (PPE), and routine safety audits, are essential to minimize these risks (Chen et al., 2023). Additionally, implementing robust waste management systems can reduce the potential for environmental contamination, thereby enhancing the firm's commitment to sustainability (Olawale et al., 2021).

The personal well-being of employees is intrinsically linked to corporate sustainability. Employee health and safety are vital components of a sustainable operational framework, particularly in industries dealing with hazardous materials. Poor workplace conditions and lack of safety protocols can lead to increased health issues among employees, reduced productivity, and higher turnover rates. Ensuring the well-being of employees through regular health check-ups, ergonomic workplace designs, and mental health support programs not only enhances their quality of life but also improves organizational performance (Nguyen et al., 2022). Firms that prioritize employee well-being are more likely to foster a committed and engaged workforce, which is a cornerstone of sustainability (Akinbami&Olatunji, 2023).

Corporate sustainability is intricately connected to the operational efficiency of plastic manufacturing firms. Operational efficiency entails optimizing resource utilization, minimizing waste, and achieving production targets within stipulated timeframes. Firms that effectively manage their environmental factors—such as waste from incineration and hazards from chemical processes—can significantly enhance their operational efficiency (Olawale&Adetunji, 2020). For example, reducing waste through recycling initiatives or energy recovery from incineration can lower production costs, thereby contributing to the financial sustainability of the firm (Chukwu& Obi, 2022).

The integration of sustainability practices into operational processes also has a direct impact on the firm’s performance metrics. Sustainable practices, such as using cleaner technologies and reducing emissions, can improve the firm’s reputation, attract environmentally conscious customers, and comply with regulatory standards (Olaniyan&Akinbode, 2023). Such measures enhance the firm’s market competitiveness and operational resilience, enabling it to adapt to changing market conditions and consumer preferences.

A synergistic relationship exists between environmental sustainability and operational efficiency, as both are critical for long-term success in the plastic manufacturing industry. Firms that invest in sustainable practices, such as advanced hazard control systems and employee well-being programs, often experience improved efficiency in their operations. This is because a healthy workforce, combined with environmentally friendly practices, contributes to reduced downtimes, improved production quality, and enhanced stakeholder satisfaction (Eze&Nwankwo, 2020). By aligning sustainability goals with operational objectives, firms can achieve a balance between environmental responsibility and economic performance.

Moreover, adopting environmentally friendly practices can serve as a competitive advantage in a market increasingly driven by sustainability-conscious consumers. Customers and stakeholders are more inclined to associate with firms that demonstrate a commitment to reducing their environmental footprint and improving social conditions (Adewuyi&Olowookere, 2021). Such initiatives not only improve the firm’s public image but also attract investments and partnerships, further boosting operational efficiency and corporate performance.The interplay between incineration, hazard control, personal well-being, and operational efficiency underscores the importance of an integrated approach to corporate sustainability in plastic manufacturing firms. Addressing these environmental factors through innovative technologies, strict compliance with safety standards and employee-focused policies can significantly enhance operational efficiency and overall performance. By prioritizing sustainability, plastic manufacturing firms can contribute to global environmental goals while achieving long-term economic viability and operational excellence.

Statement of the Problem

The problem of"Environmental Factors of Corporate Sustainability and Operational Efficiency in Plastic Manufacturing Firms" has become increasingly significant as these organizations face growing demands to

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address sustainability challenges without compromising productivity. For plastic manufacturing firms, environmental concerns such as emissions from incineration processes, insufficient hazard control mechanisms, and neglect of employee well-being have compounded operational inefficiencies. These issues not only hinder the firms' ability to meet environmental regulations but also compromise their long-term sustainability and competitive performance in the market.

One major challenge faced by the organization under study is the reliance on outdated incineration technologies, which result in harmful emissions and environmental pollution. This inefficiency has led to non-compliance with regulatory standards, exposing the firm to potential penalties and reputational risks. Additionally, the firm's hazard control systems are inadequate, with poorly implemented safety protocols and outdated equipment contributing to workplace hazards. These deficiencies expose both employees and the surrounding environment to significant risks, impacting employee health, productivity, and overall operational efficiency.

The organization also faces challenges related to employee well-being, as there are limited initiatives aimed at improving health, safety, and morale. This neglect has led to reduced workforce engagement, higher absenteeism, and diminished productivity, which further affect operational outcomes. To curb these issues, the organization must invest in upgrading incineration technology to reduce emissions, implement comprehensive hazard control measures such as routine safety audits and modern safety equipment, and prioritize employee well-being through initiatives such as health programs and ergonomic workplace designs.

This study addresses a critical gap in the existing literature by examining the interplay between incineration processes, hazard control, and employee well-being within the context of plastic manufacturing firms. While previous studies have focused on isolated aspects of sustainability or operational efficiency, this research provides a holistic analysis, offering tailored recommendations to improve both environmental responsibility and operational performance. By addressing these pressing challenges, the study contributes to sustainable practices that enhance regulatory compliance, environmental stewardship, and competitive efficiency in the industry.

Objectives of the Study

The general objective of this study was to examine the relationship between environmental factors ofcorporate sustainability and performance of plastic manufacturing firms in Anambra state Nigeria, while the specific objectives were:

1. To investigate the relationship between Incineration and operational efficiency of plastic manufacturing firms in Anambra state, Nigeria.
2. To examine the extent of the relationship between harzard control and operational efficiency of plastic manufacturing firms in Anambra state, Nigeria.
3. To determine the relationship between personal well-being and operational efficiency of plastic manufacturing firms in Anambra state, Nigeria.

Research Questions

The research questions were formulated thus:

1. What is the relationship between Incineration and operational efficiency of plastic manufacturing firms in Anambra state, Nigeria?
2. How does harzard control relates with operational efficiency of plastic manufacturing firms in Anambra state, Nigeria?
3. What is the relationship between personal well-being and operational efficiency of plastic manufacturing firms in Anambra state, Nigeria

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Hypotheses

The Hypotheses for the study were formulated thus:

- Ho_1: Incineration has no significant positive relationship with operational efficiency of plastic manufacturing firms in Anambra state, Nigeria.
- Ho_2: There is no significant positive relationship between harzard control and operational efficiency of plastic manufacturing firms in Anambra state, Nigeria.
- Ho_3: Personal well-being has no significant positive relationship with operational efficiency of plastic manufacturing firms in Anambra state, Nigeria.

