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Management Strategies for Successful Planned Shut Down Operations in Oil and Gas Industry in Nigeria

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ABSTRACT: This study examines management strategies essential for the successful execution of planned shutdown operations in Nigeria's Oil and Gas industry. The research focuses on three primary objectives: assessing the effectiveness of maintenance crews, evaluating the efficacy of replacement parts and machinery strategies, and determining the impact of safety facilities, particularly Personal Protective Equipment (PPE), on the success of shutdown operations. A descriptive survey design was employed, gathering data from 290 respondents across selected oil and gas companies in Rivers State, Nigeria. The findings reveal a strong consensus on the critical role of maintenance crews, with an overall mean of 3.08, indicating their significant contribution to efficient shutdowns. The study also highlights the importance of replacement parts and machinery strategies, reflected in an overall mean of 3.05, as essential for minimizing downtime and enhancing operational efficiency. Moreover, the provision of PPE was found to be imperative, with a mean of 3.06, which demonstrates its effectiveness in preventing injuries and ensuring a safe work environment. The study concludes that meticulous planning, strategic management, and continuous investment in training and safety measures are vital for optimizing shutdown operations and minimizing associated risks and costs. Recommendations include systematic documentation of maintenance tasks, proactive training initiatives, and clear objective-setting for shutdown projects to enhance operational success.

I. INTRODUCTION

Planned shut-downs are essential when conducting preventive maintenance, inspections, and equipment replacement in order to ensure operational continuity throughout the operational life cycle. Although necessary, shut-downs can result in considerable financial loss. Also, managing shut-down execution and the subsequent return to operations is a significant challenge (Kowo et al., 2023). This is why it is crucial to establish a meticulous shut-down plan with the right partners beforehand. The planning process allows for identification and prevention of potential deficiencies such as a lack of resources i.e., qualified personnel, equipment, and materials. To be optimal, the planning process must be sufficiently anticipated. For example, planning must take place weeks or even months before the production shut-down, depending on the scope of the shut-down.

Maintenance shut-down planning, and the resulting shut-downs, in many respects, prove the rigor of a business' management systems. While off-line maintenance activities are generally planned, scheduled and executed as per business-as-usual techniques, and task-level work scope and individual activities rarely change, the critical difference between daily operations and shut-downs is intensity (Abeh-Ukaidi, 2019). A huge volume of tasks is executed simultaneously, dramatically increasing risk in areas such as safety, quality and cost. One of the most resource-intensive activities a company can undertake is planning and executing a scheduled process outage, better known as a plant shut-down. Managing such a shut-down is referred to as a plant turnaround. Many people use the terms outage, shut-down and turnaround interchangeably to mean the period of time during which major assets or an entire facility are taken off-line to complete maintenance work that's difficult or impossible to perform while plant equipment is operational (Asenge et al., 2023). Shut-downs can be large-scale, complex, costly and disruptive to the daily pulse of

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plant operations. That's precisely why there's usually significant potential for improvement, especially in an environment where the maintenance activities are in large scale. This column highlights some of the key improvement opportunities. Ogwobo et al. (2017) detailed shut-down planning and in-depth project management experience, possible risks can be minimized and the planned tasks can be accomplished on time and on budget.

In view of the imperativeness of successful plant shutdown, this study is focused on the management strategies required for successful planned shut-down operations in the oil and gas industry in Nigeria. Shut-down operations are complex and involve significant costs, risks, and downtime. Effective management strategies are crucial to minimize disruptions, ensure safety, and optimize operational efficiency during these shut-downs.

Plant shut-downs are often times a necessary aspect of operational maintenance, and typically happen at least once a year depending on the scale of operation of the field. Without maintenance shut-downs, a business may be derailed unexpectedly by faulty equipment. It's an important part of a plant's annual routine to ensure the efficient operation of equipment and machinery, such as the pneumatic conveying system (Maren et al, 2022). Oil and gas installation shut-downs are usually planned to be done during a specified duration that are agreed by partners due to the high cost associated with shut-down operation.

The key to a successful shut-down lies in its detailed planning and scheduling ahead of time. Without this essential step it would be impossible to carry out all the required overhaul work, check-ups and measurements needed during the shut-down. Planning for the next major shut-down should start right after the previous one has ended. Planning should be carried out on a rolling basis; planned tasks should be added to the shut-down plan as soon as possible and unplanned tasks added as they come up (Adeyemo, 2019).

