Greener Journal of Business and Management Studies
Vol. 8(1), pp. 001-009, May, 2018
ISSN: 2276-7827; ICV: 6.02

DOI Link: http://doi.org/10.15580/GJBMS.2018.1.033118053
http://gjournals.org/GJBMS

Maintenance Culture and Performance of Selected Rice Mills in Ebonyi State

[1]Onyeizugbe Chinedu Uzochukwu, [2]Orogbu Lilian Obiageli [3]Enaini Stella Olohi and [4]Okafor Patricia

[1,2& 4]Department of Business Administration, Nnamdi Azikiwe University, Awka, Nigeria.
[3]Department of Business Administration, Auchi Polytechnic Auchi, Edo State, Nigeria.

ARTICLE INFO

Article No.: *033118053*
Type**:** *Research*
DOI: *10.15580/GJBMS.2018.1.033118053*

Submitted: *31/03/2018*
Accepted: *16/04/2018*
Published: *01/05/2018*

Corresponding Author
Onyeizugbe Chinedu Uzochukwu
E-mail: *Email:edu_phd @yahoo.com*

Keywords: *Maintenance Culture, Corrective Maintenance, Performance and Machine Availability*

ABSTRACT

The seeming frequent breakdown of machineries as a result of poor maintenance culture in the studied rice mills necessitated this study. The objective was to identify the extent of relationship that exists between maintenance culture and performance of selected Rice Mills in Ebonyi State. Correlation Survey Research Design was adopted for the study. The population of the study was 1024 and sample size was 279 arrived at using Krejcie and Morgan formula. Correlation analysis was adopted in analysing the data. The findings of the study revealed that a statistically significant relationship exists between corrective maintenance and machine availability with a correlation coefficient of .984. The study concluded that maintenance culture has a vital role to play in the performance of manufacturing outfits like the studied organizations. Sequel to this, it was recommended among other things that maintenance of equipment in the studied firms should not be done when there is total shutdown as this will amount to stoppage of work and that allowing machine to breakdown first could amount to huge capital outlay for repair and therefore should be avoided by the studied firms.

1. INTRODUCTION

Milling of rice is a very important component in rice production in the world and in Ebonyi state in particular. To be successful in this regards, milling machines and equipment are critical. Federal and States Government have over the years recognized this fact and have embarked on machine importation to boost agricultural activities. Oluka and Nwani (2012) posit that it has been the policy of the Federal Government (FG) of Nigeria to import some agricultural machinery in order to boost agricultural mechanization' aimed at increasing food production in the country. However, for these machines and equipment used in production and milling to be able to perform at optimum level, maintenance is critical. This is because the frequency of machine breakdown or shutdown could be attributed to the maintenance culture adopted by the firms. This was corroborated by Oluka and Nwani (2013) who opine that the reasons for the high rate of machinery breakdown may be attributed to poor maintenance culture. Making this point differently, Amaeshi, Okorocha and Akujor (2015) posit that in manufacturing operations, it is obvious that system interruptions result from equipment failure and it is necessitated by poor maintenance culture. As a result of the seeming poor maintenance culture, the studied firms which are Abakaliki Rice Mill, Government Rice Mill Iboko, Government Rice Mill Ikwo and Government Rice Mill Oseda in Ebonyi experience frequent machine breakdown.

The concept of “maintenance” in the industrial arena has its root in Japan and it rests on the premise that no facility can operate effectively and efficiently without being maintained (Amaeshi, Okorocha & Akujor, 2015). Today, maintenance function is developed on the basis of Japanese philosophy for machine availability, reliability and performance and it is no longer seen as a “necessary evil” but as an integral part of production. Maintenance can be summarized as the repair and upkeep of existing equipment, buildings and facilities to keep them in a safe and effective way as its designed condition so that they can meet their intended purpose (Eti, Ogaji & Probert, 2004). To Bolaji and Adejuyigbe (2012), it encapsulates positive efforts, actions and activities aimed at sustainability of the life of any infrastructure or equipment.