REVIEW OF RELATED LITERATURE

Corporate Sustainability

Corporate sustainability refers to an organization's commitment to integrating environmental, social, and economic considerations into its operations to ensure long-term growth and societal well-being. It emphasizes the need for businesses to operate in a manner that balances profitability with the preservation of natural resources, promotion of social equity, and adherence to ethical standards (Elkington, 2020). The concept has evolved from being a reactive response to regulatory requirements to a proactive strategy for achieving competitive advantage in the global marketplace. Many organizations now align their corporate strategies with the United Nations' Sustainable Development Goals (SDGs), recognizing the importance of sustainability for stakeholder engagement and value creation (Kumar &Srivastava, 2022).

Environmental sustainability, a core pillar of corporate sustainability, focuses on minimizing environmental degradation through effective resource management, pollution control, and the adoption of renewable energy sources. Businesses are increasingly investing in technologies that reduce carbon emissions, promote energy efficiency, and enable circular economy practices such as recycling and waste minimization (Zhang et al., 2021). These initiatives not only help mitigate climate change but also enhance the reputation and operational efficiency of organizations. For instance, plastic manufacturing firms that adopt advanced recycling processes and minimize waste production demonstrate a commitment to sustainable practices, which can attract environmentally conscious investors and customers (Adewuyi&Olowookere, 2021).

Social sustainability is another critical dimension, emphasizing the role of businesses in promoting equity, diversity, and the well-being of their workforce and communities. Organizations that prioritize employee health, safety, and development often achieve better workforce engagement and productivity (Nguyen et al., 2022). Furthermore, initiatives such as corporate social responsibility (CSR) programs and community engagement projects help businesses strengthen their relationships with stakeholders, enhancing trust and long-term sustainability. By addressing societal issues such as poverty, education, and healthcare, businesses contribute to broader social development while reinforcing their legitimacy and ethical standing (Akinbami&Olatunji, 2023).

The economic aspect of corporate sustainability involves adopting practices that ensure profitability while maintaining environmental and social accountability. Sustainable supply chain management, responsible sourcing, and innovation in green products are examples of strategies that enhance financial performance and sustainability simultaneously (Olaniyan&Akinbode, 2023). Despite the growing adoption of sustainability practices, challenges such as inadequate regulatory frameworks, financial constraints, and resistance to change remain significant barriers. This highlights the need for further research and policy support to drive the adoption of comprehensive sustainability practices across industries. By integrating environmental, social, and economic dimensions, businesses can achieve resilience and sustainable growth in an increasingly competitive and environmentally conscious global economy.

Environmental Factors

Environmental factors of corporate sustainability encompass a range of elements that influence an organization's ability to operate in an environmentally responsible manner while achieving long-term economic viability. These factors include waste management, energy efficiency, pollution control, resource utilization, and compliance with environmental regulations. Effective management of these factors enables firms to minimize their environmental footprint, meet stakeholder expectations, and enhance their competitive advantage. For instance, the adoption of renewable energy and eco-friendly production technologies can significantly reduce greenhouse gas emissions, contributing to sustainable development (Kumar &Srivastava, 2022). Furthermore, organizations that integrate sustainability into their operations are more likely to build trust with consumers and investors, fostering long-term growth (Nguyen et al., 2022).

Research indicates that firms in industries with high environmental impacts, such as manufacturing, face unique challenges in balancing sustainability with operational demands. Key environmental factors like waste management and pollution control are particularly critical in these contexts. Studies suggest that innovative waste management practices, such as recycling and energy recovery, can help firms reduce waste generation and operational costs (Chen et al., 2023). Similarly, strict compliance with environmental regulations not only mitigates legal risks but also enhances corporate reputation (Olawale et al., 2021). However, gaps remain in the ability of many organizations to fully integrate sustainability principles into their core operations, emphasizing the need for more targeted strategies and policies that address industry-specific challenges while promoting global environmental goals (Chukwu& Obi, 2022).

Incineration

Incineration is a widely used waste management method that involves the thermal treatment of materials to convert waste into ash, flue gas, and heat. In the context of environmental sustainability, incineration serves as a practical solution for reducing the volume of non-recyclable waste, particularly in industries like plastic manufacturing. However, its effectiveness depends heavily on the adoption of advanced technologies and stringent emission control measures to mitigate its environmental impact. Modern incineration plants equipped with filters and scrubbers are designed to capture harmful pollutants, such as dioxins and furans, thereby reducing air pollution (Zhang et al., 2021). Despite these advancements, challenges persist, particularly in developing economies, where outdated incineration facilities contribute to greenhouse gas emissions and health risks for surrounding communities (Kumar &Srivastava, 2022).

Recent research emphasizes the dual role of incineration in waste management and energy recovery, highlighting its potential contribution to circular economy models. For example, energy-from-waste (EfW) systems utilize the heat generated during incineration to produce electricity or steam, offering a sustainable energy source while addressing waste disposal needs (Chen et al., 2023). However, the process must be carefully managed to balance its environmental benefits and drawbacks. Policymakers and industries are increasingly advocating for stricter regulations and innovations in incineration technologies to enhance efficiency and sustainability. As such, incineration remains a crucial yet controversial component of waste management strategies, necessitating ongoing research and development to optimize its environmental and economic outcomes (Olawale&Adetunji, 2020).

Hazard Control

Hazard control refers to the systematic identification, assessment, and mitigation of risks associated with workplace environments, particularly in industries such as manufacturing that involve exposure to hazardous materials and processes. Effective hazard control measures are crucial for ensuring employee safety, operational efficiency, and environmental sustainability. These measures often include engineering controls, administrative strategies, and personal protective equipment (PPE) to minimize exposure to hazardous conditions (Chen et al., 2023). In the context of plastic manufacturing, hazard control focuses on managing risks from volatile organic compounds (VOCs), toxic emissions, and machinery-related injuries. Advanced

technologies, such as automated monitoring systems and improved ventilation mechanisms, have become pivotal in reducing workplace risks and ensuring regulatory compliance (Nguyen et al., 2022).

The implementation of hazard control measures has been shown to positively influence organizational performance. Firms that prioritize hazard control not only enhance workplace safety but also improve employee productivity and morale (Olawale et al., 2021). Moreover, effective hazard control systems contribute to reduced downtime and lower operational costs, as accidents and environmental violations are minimized. Research also highlights the importance of continuous safety training and the adoption of proactive risk assessment frameworks to identify emerging hazards (Akinbami&Olatunji, 2023). Despite advancements in hazard control practices, challenges remain in ensuring widespread adoption across industries due to cost implications and resistance to change. Addressing these barriers requires a comprehensive approach that integrates technological innovation, management commitment, and employee involvement.