To this end, this study intends to examine management strategies for successful planed shut down operations in oil and gas industry in Nigeria. This study is guided by three objectives; first to investigate the effectiveness of maintenance crew on the successful execution of planned shutdown operations in oil and gas industry in Nigeria. Second, to determine the efficacy of replacement part and machine strategy in supporting uninterrupted shutdown maintenance in oil and gas industry in Nigeria. Lastly, to assess the impact of safety facilities strategy on the success of planned shutdown operations in oil and gas industry in Nigeria. These objectives aim to thoroughly explore how different management strategies specifically tailored to shut-down operations can significantly enhance operational efficiency and safety in the Nigerian Oil and Gas Industry.

II. REVIEW OF RELATED LITERAURE

2.1 Planned Shut-down Operation

Shut-downs, Turnarounds, and Outages (STO) are commonly used terms, often interchangeably, to describe a planned or unplanned period of time in which a plant/facility, unit, or piece of equipment is out of service. In many process industries (e.g., refining, petrochemicals, chemicals, power generation, etc.), equipment operates continuously, making it difficult to perform necessary inspection and maintenance work without taking said equipment off-line (Akuru and Okoro, 2021). For this reason, facilities routinely schedule turnarounds, where a section of an industrial plant or the entire facility is shut down to perform major maintenance, overhaul, and/or repair operations, as well as to inspect, test, and replace process materials and equipment. These planned events also provide owner/operators with the opportunity to perform de-bottlenecking, process upgrades, and capital project improvements while the unit or facility is off-line (Aliyu et al., 2019). The primary purpose of turnarounds is to conduct the activities necessary to keep the plant running safely, reliably, and as efficiently as possible. Sometimes equipment goes off-line unexpectedly or operators are forced to shut down equipment or an entire facility due to unforeseen events like power outages, fires, mechanical failures, weather events, or losses of primary containment (LOPC). These unplanned shut-downs or outages may or may not require immediate action, depending on the circumstances. The cost of a shut-down, turnaround, or outage can be substantial, so owner/operators strive to optimize planning and work whenever possible. Far in advance of a turnaround, operators begin planning schedules and coordinating resources to ensure that personnel, budgets, equipment, and access points are available to accomplish the turnaround objectives safely and efficiently (Lassana, 2018). The better prepared owner/operators are for STOs, the greater their ability to minimize facility downtime.

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2.2 Provision of Maintenance Crew Strategy for Successful Planned Shut-Down Operations

The key to a successful shut-down is to start the planning process early. Allow plenty of time to plan each job in detail, obtain competitive bids on contract work, manage the process inventory to gain access to tanks and other equipment for inspection, etc. (Stephen and Milton, 2020). A detailed "shut-down countdown" process should also be developed, including a list of essential activities, with a deadline for each one. There is often a discussion about the best tools to use for shut-down management. For large jobs, a good critical-path application should always be used. For small, independent jobs, critical-path software or a spreadsheet may be employed. This is often a question of personal preference. Detailed planning of shut-down work should be combined with some scheduling to key tradespeople and contractors who will be assigned to critical shut-down work can be included in the planning process (Sinan, 2021).

During a major plant outage, roles will often change. For example, maintenance supervisors may switch areas to allow a special focus on critical work. Engineers could be assigned the role of "owner's representative" to manage contract work. Planners may be assigned the responsibility of keeping work schedules and critical paths marked up to show actual progress, to assist with jobs they have planned, to flag problems and to monitor shut-down activity in detail. During shut-downs, they may also act as assistants to the maintenance supervisors or plan unexpected work (Hachimenum et al., 2023).

Shut-down projects, also known as turnarounds, planned outages or STOs are a distinctive and demanding type of project. Stakes are high, as is pressure on the schedule and project team. They are typically costly, short in duration, high risk, require a large number of human resources (including a substantial proportion of sub-contractors), and have a significant focus on HSE (health, safety, and environment). The complexity of these projects dictates a sound process for planning and executing (Adewuyi and Emmanuel, 2018). Many shut-down projects experience a cost overrun or schedule delay of more than 30%. But what are the main differences between shut-down projects and regular projects? And what do these differences tell us about the best way to approach scheduling.