Maintenance culture and maintenance itself is propelled by the desire to improve the fortunes of an organization through improving the performance of equipment with respect to effectiveness, efficiency, reliability and serviceability. Aligning with this line of thought, Amaeshi, Okorocha and Akujor (2015) posit that the need to improve the availability, reliability and operations of a manufacturing plant (production system) has brought maintenance function/culture into the limelight. There is consensus among researchers that equipment maintenance and system reliability are important factors that affect manufacturing firms’ ability to provide quality and timely services to customers and to be ahead of competition (Kutucuoglu, Hamali, Iran & Sharp, 2001; Crespo, 2007; Cooke, 2000; Madu, 2000).

Firms have been shying away from maintenance activities probably because it is associated with cost and expenditure. Due to the changing organizational role of maintenance, and the increasing complexity of manufacturing technologies, maintenance related costs have been on the increase (Parida & Kumar, 2006). In manufacturing organizations, maintenance related costs are estimated to be twenty five percent of the overall operating cost (Cross, 1988; Komonen, 2002). In some industries, such as petrochemical, electrical power, and mining, maintenance related costs may surpass operational cost (Eti et al., 2005; Parida & Kumar, 2006).

The maintenance culture in the studied firms seem to be poor as in most cases equipment are allowed to breakdown before maintenance is carried; this is a reactive or corrective maintenance culture. This appears to be affecting machine availability resulting in thwarted performance of the organizations. It is against this backdrop that this study was deemed necessary.

The most important thing that influences the performance of equipment like milling machines is the maintenance culture and strategy adopted by the organization. Oluka (2000) states that between 1975 and 1985, the Federal Government of Nigeria imported and distributed 19,906 tractors and other farm processing equipment. Sadly however, only 59% were functional at the time of the survey while 26.66% were not in operational conditions and 13.5% were not serviceable due to poor maintenance culture. Firms just like the studied organizations seem to shy away from maintenance due to its huge cost implication. The organizations studied make use of different engines in milling rice. These engines do different things ranging from stone selection, separation of good grains from bad ones, selection of milled and un-milled grains, and watering to final grading and they come in different shapes and sizes as well. In the cluster (Abakaliki Rice Mill) apart from cleaning the machines and sometimes checking the water and oil level, the operators do not do other forms of maintenance. The operators appear less concerned as they are mostly employees and not the real owners of the milling machines. Hence, they appear to neglect important signals and signs of the machines needing maintenance like sound and smoke. In the government mills where the machines are mostly digital and requiring codes; the installers of these machines are mostly expatriates. What the operators do is just to clean the machines as it was said to be critical in the quality and cleanliness of rice milled. No other form of maintenance and monitoring seem to be done until such machines completely shut-down before calling on the engineers. When this happens, customers are forced to look elsewhere for products and or services which reduces the overall performance of the rice mills. This point to the fact that the maintenance culture adopted in the studied firms appear to be repair or reactive maintenance culture. As a result of this, the milling

machines have been observed to shut down frequently and unexpectedly leading to reduction in machine availability. This observed scenario in the firms of study necessitated the study.

The broad objective of this study is to identify the extent of relationship that exists between maintenance culture and performance of selected Rice Mills in Ebonyi State. Specifically, the study seeks to:

a) Identify the extent of relationship that exists between corrective maintenance and machine availability.

Research Hypothesis

a) H_{A1}: there is a significant positive relationship existing between corrective maintenance and machine availability.

2. REVIEW OF RELATED LITERATURE

2.1.1 Maintenance Culture

Before delving into the concept of maintenance culture, it is pertinent to first demystify the concepts of culture and maintenance. Culture in ordinary parlance is the way of life of a people. It is the belief, value system and norms which a group of people have come to accept as a way of doing things in a community or setting. Culture is an integrated pattern of human behaviour and interactions. This behaviour include thought, speech, actions, and those objects created as a result of our actions (Wilkins, 1994). It is the total of the inherited ideas, beliefs, values and knowledge that contribute the shared bases of social actions (Eti, Ogaji & Probert, 2006). Relating culture to an organization, Schein (2011**)** states that it is the set of shared values, beliefs, and norms that influence the way employees think, feel, and behave in the workplace. It refers to a system of shared meaning held by members that distinguish one organization from other organizations (Collins & Porras, 2000). Linking it then to maintenance, it is the way an organization carries out maintenance activities in the organization to make sure equipment are in good shape and order and performing optimally.