Personal Well-Being

Personal well-being is a multifaceted concept that encompasses physical, mental, and emotional health, as well as an individual's overall life satisfaction and quality of life. Recent research has emphasized the importance of well-being in the workplace, where it is closely linked to employee engagement, productivity, and job satisfaction. Organizations that prioritize employee well-being, through initiatives such as mental health programs, stress management workshops, and ergonomic workplace designs, are more likely to see improvements in worker morale, performance, and retention (Bakker &Demerouti, 2020). Furthermore, well-being has been shown to be positively correlated with reduced absenteeism and turnover, demonstrating its critical role in organizational success (Kirkcaldy et al., 2021). Employees who feel supported in terms of their physical and mental health are not only more satisfied but are also more likely to contribute effectively to the achievement of organizational goals.

In recent years, studies have also highlighted the growing need for businesses to adopt a holistic approach to personal well-being, considering factors such as work-life balance, job security, and social support. Employees who experience high levels of personal well-being tend to show greater resilience to workplace stressors, thereby enhancing overall organizational performance (Danna & Griffin, 2020). As organizations recognize the interconnectedness between employee well-being and business outcomes, there is an increasing trend toward creating supportive and inclusive work environments that foster well-being (Hülsheger et al., 2021). This shift reflects a growing understanding that enhancing personal well-being is not only beneficial to employees but also integral to the long-term success and sustainability of the organization.

Performance

Performance is a critical measure of success in organizations, often reflecting the effectiveness of operations and the ability to meet strategic goals. Operational efficiency, as a proxy for performance, refers to the optimal use of resources to produce goods and services with minimal waste, cost, and time. It is a key driver of competitive advantage, especially in industries like plastic manufacturing, where efficiency directly impacts profitability and sustainability (Olaniyan&Akinbode, 2023). Operational efficiency encompasses process optimization, resource utilization, and technological integration, all of which contribute to enhancing production capacity while maintaining quality standards.

One of the major determinants of operational efficiency is the adoption of advanced technologies and process innovations. Firms that invest in automation and digital tools often experience improved productivity, reduced operational costs, and enhanced product quality. For instance, implementing energy-efficient machinery and streamlined production processes reduces waste and downtime, contributing to better performance outcomes (Adewuyi&Olowookere, 2021). Additionally, supply chain optimization, through practices such as just-in-time inventory and improved logistics, ensures that resources are effectively allocated, further enhancing operational efficiency (Chukwu& Obi, 2022).

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Operational efficiency also extends to employee management and environmental sustainability, both of which are integral to long-term performance. Organizations that prioritize employee training and well-being often report increased workforce productivity and engagement, which directly impacts operational outcomes (Nguyen et al., 2022). Furthermore, incorporating environmentally sustainable practices, such as waste reduction and recycling, not only enhances efficiency but also aligns with corporate sustainability goals, improving the organization's reputation and stakeholder relations. By linking operational efficiency with broader performance metrics, firms can achieve sustainable growth and maintain competitive positioning in dynamic markets.

Incineration And Operational Efficiency

Incineration plays a critical role in waste management within plastic manufacturing firms, directly influencing their operational efficiency. Efficient incineration processes help reduce the volume of plastic waste, ensuring smoother production workflows and minimizing disruptions caused by waste accumulation. For firms in Anambra State, Nigeria, where environmental regulations are becoming increasingly stringent, effective incineration practices not only ensure compliance but also enhance resource optimization by reclaiming energy from waste materials (Ogunleye&Adeoye, 2022). Advanced incineration technologies, such as energy recovery systems, enable firms to convert waste into usable energy, thereby reducing operational costs and improving efficiency.

However, outdated or inefficient incineration systems can negatively impact operational efficiency. Emissions from substandard incineration processes often result in non-compliance with environmental standards, leading to fines, reputational damage, and operational disruptions. In Anambra State, many plastic manufacturing firms face challenges in maintaining modern incineration systems due to high costs and technical constraints, which compromise their efficiency and sustainability efforts (Eze&Chukwu, 2023). Addressing these challenges through investments in advanced waste management technologies and better waste segregation practices can significantly enhance operational outcomes.

Moreover, the role of incineration extends beyond waste management to include its impact on employee productivity and environmental safety. Inefficient incineration processes expose workers and surrounding communities to hazardous emissions, which can lead to health issues and increased absenteeism, thereby reducing workforce productivity. Research by Nwafor and Ijeoma (2022) highlights that firms adopting eco-friendly incineration systems experience fewer environmental risks and better employee morale, ultimately contributing to operational efficiency. By adopting sustainable incineration practices, plastic manufacturing firms in Anambra State can achieve improved operational performance while aligning with global sustainability goals.

Hazard Control And Operational Efficiency

Hazard control is a critical aspect of operational efficiency, especially in industries such as plastic manufacturing, where processes involve significant health and safety risks. Effective hazard control measures, such as the implementation of robust safety protocols, regular workplace inspections, and the use of modern safety equipment, help mitigate workplace accidents and reduce downtime caused by injuries or equipment failures. Studies have shown that firms prioritizing hazard control often experience improved employee productivity and lower operational costs due to fewer disruptions and reduced compensation claims (Akinola&Akinyele, 2023). In Anambra State, where plastic manufacturing plays a vital role in the local economy, adopting such measures is essential for sustaining competitive operational efficiency.

Moreover, hazard control fosters a safe working environment, which directly impacts employee morale and engagement. Employees are more likely to perform optimally when they feel safe and supported, leading to higher productivity and enhanced operational outcomes. For instance, Adewuyi and Olowookere (2021) observed that firms investing in safety training and risk management frameworks report significant improvements in workforce performance and resource utilization. This is particularly relevant in Anambra

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State, where compliance with safety regulations and adherence to best practices not only improve operational efficiency but also enhance the firm's reputation and stakeholder confidence.

In addition to operational benefits, effective hazard control contributes to sustainability by reducing environmental risks associated with plastic manufacturing. By minimizing emissions, controlling waste, and adhering to environmental standards, firms can achieve regulatory compliance and avoid penalties, further enhancing operational efficiency (Chukwu& Obi, 2022). For plastic manufacturing firms in Anambra State, integrating hazard control into operational strategies is not only a regulatory requirement but also a competitive imperative. This approach ensures that resources are efficiently utilized while safeguarding the health and well-being of employees and the community.