Operators and their supervisors should provide support to the maintenance team by ensuring equipment is empty, clean and isolated when required, as well as thoroughly tested prior to start-up. Generally, the best roles for maintenance superintendents or managers are to stay clear of all meetings except those related to the shut-down and to "carry water" for their people by assisting in the removal of any obstacles that arise and expediting additional help when needed (Ogbe and Enobong, 2019). It may be useful to make a list of jobs that have the potential to become problems, including those on or near the critical path, those with new contractors and those where the scope of work is uncertain. List these jobs in order of shortest distance and walk by a couple of times each day, talking to the supervisors and tradespeople to assess the job status (Abotsi, 2021).

During the shut-down, progress meetings should be brief and frequent. Twice a day for 24-hour work schedules is suggested. Attendees should include the people with the overall responsibility for work in each area and for critical jobs. The agenda should be limited to asking each person if he or she is aware of any issues or problems in their area of responsibility that may affect the shut-down scope or schedule, to identify actions to address these issues and to name the person responsible for those actions (Adegbulugbe and Akinbami, 2022). At the beginning of the next meeting, the agenda should begin with a review of the issues from the previous meeting to ensure they have been adequately addressed. Surprises should never be allowed.

The documentation for a major shut-down can be extensive. It may include the list of shut-down work, critical-path schedules, the process inventory plan, permits and other safety documentation, the shut-down budget, all isolation and vessel-entry procedures (complete with detailed schedules and resource plans), as well as a list of the people responsible for all aspects of the shut-down (including their work schedules and 24-hour contact information) (Edet, 2016). Major shut-downs provide an opportunity for the people in the maintenance department to demonstrate how well they can perform under pressure. A well-planned and well-executed shut-down can be an exciting and satisfying experience. A strong operations/maintenance partnership will be key. Finally, be sure to include all operations and maintenance activities in an integrated shut-down schedule, which should be under constant review and revision during the shut-down period (Nyansu, 2016).

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2.3 Empirical Review

Asenge et al., (2023) investigated the effect of turnaround strategies on the performance of Foods and Beverages manufacturing companies in Nigeria with focus on BUA Foods Plc. The study specifically examined the effect of retrenchment strategy and diversification strategy on the performance of BUA Foods Plc. The study adopted a survey research design and primary data were collected using questionnaire. The target population of the study was 346 staff of BUA Foods Plc and a census sampling approach was used. Data collected from participants were analyzed using mean, standard deviation, correlation and regression analyses with the aid of the Statistical Package for Social Sciences (SPSS version 23). The study found that retrenchment strategy has a positive and significant effect on the performance of BUA Foods Plc. The study also established a positive and significant effect of retrenchment strategy on the performance of BUA Foods Plc. The study concluded that turnaround strategies help to reduce costs associated with business operations and improve performance.

Similarly, Maren et al., (2022) assessed experiences with shut-down and pit stop maintenance in Hydropower Plants. The authors noted that shut-down maintenance requires the generating unit of a hydro-power plant to be stopped for a period of time for maintenance purposes. These shut downs according to the authors may lead to water losses and decreased availability. The study used content analysis for the data analysis. It was found that outage time and water losses caused financial losses because less power was produced and sold to the consumers. It was noted that the size of these financial losses can be up to 100, 000 EUR/day for a run-of-river power station. This, the authors noted, motivates a minimization of the outage time by reducing the time spent on each maintenance activity through elimination of unnecessary activities as well as an optimization of the shut-down maintenance frequency. The motivation for efficiency improvement of shut-down maintenance forms the basis for future pit stop maintenance in the sector, the authors asserted.

Abeh-Ukaidi, (2019) assessed empirically the impact of turnaround strategy and corporate performance. Specifically, the study sought to examine impact of turnaround strategy on corporate performance. The proxies were return on investment (ROI) and return on equity (ROE) corresponding to turnaround strategy which was the predictor variable. This was operationalized into three empirically referents namely: cost reduction, asset reduction and revenue generation. Adopting methodological triangulation, the data collection included the questionnaires and interviews. An eight-item scale was developed from literature and validated to generate data on mediating influence of contextual factors. Also the Crobach's alpha value of the scale which was above the benchmark of 0.7 indicated that the scales used for the study were reliable. By means of the SPSS window editor, descriptive statistics were computed using Pearson correlation coefficient and regression coefficients were calculated for testing the hypotheses. The result of the analysis showed that there is a positive and significant association between the empirical referents of turnaround strategy and corporate performance.