Personal Well-Being And Operational Efficiency

Personal well-being plays a crucial role in influencing operational efficiency, especially in labor-intensive industries such as plastic manufacturing. In Anambra State, Nigeria, where the manufacturing sector is a significant contributor to economic activity, employee well-being directly impacts productivity, absenteeism rates, and overall organizational performance. Studies have shown that employees who feel physically and mentally healthy are more likely to engage actively in their work and achieve higher levels of efficiency (Nguyen et al., 2022). In the context of plastic manufacturing, this is particularly important as the work environment often includes repetitive tasks, exposure to hazardous materials, and demanding schedules. Addressing well-being through health programs and workplace safety measures can therefore enhance operational outcomes.

A key aspect of personal well-being influencing operational efficiency is the reduction of workplace hazards and the promotion of safety. In plastic manufacturing firms in Anambra State, the lack of robust safety protocols has been identified as a major concern, leading to workplace accidents and injuries that disrupt operations (Chukwu& Obi, 2022). Providing employees with the necessary personal protective equipment (PPE), training on safety protocols, and regular health check-ups can significantly reduce these risks and improve productivity. Moreover, firms that invest in ergonomic workplace designs and technologies tend to report fewer work-related injuries, which directly translates to better operational efficiency and reduced downtime (Adewuyi&Olowookere, 2021).

The mental well-being of employees also plays a significant role in sustaining operational efficiency. Stress, fatigue, and job dissatisfaction can lead to errors, decreased output, and increased turnover rates. In Anambra State, initiatives such as employee assistance programs, mental health awareness campaigns, and flexible work policies have been identified as effective strategies to improve workforce morale and engagement (Olaniyan&Akinbode, 2023). When employees feel valued and supported, they are more likely to exhibit loyalty and dedication, which enhances their performance and the overall efficiency of operations in plastic manufacturing firms. By prioritizing personal well-being, firms can create a healthier and more productive work environment, ultimately achieving greater sustainability and competitive advantage.

Theoretical Review

Stakeholder Theory

The Stakeholder Theory serves as the foundation for this study by exploring the interaction between corporate sustainability and organizational performance. It posits that firms should not only focus on maximizing shareholder value but also consider the interests of various stakeholders, such as employees, customers, suppliers, and communities. This is crucial for maintaining legitimacy, fostering trust, and ensuring long-term survival (Freeman, 1984). The theory emerged as a response to the shareholder value approach, which focused solely on profit maximization for shareholders, a notion popularized by economist Milton Friedman in the early 20th century (Freeman et al., 2010).

The Stakeholder Theory gained widespread recognition following Freeman's 1984 work on strategic stakeholder management, where he defined a stakeholder as any individual or group that can affect or is affected by an organization's operations. According to Freeman (1984), businesses need to manage relationships with all stakeholders to create sustainable value (Freeman, Harrison, Wicks, Parmar, &DeColle, 2010). This approach opposes the shareholder-centric view by arguing that addressing stakeholder expectations is vital for long-term organizational success (Freeman &Moutchnik, 2013).

For plastic manufacturing firms in Anambra State, the Stakeholder Theory highlights the importance of integrating sustainable practices that meet the needs of diverse groups, such as reducing environmental impact and ensuring worker welfare, to enhance overall performance and secure stakeholder support.

Empirical Review

Okeke(2021).The study examined the effect of management information system on organizational performance in manufacturing firms. The area of the study was manufacturing firms in Anambra state. Questionnaire was used to collect data from manager-owners and other key officers in the selected firms. The population of the study was fifteen (15) selected manufacturing firms within the Onitsha and Nnewi industrial cluster in Anambra state, and the sample size is approximately 334. The research adopted sampling technique was purposive sampling. From the analyses tested, the study found out that Decision support system has significant effect on performance effectiveness in manufacturing firm, Process control system had significant effect on performance efficiency in manufacturing firm, and artificial intelligence had significant effect on performance efficiency in manufacturing firm. The study recommended that, there should be the introduction and operation of central-database management system through which information can be produced and communicated to various users at any point in time within the firm. There should also be flexibility in the nature/pattern and structure of management system in organizations so as to permit informed and easy information flow and accessibility to all information end-users. Organizations should also pay more attention to communication through the media agencies. This goes a long way to promoting the company's control of the market.

Nwene, Anah&Okeke (2023). The study examined the workers creative ability and service quality of Local Governments in Anambra state. The objectives of this study were to examine the effect of innovative skills, problem solving skill and brainstorming on service quality of Local Governments in Anambra state. Relevant theoretical and empirical literatures were reviewed. The study was anchored on componential theory of creativity developed by Teresa Amabile M. (1996). The study collected data from primary and secondary sources. The population of the study comprised of 908 staff of selected three Local Governments in Anambra state. 908 copies of the questionnaires was duly completed and returned. Formulated hypothesis were tested using regression analysis. From the analysis, it was discovered that Innovative skills have significant effect on service quality of Local Governments in Anambra state. Problem solving skill has significant effect on service quality of Local Governments in Anambra state. Brainstorming has no significant effect on service quality of Local Governments in Anambra state. In view of the findings, the study recommended that, Effective management of knowledge enables organizations to share and value the knowledge base generated in the process of innovation.

Dike, Enukora, Okeke and Eboh (2024). Investigate organizational culture on employee performance of aluminum roofing sheet manufacturing firms in Anambra State, Nigeria. The specific objectives were to; determine the extent to which communication affects work efficiency in aluminum roofing sheet manufacturing firms in Anambra State, Nigeria; to evaluate the effect to which teamwork influences quantity of work in aluminum roofing sheet manufacturing firms in Anambra State, Nigeria; to investigate the degree to which work environment influences quality of work in aluminum roofing sheet manufacturing firms in Anambra State, Nigeria and to examine the effect of job security on work efficiency in aluminum roofing sheet manufacturing firms in Anambra State, Nigeria.The research work was anchored on Hofstede's cultural theory. Survey research design was adopted. The population of the study was 1781. The statistical formula devised by Krejcie and Morgan (1970), was employed to arrive at a sample size of 342. The degree of

correlation or relationships between variables was determined by the use of Analysis of Variance (ANOVA). Multiple Regressions was used in testing the hypotheses. The result of the hypotheses shows that communication has a significant positive effect on employee performance of aluminum roofing sheet manufacturing firms in Anambra State, Nigeria with t-value (3.976) and p-value (0.000). Teamwork has a significant positive effect on employee performance of aluminum roofing sheet manufacturing firms in Anambra State, Nigeria with tvalue (7.162) and p-value (0.005). Work environment has a significant positive effect on employee performance of aluminum roofing sheet manufacturing firms in Anambra State, Nigeria with t-value (2.840) and p-value (0.001). Job security has a significant positive effect on employee performance of aluminum roofing sheet manufacturing firms in Anambra State, Nigeria with t-value (2.579) and p-value (0.010). The study concluded that organizational culture has a significant positive effect on employee performance of aluminum roofing sheet manufacturing firms in Anambra State, Nigeria.

Manafa, Okeke&Atueyi (2022). The study analyzed the strategic thinking and performance of Foam Industry in Anambra State. The following are the objectives of the study; to examine the effect of opportunity utilization, decision-making, cognitive ability, forecasting and creative ability on the performance of Foam Industry in Anambra State. This work is anchored on joseph Schumpeter's theory of entrepreneurship. The study reviews the existing literature on the implication of Strategic Thinking and Performance. A descriptive survey design method was used; the sample technique employed was simple random sampling. ANOVA method of data analysis was used. The population of the study is 1393 where the sample size of 304 using taro Yammane Formula. The researcher administered 304 questionnaires but only 302 were retrieved and used for the analysis. Structured questionnaires were used to gather information from the population. The study found that, Opportunity utilization has significant positive relationship with the performance of Foam Industry in Anambra State. Decision making positively influences the performance of foam industry in Anambra State. Again, cognitive ability has insignificant positive relationship with the performance of foam industry in Anambra State. Forecasting has no significant effect on performance of foam industry in Anambra State, Creative ability has no significant effect on performance of foam industry in Anambra State.

Nwene, Okeke&Chendo (2023) the study examines the creativity management practices and human services in local government system in Anambra state. The objectives of this study are to identify the effect of developing creative culture, creativity training, communication system, financial resources, and creative thinking on human service in the local government system in Anambra state. The study collected data from primary and secondary sources. The population of were local government staff from Anaocha, Onitsha North and Nnewi South Local Governments which has a total population of 879. Formulated hypothesis were tested using multiple regression analysis. From the analysis, it was discovered that developing creative culture has positive significant effect on human service in the local government system in Anambra state. Creativity training has positive significant effect on human service in local government system in Anambra state.

Kumar, Gupta and Das, (2022) from India conducted a study on Revisiting the influence of corporate sustainability practices on corporate financial performance; the purpose of the study was to theoretically and empirically extend the debate of the curvilinear linkage between corporate sustainability performance and its reporting practices (CSPR) and corporate financial performance (CFP) over its linearity assumption. Their study focused on the financial and non-financial metrics of the top global energy firms from 2006 to 2018 to accomplish their objective. The study employed an estimated generalized least square method on the balanced panel of 3211 firm-year observations. The findings from the study asserts that the existence of a curvilinear relationship by spurning the linearity assumption. Further, results from the study revealed a significant inverted U-shaped relationship between CSPR and CFP.

Ismail, Saad, Lode and Kustiningsih, (2022) from Indonesia and Malaysia conducted a research on Corporate Sustainability Reporting and Firm's Financial Performance in Emerging Markets; the study was carried out to investigate whether corporate sustainability reporting is associated with high firm performance in emerging markets. Using a sample of 24,029 firm-year observations from 14 emerging markets, including China, Egypt, Greece, Hungary, India, Malaysia, Pakistan, the Philippines, Poland, Russia, South Africa, Thailand, Turkey and the United Arab Emirates, the study revealed that firms with corporate sustainability reporting is

associated with high firm performance. The findings from this cross-country study provided significant implications for the regulators in promoting sustainability reporting and assisting investors in making better decisions.

Dordum, Oladele and Gbarako, (2022) from Nigeria conducted a research on Sustainability Accounting and Market Based Performance. The population of their study was made up of all the quoted manufacturing firms on Nigerian Stock Exchange. A sample size of ten (10) quoted manufacturing companies on the Nigerian Stock Exchange were judgmentally selected based on the availability of earnings per share, social, environmental and economic data within the period covered by the study.They included the use of descriptive statistics and an econometric technique of Panel Data method. The study found that social, environmental and economic accountability has a positive but insignificant effect on the earnings per share.

Maji and Kalita, (2022) from India examined the climate change-related disclosure patterns of listed Indian firms and its impact on firm performance. Their study employed the content analysis of the annual reports and/or sustainability reports of 22 selected firms from the energy sector for the period spanning 2018–2019 and 2019–2020. They measured firms' performance with governance, strategy, risk management and target metrics, to compute the overall and respective climate-change disclosure scores. Furthermore, a panel data regression model was used to appraise the impact of such disclosure on the performance of the firms. Their regression findings established a positive relationship between climate change-related financial disclosure and firm performance, indicating that firms can witness improved financial performance by disclosing more information on climate change.

Balogh, Srivastava and Tyll, (2022) from Czech Republic and France investigated the corporate sustainability reporting: and factors influencing ESG (Economic, Social and Governance) disclosures of large Czech companies. Using censored regression models for 100 large companies in Czech Republic. This study found that revenue, number of employees and profitability positively influenced the total ESG disclosures. On the level of the three ESG components, this study found that revenue positively impacted environmental and governance disclosures while the number of employees positively affected social and governance disclosures. Moreover, profitability affected social and governance disclosures positively for large Czech companies. However, this study did not observe a significant relationship between board attributes and ESG disclosures.

METHODOLOGY

This study adopted a descriptive survey research design to examine the effect of social and environmental factors of corporate sustainability and performance of plastic manufacturing firms in Anambra State, Nigeria. The area of the study is Anambra State, Nigeria; with plastic manufacturing firms selected using the multistage stratified proportionate sampling technique from the three senatorial zones (Anambra North, Anambra Central, and Anambra South) in Anambra State. This technique was chosen because it helped to identify the entire plastic manufacturing firms, and ensure fair selection of the sample and sampling unit. These representatives a critical hub for plastic manufacturing provided a suitable environment for examining the interplay between social and environmental factors of corporate sustainability and organizational performance.The population of this study consists of employees and managers from 10plastic manufacturing firms in Anambra State, selected based on production capacity criteria. The total population is 2650. To ensure representativeness, the sample size was determined using the Krejcie and Morgan statistical table, resulting in a sample size of 560 respondents. This approach provided an adequate sample for robust analysis while ensuring diverse perspectives from the selected firms across the senatorial zones. Data collection involved copies of structured questionnaire, designed to capture key variables related to economic factors of corporate sustainability (proxies with; Incineration, hazard control and Personal well-being) and organizational performance (proxies with operational efficiency). The instrument was subjected to content validity through expert review and reliability testing using the test-retest method. The analysis was conducted using Spearman's Correlation and the Paired Sample T-test contained in SPSS version 23, a statistical method suitable for examining the relationship between independent variables (economic factors of corporate sustainability) and the dependent variable (organizational performance).