From the forgoing, it is evident that existing literature provides a strong foundation for understanding various aspects of planned shutdown operations in the oil and gas industry, but several research gaps remain. While the effectiveness of maintenance crews is generally acknowledged, there is limited empirical evidence specifically focusing on how their training,

III. METHODOLOGY

3.1 Research Design

The study employed a descriptive survey design, which is well-suited for collecting detailed information from a large population to describe existing conditions or phenomena. This design allowed the researchers to gather quantitative data on the effectiveness of maintenance crews, the efficacy of replacement part strategies, and the impact of safety facilities during planned shutdown operations in the Nigerian oil and gas industry. The descriptive approach facilitated the identification of patterns, relationships, and potential areas for improvement within the industry.

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3.2 The Area of Study

Study Area was Rivers State Nigeria. Rivers State also known simply as Rivers, is a state in the Niger Delta region of southern Nigeria (Old Eastern Region). The choice of location is based on proximity. Again, another reason for chosen the area of the study is for effective coverage and cost minimisation.

3.3 Sample Size and Sampling Technique

This study applied a multi-stage sampling technique to sample the participants. First, a purposive sampling was used to sample three (3) oil and gas firms from twenty-four (24) oil and gas firms in Rivers state. The companies are Shell Petroleum Development Company of Nigeria Limited, Belema Oil Producing Ltd, and Chevron Nigeria Limited. The choice of these companies were informed by their significance in the region. In the next step, the Yamane Taro method was used to determine the sample size from a total population of 3240 members of staff of the selected oil and gas companies. The Yamane Taro sample size determination formula is presented in Equation 3.1 below.

$$n = \frac{N}{1 + N(e^2)} \qquad (3.1)$$

Where

N = population of the study
1 = Mathematical constant
e = Error margin (0.05)
n = Sample size

Based on the Equation 3.1, the sample size is determined as follows;

$$n = \frac{3240}{1 + 3240(0.05^2)}$$

$$n = \frac{3240}{1.9}$$

$$n = 356$$

Hence, the sample size is 356 members of staff in the three selected oil and gas industry. The last stage involved stratified simple random technique. This was done to ensure that a proportional sample was obtained from each of the three firms.

IV. RESULTS AND DISCUSSIONS

Three hundred and fifty-six (356) copies of questionnaire were designed and distributed to the respondents. Out of the 356 Questionnaires distributed, 290 (81%) were completed and returned while 66 (19%) were not returned.

4.1 Data Analysis

The findings with respect the first objective which seeks to determine how provision of maintenance crew strategy contribute to successful planed shut down operations in Oil and Gas Industry in Nigeria.

Table 4.1: Descriptive statistical analysis on participants responses on how provision of maintenance crew strategy contribute to successful planned shut down operations in oil and gas industry in Nigeria.

S/N	Question Items	SA 4 (%)	A 3 (%)	DA 2 (%)	SD 1 (%)	Total	Mean	SD
1	Maintenance crew inspect different equipment and perform any basic repairs or preventative maintenance at outage of production plant	99 (34)	119 (41)	42 (14)	30 (10)	290 100%	2.99	0.0287

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2	Maintenance crew make plant repairs, assemble or disassemble equipment and implement the maintenance budget.	120 (41)	78 27)	62 21)	30 10)	290 100%	2.99	0.0917
3	Maintenance crew work with maintenance workers to acquire maintenance skill to handle maintenance even after shut-down.	123 (42)	101 (26)	56 (35)	10 (3)	290 100%	2.91	0.0389

S/N	**Question Items**	**SA 4 (%)**	**A 3 (%)**	**DA 2 (%)**	**SD 1 (%)**	**Total**	**Mean**	**SD**
4	Maintenance crew have a broad practical skillset to performing basic welding or mechanical repairs.	190 (66)	50 (17)	26 (8)	24 (8)	290 100%	3.40	0.0528
5	Maintenance crew troubleshoot production to identify hidden machine fault during maintenance shut-down	100 (34)	140 (48)	26 (8)	24 (8)	290 100%	3.09	0.0109
	Grand Mean						**3.08**	**0.0446**

Key: **SA**:= Strongly Agree; A:= Agree, DA: =Disagree; SD: =Strongly Disagree.