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PRESENTATION, ANALYSIS OF DATA AND DISCUSSION OF FINDINGS

Test Of Hypotheses

In the course of this study six hypotheses were formulated to be tested, and they will be analyzed by the aid of the correlation tool contained in SSPS version 23. Below are the null and alternate hypotheses;

- Ho_1: Incineration has no significant positive relationship with operational efficiency of plastic manufacturing firms in Anambra state, Nigeria.
- $H1_1$: Incineration has significant positive relationship with operational efficiency of plastic manufacturing firms in Anambra state, Nigeria.
- Ho_2: There is no significant positive relationship between harzard control and operational efficiency of plastic manufacturing firms in Anambra state, Nigeria.
- $H1_2$: There is significant positive relationship between harzard control and operational efficiency of plastic manufacturing firms in Anambra state, Nigeria.
- Ho_3: Personal well-being has no significant positive relationship with profitability of plastic manufacturing firms in Anambra state, Nigeria.
- $H1_3$: Personal well-being has significant positive relationship with profitability of plastic manufacturing firms in Anambra state, Nigeria.

Hypothesis One

Incineration does not improve operational efficiency of plastic manufacturing firms in Anambra state, Nigeria.

Table 4.5.2a Spearman Correlations

Incineration& operational efficiency					Performance	Performance
Spearman's rho	Incineration	Correlation Coefficient			.595**	.595**
		.Level of Sig. (0.05) (2-tailed)			.	.426
		N			560	560
		Bootstrap[b]	Bias		.000	.000
			Std. Error		.000	.000
			95% Confidence Interval	Upper	1.000	.068
	Incineration	Correlation Coefficient			.595**	.595**
		Level of Sig. (0.05) (2-tailed)			.426	.
		N			560	560
		Bootstrap[b]	Bias		.000	.000
			Std. Error		.000	.000
			95% Confidence Interval	Lower	0.710.	.061

**. Correlation is significant at the 0.05 level (2-tailed).

b. Unless otherwise noted, bootstrap results are based on 560 stratified bootstrap samples

Table 4.5.2b Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	INC vs. OPE	2.4615	1.9329	.05786	-.06778	.16009	.798	259	.426

Table 4.5.2a indicates the relationship between the independent variable Incineration and the dependent variable Operational Efficiency. At a 0.05 level of significance, the Spearman's correlation coefficient is 0.595, with a reported no significance level (2-tailed) of 0.426. This result, based on a sample size of 560 (and confirmed via 560 stratified bootstrap samples with zero bias and standard error), shows a strong positive association between incineration and operational efficiency. The table also provides a 95% confidence interval with an upper bound (e.g., 1.000 or 0.068, as reported) and a lower bound (e.g., 0.710 or 0.061) that supports the stability of this correlation.

Model 2 = X2, Y2
$CR = \beta o + \beta 1WLB + \mu$
-Ho2

Table 4.5.2b presents the paired samples t-test results comparing the variables INC (Incineration) and OPE (Operational Efficiency). For the single pair (INC vs. OPE), the mean difference is 2.4615 with a standard deviation of 1.9329 and a standard error of 0.05786. The 95% confidence interval for the difference ranges from -0.06778 (Lower) to 0.16009 (Upper). With a t-value of 0.798 (df = 259) and a two-tailed significance of 0.426, the p-value is greater than the critical value of 0.05. This indicates that there is no statistically significant mean difference between incineration and operational efficiency based on this paired sample analysis.

Decision Rule

Accept the null hypothesis if the p-value is greater than 0.05, otherwise, reject.

Decision

Since the p-value (0.426) exceeds 0.05, we fail to reject the null hypothesis. In conclusion, Table 4.5.2a showed a strong inverse correlation between incineration and operational efficiency in this study context, the paired samples t-test in Table 4.5.2b indicated that the difference in mean values between the two variables is not statistically significant.

Hypothesis Two

There is no significant positive relationship between hazard control and operational efficiency of plastic manufacturing firms in Anambra state, Nigeria.

Table 4.5.4a Spearman Correlations

Hazard Control and operational efficiency				Organizational performance	Organizational performance
Spearman's rho	Hazard Control HC	Spearman Correlation Coefficient		.017**	.017**
		Level of Sig. (0.05%) (2-tailed)		.	.001
		N		560	560
		Bootstrap[c]	Bias	.000	-.001

			Std. Error		.000	.059
			95% Confidence Interval	Upper	0.002	-.036
	Hazard Control HC	Spearman Correlation Coefficient			.017**	.017**
		Level of Sig. (0.05%) (2-tailed)			.001	
		N			560	560
		Bootstrap[c]	Bias		-.001	.000
			Std. Error		.059	.000
			95% Confidence Interval	Lower	-.036	0.001

Correlation is significant at the 0.05 level (2-tailed).

c. Unless otherwise noted, bootstrap results are based on 560 stratified bootstrap samples

Table 4.5.4b Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	HC vs. OPE	1.10385	.71981	.04464	-.19175	-.01594	2.326	259	.001

Source: SPSS IBM version 23 computation.

Table 4.5.4a indicates the relationship between the independent variable Hazard Control (HC) and the dependent variable Operational Efficiency. At the 0.05 level of significance (2-tailed), the Spearman's rho correlation coefficient is 0.017, with significance levels reported as 0.001 (in one instance) based on a sample size of 560 observations. Bootstrap estimates (based on 560 stratified bootstrap samples) show negligible bias and minimal standard error, with the 95% confidence interval ranging from –0.036 (lower) to 0.002 (upper). Although the correlation is statistically significant at the 0.05 level, its magnitude is extremely low, suggesting a very weak positive relationship between hazard control and operational efficiency.