The descriptive statistical analysis presented in Table 4.1 provides a comprehensive view of how maintenance crew strategies contribute to the successful execution of planned shutdown operations in the Nigerian oil and gas industry. The analysis reveals that the majority of respondents recognize the critical role of maintenance crews in ensuring the smooth and effective management of these shutdowns.

Firstly, the data shows that 75% of respondents (34% strongly agree, 41% agree) believe that maintenance crews are effective in inspecting different equipment and performing basic repairs or preventative maintenance during production outages. This finding, with a mean score of 2.99, underscores the importance of regular and thorough inspections by maintenance teams as a fundamental component of successful shutdown operations. Similarly, the maintenance crew's role in executing plant repairs, assembling or disassembling equipment, and implementing the maintenance budget is also highly regarded by the respondents, with 68% (41% strongly agree, 27% agree) expressing their confidence in these abilities. The mean score of 2.99 and a low standard deviation of 0.0917 indicate a strong consensus on the reliability of the maintenance crew in managing these critical tasks during shutdown periods.

In terms of skill acquisition, 68% of the respondents (42% strongly agree, 26% agree) affirm that maintenance crews work effectively with maintenance workers to acquire the necessary skills to handle maintenance even after shutdowns. The mean score of 2.91, however, suggests that while the crew's role in skill transfer is acknowledged, there is a slight variation in perception, indicating potential areas for improvement in this aspect of shutdown operations. The analysis further reveals that maintenance crews are perceived to have a broad practical skillset, which is crucial for performing tasks such as welding or mechanical repairs during shutdowns. This is evidenced by the strong agreement among 83% of respondents (66% strongly agree, 17% agree), reflected in the highest mean score of 3.40. The low standard deviation of 0.0528 suggests that this view is uniformly held across the sample, highlighting the importance of versatile skillsets within maintenance teams. Lastly, the ability of maintenance crews to troubleshoot and identify hidden machine faults during shutdowns is highly regarded, with 82% of respondents (34% strongly agree, 48% agree) supporting this assertion. The mean score of 3.09 and the lowest standard deviation of 0.0109 indicate a strong consensus on the critical role of troubleshooting in preventing downtime and ensuring the success of shutdown operations.

In sum, the findings from the descriptive statistical analysis suggest that maintenance crew strategies are vital to the successful execution of planned shutdown operations in the Nigerian oil and gas industry. The high levels of agreement across all items reflect a general consensus on the effectiveness of maintenance crews, particularly in areas of

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equipment inspection, repair, skill acquisition, and troubleshooting. These results emphasize the need for continued investment in the training and equipping of maintenance teams to maintain and enhance their contribution to successful shutdowns.

Furthermore the responses of the participants on the second objective is as presented in Table 4.2 below. The objective seeks to determine the efficacy of replacement part and machine strategy in supporting uninterrupted shutdown maintenance in oil and gas industry in Nigeria.

Table 4.2: Descriptive statistical analysis on participants responses on how does provision of replacement part strategy contribute for successful planed shut down operations in Oil and Gas Industry in Nigeria?

S/N	Question Items	SA 4 (%)	A 3 (%)	DA 2 (%)	SD 1 (%)	Total	Mean	SD
1	Shut-down maintenance improve the availability and uptime of individual equipment, thereby increasing the overall plant availability	101 (35)	144 (49)	30 (10)	15 (5)	290 100%	3.14	0.250
2	Shut-down maintenance improves overall plant efficiency and operations and improves the plant performance and utilization	112 (37)	102 (35)	40 (14)	36 (12)	290 100%	3.00	0.293
3	Shut-down maintenance avoids plant outages and equipment failures and improves equipment reliability and plant reliability.	109 (38)	98 (34)	45 (16)	38 (13)	290 100%	2.96	0.2693
4	Shut-down maintenance increases productivity and improves the business goals and generates more output per employee	112 (38)	98 (33)	50 (17)	30 (10)	290 100%	3.01	0.314
5	Shut-down maintenance reduce waste and effluents, thereby promoting a safe environment and sustainability of operations.	114 (39)	106 (36)	50 (17)	40 (14)	290 100%	3.15	0.306
	Grand Mean						**3.05**	**0.291**

The descriptive statistical analysis presented in Table 4.2 provides a comprehensive understanding of how replacement part strategies contribute to the success of planned shutdown operations in the Nigerian oil and gas industry. The data indicate a strong consensus among respondents regarding the critical role that these strategies play in enhancing various operational aspects during shutdowns.

The findings suggest that the majority of respondents perceive shutdown maintenance as highly effective in improving the availability and uptime of individual equipment, which subsequently increases overall plant availability. With 84% of participants either strongly agreeing or agreeing, and a mean score of 3.14, it is evident that well-executed replacement part strategies are seen as essential to minimizing downtime and ensuring the continuous operation of equipment during shutdowns. This is further supported by the relatively low standard deviation of 0.250, indicating consistent views across the respondent pool. Additionally, the study reveals that a significant portion of respondents believes that shutdown maintenance enhances overall plant efficiency, performance, and utilization. With 72% of respondents in agreement and a mean score of 3.00, this finding underscores the importance of maintaining and replacing parts in a timely manner to optimize plant operations during shutdowns. The slightly higher standard deviation of 0.293 suggests some variation in the extent to which respondents perceive these improvements, though the general consensus remains positive.

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Furthermore, the data highlight the role of shutdown maintenance in preventing plant outages and equipment failures, thereby improving both equipment and plant reliability. With 72% of respondents agreeing and a mean score of 2.96, the results indicate a strong belief in the effectiveness of replacement parts in maintaining operational reliability during shutdowns. However, the standard deviation of 0.2693 reflects a slightly broader range of responses, suggesting that while most respondents acknowledge the importance of these strategies, there is some variation in their perceived impact. In terms of productivity and alignment with business goals, the analysis shows that 71% of respondents agree that shutdown maintenance increases productivity and generates more output per employee. The mean score of 3.01 and the standard deviation of 0.314 suggest a generally positive perception of the role that replacement part strategies play in enhancing productivity during shutdowns, although the variation in responses indicates differing levels of agreement on this issue. Lastly, the study points to the role of shutdown maintenance in promoting environmental sustainability by reducing waste and effluents. With 75% of respondents agreeing and a mean score of 3.15, the data suggest a strong consensus that effective replacement part strategies not only enhance operational efficiency but also contribute to a safer and more sustainable working environment. The standard deviation of 0.306, while slightly higher, still indicates a relatively uniform agreement among respondents.

Conclusively, the analysis suggests that replacement part strategies are viewed as crucial to the success of planned shutdown operations in the oil and gas industry in Nigeria. The high levels of agreement across the various aspects of plant operation, coupled with the relatively low standard deviations, reflect a broad consensus on the effectiveness of these strategies in ensuring successful shutdown outcomes.

The result of the survey on regarding the last objective of the study which seeks to assess impact of safety facilities strategy on the success of planned shutdown operations in oil and gas industry in Nigeria, is presented in Table 4.3 belwo.

Table 4:3 Descriptive statistical analysis on participants responses on how provision of safety facilities strategy contribute to successful planed shut down operations in oil and gas Industry in Nigeria

S/N	Question Items	SA 4 (%)	A 3 (%)	DA 2 (%)	SD 1 (%)	Total	Mean	SD
1	Lack of Personal Protective Equipment (PPE) or unsuitable PPE were related to the incident that caused the injury.	109 (38)	116 (40)	30 (10)	35 (12)	290 100%	3.03	0.427
2	Personal protective safety equipment creates the appropriate environment in the workplace	111 (38)	90 (31)	59 (20)	30 (10)	290 100%	2.97	0.147
3	Personal protective safety equipment provides useful measures to prevent small and even sometime large injuries to the workers.	117 (32)	98 (33)	40 (14)	30 (10)	290 100%	3.00	0.292
4	Personal protective safety equipment reduces accidents, improves the health of your employees, and makes for a safer, secure work environment.	114 (39)	106 (36)	50 (17)	40 (14)	290 100%	3.15	0.306
5	Personal Protective Equipment, helps prevent staff emergencies on the job due to inhalation, absorption, irritants, or other prolonged contact with a cleaning chemical.	114 (52)	106 (41)	50 (17)	20 (6)	290 100%	3.15	0.562
	Grand Mean						**3.06**	**0.467**