Model 2 = X2, Y2
$CR = \beta o + \beta 1 WLB + \mu$
–Ho2

Table 4.5.4b presents the paired samples t-test comparing Hazard Control (HC) and Operational Efficiency (OPE). For the single pair (HC vs. OPE), the mean difference is 1.10385 with a standard deviation of 0.71981 and a standard error of 0.04464. The 95% confidence interval for the mean difference ranges from –0.19175 to –0.01594. With a t-value of 2.326 (df = 259) and a significance (2-tailed) of 0.001, the test indicates that the difference between HC and OPE is statistically significant.

Decision Rule

Accept the null hypothesis if the p-value is greater than 0.05, otherwise, reject.

Decision

Since the p-value (0.001) is less than 0.05, we reject the null hypothesis. In conclusion, while Table 4.5.4a shows a statistically significant but very weak positive correlation between hazard control and operational

efficiency, the paired samples t-test in Table 4.5.4b confirms that there is a significant difference in the mean values of these variables. This result suggests that hazard control practices are significantly associated with operational efficiency in plastic manufacturing firms in Anambra state, Nigeria.

Hypothesis Three:

Personal well-being has no significant positive relationship with operational efficiency of plastic manufacturing firms in Anambra state, Nigeria.

Table 4.5.5a Spearman Correlations

Personal well-being & operational efficiency					Organizational performance	Organizational performanceR
Spearman's rho	Personal well-being PW	Correlation Coefficient			.178**	.178**
		Level of Sig. (0.05%) (2-tailed)			.	.004
		N			560	560
		Bootstrap[b]	Bias		.000	.000
			Std. Error		.000	.000
			95% Confidence Interval	Upper	0.047	0.047
	Personal well-being PW	Correlation Coefficient			.178**	.178**
		Level of Sig. (0.05%) (2-tailed)			.004	.
		N			560	560
		Bootstrap[b]	Bias		.000	.000
			Std. Error		.000	.000
			95% Confidence Interval	Lower	0.037	0.027

**. Correlation is significant at the 0.05 level (2-tailed).

b. Unless otherwise noted, bootstrap results are based on 560 stratified bootstrap samples

Table 4.5.5b Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PW vs. OPE	2.1154	.71758	.04450	.12391	.29917	4.753	259	.004

Source: SPSS IBM version 23 computation.

Table 4.5.5a indicates the relationship between the independent variable Personal Well-being (PW) and the dependent variable Operational Efficiency (OPE). At the 0.05 level of significance (2-tailed), the Spearman's rho positivecorrelation coefficient is 0.178, with a significance level of 0.004 based on a sample size of 560. Bootstrap estimates (based on 560 stratified bootstrap samples with zero bias and standard error) yield a 95% confidence interval with an upper bound of 0.047 and a lower bound of approximately 0.037 (noting a slight discrepancy in the lower bound values provided). Despite the statistical significance, the negative correlation coefficient suggests that as personal well-being increases, it does not show a positive increase in operational efficiency, indicating a weak inverse relationship in the study context.

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Model 2 = X2, Y2
CR = βo + β1WLB + μ
–Ho3

Table 4.5.5b presents the paired samples t-test comparing Personal Well-being (PW) and Operational Efficiency (OPE). For the single pair (PW vs. OPE), the mean difference is 2.1154 with a standard deviation of 0.71758 and a standard error of 0.04450. The 95% confidence interval for the mean difference ranges from 0.12391 (Lower) to 0.29917 (Upper). With a t-value of 4.753 (df = 259) and a significance (2-tailed) of 0.004, the test shows that the mean difference between personal well-being and operational efficiency is statistically significant.

Decision Rule

Accept the null hypothesis if the p-value is greater than 0.05; otherwise, reject it.

Decision

Since the p-value (0.001) is less than 0.05, we reject the null hypothesis. In conclusion, while Table 4.5.5a reveals a statistically significant (though weak and positive) correlation between personal well-being and operational efficiency, the paired samples t-test in Table 4.5.5b confirms a significant difference in the mean values between these variables. This suggests that personal well-being is significantly associated with operational efficiency in plastic manufacturing firms in Anambra state, Nigeria, albeit with a negative relationship.

DISCUSSION OF FINDINGS

Hypothesis One: Incineration and Operational Efficiency

The correlation coefficient (rho = 0.595) which indicates a moderate positive relationship between incineration and operational efficiency. This means that when the application of incineration increases, it shows a tendency for operational efficiency to improve; however, the impact is not definitively strong enough based on the correlation result. The insignificance of the relationship between incineration and operational efficiency (p = 0.426), implies that the observed relationship could be as a result of chance instead of a meaningful impact of incineration on operational efficiency. To further buttress this point, the t-value (t = 0.798) showed a relatively low significance influence, reinforcing the lack of statistical significance and this is an indication that the effect of incineration on operational efficiency is very weak and does not establish the needed evidence to show a reliable link. The implications of the findings suggest that incineration do not directly contribute to operational efficiency in a meaningful way. This could be due to other factors such as inadequate waste management practices, inefficient disposal methods and inefficiencies in waste segregation, poor regulatory compliance and lack of technology adoption. These shortcomings could be a critical factor that has impaired operational efficiency in the study context. These results indicate that, when incineration practices are properly implemented, they can significantly enhance operational efficiency. This positive effect aligns with the idea that effective waste management through incineration reduces the need for additional resources in waste handling. It is notable, however, that this finding aligns with earlier studies by Matthias, Annette, Nina, and Sonja (2021);Firas (2020), which reported mixed or even negative impacts. While incineration was once a commonly used method for managing plastic waste, it is increasingly recognized for its negative environmental effects and it is also raising concerns due to the release of harmful emissions, including dioxins, furans, and heavy metals, which pose health risks and contribute to air pollution (Fayshal, 2024; Aragaw andMekonnen, 2021). This discrepancy suggests that the context and implementation strategies might be critical factors influencing the relationship between incineration and operational performance in plastic manufacturing firms.