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The third objective of this study aims to assess the impact of safety facilities strategies, specifically the provision and use of Personal Protective Equipment (PPE), on the success of planned shutdown operations in the Oil and Gas industry in Nigeria. The analysis of participants' responses provides valuable insights into how these safety strategies contribute to the successful execution of such operations. The data indicates that a significant portion of the participants, representing 38% who strongly agreed (SA) and 40% who agreed (A), acknowledged that incidents leading to injuries were often related to a lack of PPE or the use of unsuitable PPE. This high level of agreement, with a mean score of 3.03, underscores the critical importance of appropriate PPE in preventing injuries during shutdown operations. The standard deviation (SD) of 0.427 suggests a relatively consistent view among the participants regarding the role of PPE in mitigating injury risks.

Participants also recognized the role of PPE in creating a safe working environment, with 38% strongly agreeing and 31% agreeing with this statement. However, there is a noticeable proportion of disagreement, with 20% disagreeing and 10% strongly disagreeing, which is reflected in the slightly lower mean score of 2.97. The low standard deviation of 0.147 indicates that while the views are relatively consistent, there is some variability in how participants perceive the efficacy of PPE in fostering an appropriate work environment. Regarding the effectiveness of PPE in preventing both minor and significant injuries, 32% of participants strongly agreed, and 33% agreed, resulting in a mean score of 3.00. This score reflects a general consensus on the protective role of PPE, though the standard deviation of 0.292 suggests some differences in opinion, particularly regarding the extent of protection PPE offers.

The data shows strong support for the notion that PPE reduces accidents and improves the health of employees, with 39% strongly agreeing and 36% agreeing. The mean score of 3.15, coupled with a standard deviation of 0.306, indicates strong agreement among participants about the positive impact of PPE on workplace safety. This suggests that effective use of PPE is seen as a crucial strategy for enhancing safety during shutdown operations. The highest level of agreement was observed in the statement regarding PPE's role in preventing staff emergencies due to hazardous exposures, with 52% strongly agreeing and 41% agreeing. The mean score of 3.15, along with a slightly higher standard deviation of 0.562, points to a strong consensus but also reflects some divergence in participant views on this matter. This indicates that while most participants recognize the importance of PPE in preventing emergencies, there are differing opinions on its effectiveness.

The grand mean of 3.06 and a standard deviation of 0.467 across all items suggest a general agreement among participants that safety facilities strategies, particularly the provision and use of PPE, play a crucial role in the successful execution of planned shutdown operations in the Oil and Gas industry in Nigeria. The relatively low standard deviations indicate that these views are shared consistently among the participants. This reinforces the importance of comprehensive safety strategies in mitigating risks and ensuring smooth operational outcomes during shutdown periods.

V. CONCLUSION

The study concludes that the implementation of robust and strategic management practices is essential for the successful execution of planned shutdown operations in Nigeria's Oil and Gas industry. Plant shutdowns have significant financial implications, each day of inactivity not only disrupts production but also results in substantial revenue loss. Thus, it is imperative that shutdown maintenance cycles are meticulously planned. These cycles should be short, targeted, and highly efficient. This is to maximise operational efficiencies while minimising downtime.

To enhance the efficiency and success of these planned shutdown operations, the study proposes that the management of Oil and Gas companies in Nigeria should systematically compile and document all necessary maintenance work required during shutdown periods. This process should integrate lessons learned from previous shutdowns, improvements identified during inspections, and continuous operational feedback.

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REFERENCES

1. Abdisa, L.T. (2018). Power Outages, Its Economic Cost and Firms Performance: Evidence from Ethiopia. Journal of sustainable development, 4(1), 200-206.
2. Abeh-Ukaidi, C.U. (2019) Turnaround Strategy and Corporate Performance: A Study of Quoted Manufacturing Companies in Nigeria; European Journal of Business and Management; 8 (19); 81-88.
3. Abotsi, A. K. (2021) Maintenance shut-down and Production Efficiency of Firms in Africa; International Journal of Energy Economics and Policy, 2016, 6(1), 98-104.
4. Adegbulugbe, A. and Akinbami, J. (2022). Maintenance shut-down policy options for the attainment of sustainable electricity supply in Nigeria. Central Bank of Nigeria Bullion, 26(4): 3-12.
5. Adewuyi A. O. & Emmanuel Z. (2018): Electricity Outages and Firm Performance across the Six Geo-Political Zones in Nigeria: The Role of Corruption-Working Paper Series.
6. Adeyemo, F. (2019). Power Supply and Performance of Small and Medium Industries in Nigeria. The Bell Journal of Economics, 13(1), 249-253.
7. Akuru, U. B., and Okoro, O. I. (2021). Economic Implications of Constant Power Outages on SMEs in Nigeria. Journal of Energy in South Africa, 25(3), 61–66.
8. Aliyu, S. A., Ramli, A., and Saleh, M. A. (2019). Nigeria electricity crisis, Power generation capacity expansion and environmental ramifications. Energy, 61, 354– 367.
9. Asenge, E. L. Adebanjo, T. O., Enyi, L. A. and Adudu, C. A. (2023) Effect of Turnaround Strategies on Firm Performance in Nigerian Foods and Beverages Manufacturing Industry: A Study of BUA Foods Plc; International Academy Journal of Management, Marketing and Entrepreneurial Studies; 10 (1); 120-127.
10. Edet, O. A. (2016). Power sector reforms and electricity supply growth in Nigeria. Asian Journal of Economics and Empirical Research, 3(1): 94-102.
11. Hachimenum Amadi, E. Okafor, N.C. and Izuegbunam, F. I. (2023) Assessment of Impact of Outages in selected Electricity intensive Industries in Nigeria; International Journal of Research in Engineering & Technology; 4 (10); 9-24.
12. Kowo, S. A. Akinbola, O. A. and Odumesi, A. O. (2023) Implementation of turnaround strategies and organizational stakeholders' impact; Globalization, the State and the Individual; 1(31); /20-29.
13. Lassana, C. (2018). The Productivity Cost of Power Outages for Manufacturing SMEs in Senegal. International Journal of Research and Innovation in Social Sciences; 9 (3); 120-133.
14. Maren, I., Welte, T. Eivind, S. and Heggset, J. (2022) Experiences with shut-down and pit stop maintenance in Hydropower Plants European Journal of Business and Management; 8 (19); 81-88.
15. Nyansu, F. (2016). Effect of maintenance shut-down on the performance of small and medium size enterprise: A comparative analysis between SME's in Tema and the Northern part of Ghana. Asian Journal of Economics and Empirical Research, 3(1): 94-102.
16. Ogbe, E. E. and Enobong, U. M. (2019) Impact of maintenance shut-down on the performance of the manufacturing sector in Nigeria. (1980-2018); Journal of Economics and Finance; 2 (12); 169-177.
17. Ogbuagu, U., Ubi, P. and Effiom, L. (2020). The structure of maintenance shut-down in Nigeria. The Leajon. Academic Journal of Interdisciplinary Studies, 2(1): 42-48.
18. Ogwobo, J. W.; Sakwa, M.M. and Mugambi, M.F. (2017) Turnaround Strategies and Organizational Performance: A Study on the Cause-Effect Relationship; International Journal of Recent Research in Commerce Economics and Management; 4 (4); 391-400),
19. Sinan, K. (2021). Evaluation of Power Outage Costs for Industrial and Service Sectors in Finland. Master's Thesis submitted in partial fulfillment of the requirements for the Degree of Masters of Science in Technology Espoo.
20. Stephen, O. M., & Milton, U. A (2020). The Cost Outages on Enterprises Performance in Kenya. International Journal of Research and Innovation in Social Sciences; 8 (4); 30-42.
21. Ukpong, I. I. (2016). An analysis of causes of power shortage in Nigeria. Nigerian journal of Economics and Social Studies, 18(1): 34-49.
22. Ukpong, I. I. (2019). The economic consequences of electric power failures. Nigerian journal of Economics and Social Studies, 15(1): 53-74.
23. Usman, A. (2023). Determinants of electricity consumers satisfaction in selected electricity distribution zones in Nigeria: Implications for regulatory activities. Journal of Asian Business Strategy, 3(6): 103-24.

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