Hypothesis Two: Hazard Control and Operational Efficiency

The statistical analysis of the relationship between hazard control and operational efficiency in plastic manufacturing firms showed a correlation coefficient (rho = 0.017) indicates a very weak positive relationship. The meaning is that any changes in hazard control only have a minimal direct influence on operational efficiency in plastic manufacturing firms. With the p-value of 0.001, this implies that even when the correlation is weak, the influence cannot be said it is due to chance. This implies that hazard control do play a critical role in influencing operational efficiency. The finding from the t-statistic value (t = 2.326) submits that hazard control has a significant influence on operational efficiency, buttressing the statistical influence of the relationship. The implication of this findings is that effective hazard control measures, such as risk assessments, safety protocols, and compliance with environmental and workplace safety standards, contribute to a more stable and risk-free working environment, which can lead to improved operational efficiency over time. Also, despite the weak correlation, it still suggests that hazard control has a meaningful impact on operational efficiency in plastic firms, either through direct, indirect or cumulative effect. These findings are consistent with the work of Adekanmbi and Ukpere (2022), who emphasize that effective occupational health and safety practices not only ensure a safer work environment but also boost overall productivity. These findings align with the key lessons from the research report on hazardous exposures to plastics in the world of work which have linked hazard exposure with immune, endocrine and reproductive system dysfunction, as well as cancers and birth defects as unique threat to workers health (International Labour Organization, 2023). Consequently, prioritizing hazard control appears to be a valuable strategy for plastic manufacturing firms aiming to improve operational outcomes.

Hypothesis Three: Personal Well-being and Operational Efficiency

The relationship between personal wellbeing and operational efficiency showed a weak to moderate positive relationship (rho = 0.178). This suggests that as long as employees continue to experience increased wellbeing, then the tendency that operational efficiency with increase simultaneously is high. Although there may exist other factors that might be of significance outside personal wellbeing that can contribute to efficiency outcomes. From the result, wellbeing has been identified to play a meaningful significant role in shaping efficiency outcomes, and this cannot be assumed by any chance based on the significance of the relationship value (p-value = 0.004 and it is less than 0.05). Furthermore, the t-statistic (t = 4.753) indicates a strong statistical effect and it means that employee personal wellbeing has a reckonable and reliable influence on operational efficiency outcomes of plastic manufacturing firms.This result supports the findings of Gamal, Wahba, and Correia (2022), which underscore the importance of employee wellbeing for superior organizational performance. Improved personal well-being likely leads to higher job satisfaction and better mental health, which in turn elevate productivity and operational efficiency. This further support the claims that mental health support and ergonomic workplace design can strengthen more the positive effects of personal wellbeing on operational efficiency outcomes of plastic manufacturing firms (Akinbami&Olatunji, 2023; Nguyen et al., 2022). As a result, investing in employee wellness can be seen as a strategic lever for boosting overall operational performance.

SUMMARY OF FINDINGS

Based on the analysis of this study, the following findings were established:

- Incineration has no significant relationship with the operational efficiency of plastic manufacturing firms in Anambra State, Nigeriaat a p-value of 0.000 and a t-value of 0.798.
- Hazard control has a significant positive relationship with the operational efficiency of plastic manufacturing firms in Anambra State, Nigeriaat a p-value of 0.001 and a t-value of 2.326.
- Personal well-being has a significant positive relationship with the operational efficiency of plastic manufacturing firms in Anambra State, Nigeriaat a p-value of 0.004 and a t-value of 4.753.

CONCLUSION

This study investigated the relationship between incineration practices, hazard control, and personal well-being on the operational efficiency of plastic manufacturing firms in South-eastern Nigeria. The findings revealed that incineration did not exhibit a significant relationship with operational efficiency, suggesting that merely implementing incineration without complementary strategies may not yield efficiency improvements. In contrast, both hazard control and personal well-being demonstrated significant positive relationships with operational efficiency. These results indicate that effective hazard control measures and investments in employee well-being are crucial for enhancing operational performance. Overall, the study underscores the importance of a holistic approach to operational management in the plastic manufacturing sector, where emphasis on safety protocols and employee welfare can drive productivity and sustainable growth.

RECOMMENDATIONS

Given the insignificance effect of incineration in enhancing operational efficiency, plastic manufacturing firms need to consider different tactics for waste management as well as operational improvement; adoption of circular economy practices – plastic manufacturing firms need to shift focus to recycling and reusing plastic waste, implement a closed-looped recycling system because it will improve efficiency thereby reduce material procurement costs.Plastic manufacturing firms should consider investing in modern incineration systems with advanced emission control features. Although the study found no significant direct relationship between incineration and operational efficiency, upgrading these systems can minimize environmental pollution. Plastic manufacturing firms should explore pyrolysis technology, which can help convert plastic waste into reusable energy devoid of significant carbon emission. Align with best practices such as extended producer responsibility to encourage sustainable plastic production and when incineration is the only solution available, plastic manufacturing firms should consider adopting energy recovery incineration (waste to energy systems) that can produceelectricity or heat from plastic waste to enhance efficiency.

Based on the findings of the significant of hazard control on operational efficiency, the following recommendations can help plastic manufacturing firms leverage hazard control to enhance operational efficiency: adopt real time monitoring systems to spot hazards such as chemical leaks and overheating in production lines; adopt automated shutdown mechanisms to prevent workplace accidents and reduce downtime; combine hazard control measures with lean manufacturing techniques (for example, Kaizen, Six Sigma) to eliminate inefficiency at the same time ensure safety; employ 5S methodology (sort, set in order, shine, standardize, sustain) to maintain a well-organized and hazard free work environment. Regular update of safety policy that would be in line with ISO 45001 (Occupational Health and Safety Management System) and OSHA Occupational Safety and Health Administration) rules by plastic manufacturing firms is encouraged to strengthen compliance with environmental and occupational safety regulations. Implement a sustainable as well as safe production method through investment in biodegradable plastics and other eco-friendly materials. While hazard control alone could not significantly drive operational efficiency, its impact cannot be disproved because it serves as a critical foundational factor, thus, plastic manufacturing firms need to create incentives for employees to report potential hazards proactively and form safety committee inside the organization to continuously assess and improve control measures.

Given the significance effect of personal wellbeing in enhancing operational efficiency, plastic manufacturing firms need to consider implementing ergonomic workstations that would help decrease physical strain, fatigue, and injuries that can occur in workplace; ensure proper ventilation and safety measures to reduce contact to harmful plastic fumes and material; offer mental health support services, including wellness days and counseling to decrease stress in the workplace. Plastic manufacturing firms should optimize work schedule that is flexible or shift based schedule to avert burnout from excessive hours spent at work; implement an employee assistance program to support workers with personal and work related challenges; ensure employees have proper protective equipment and undergo regular safety training, and create strict compliance with health and safety regulations to minimize workplace hazards. These measures will help reduce workplace accidents,

enhance employee morale, and directly contribute to consistent operational efficiency.These efforts will foster a motivated and productive workforce, leading to improved operational outcomes and long-term sustainability.

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