Maintenance is the combination of all technical, administrative and managerial actions during the life cycle of an item intended to retain it in, or restore it to a state in which it can perform the required function (Rastegari & Salonen, 2013). It can be summarized as the repair and upkeep of existing equipment, buildings and facilities to keep them in a safe, effective as designed condition so that they can meet their intended purpose (Eti, Ogaji & Probert, 2004). The old concept of maintenance was that it is about preserving physical asset. The new concept is that it is about preserving the functions of assets" (Srivastava, 2004). Maintenance in its narrow meaning includes all activities related to maintaining a certain level of av ailability and reliability of the system and its components and its ability to perform a standard level of quality (Al-Turki Ayar, Yilbas, & Sahin 2014). It also includes engineering decisions and associated actions that are necessary for the optimization of specified equipment capability, where capability is the ability to perform a specified function within a range of performance levels that may relate to capacity, rate, quality, safety and responsiveness (Kumar et al., 2014). Maintenance has some primary objective regardless of where it is done. Bolaji and Adejuyigbe (2012) propose the following primary purpose of maintenance to be:

1. to sustain equipment and facilities as designed, in a safe, effective operating condition;
2. to ensure production targets are met economically and on time;
3. to prevent unexpected breakdown of machinery and equipment
4. to extend the useful life of equipment; and
5. to ensure the safety of personnel using the system.

The primary objectives of an optimized maintenance strategy programme that includes predictive and condition based maintenance are (IAEA, 2007):

- Improve availability - Reduced forced outages - Improve reliability
- Enhance equipment life - Reduce wear from frequent rebuilding - Minimize potential for problems in disassembly and reassembly - Detect problems as they occur
- Save maintenance costs - Reduce repair costs - Reduce overtime - Reduce parts inventory requirements

2.1.2 Reactive/Corrective Maintenance (Immediate and deferred)

Corrective maintenance is one of the categories of maintenance activity and it is one of the most adopted and oldest ways of maintenance. It is a reactive maintenance approach. It is reactive in the sense that it is carried out after the damage has been done; after the machine has shut down and production halted. Márquez (2007) posits that corrective maintenance is maintenance carried out after fault recognition and is intended to put the equipment into a state in which it can perform a required function. It is the maintenance carried out to restore (including adjustments and repair) an item which has ceased to meet an acceptable condition (Igboanugo & Aigbe, 2003). It is usually associated with terms like overhauling, refurbishing and turn-around-maintenance (TAM).

To Chiang, Russell and Braatz (2001), it may consist of maintenance activity which includes repair, restoration or replacement of component that has undergone failure or that has totally broken down. One of the advantages of adopting corrective maintenance is

that the machines are not over maintained and machine condition is not monitored (Al-Najjar, 1997). However, its disadvantages lies in the increase of production down time, overtime labour, high cost of spare parts as well as risk of secondary failures (Al-Najjar, 2007). At first impression, this method seems the most cost effective because the manpower and their associated costs are minimal (Mulugeta, 2009). But closer examination shows that when the machinery fails, considerable expense is required to allocate manpower on an emergency basis, repair/replacement parts, and lost revenues due to non-production can mount rapidly depending upon the production process (Mulugeta, 2009). The major downside of corrective/reactive maintenance is unexpected and unscheduled equipment downtime. If a piece of equipment fails and repair parts are not available, delays ensue while the parts are ordered and delivered (Chalifoux & Baird, 1999). If these parts are urgently required, a premium for expedited delivery must be paid. If the failed part is no longer manufactured or stocked, more drastic and expensive actions are required to restore equipment function (Mulugeta, 2009).

2.1.3 Performance

Performance is a measure of how well organizations achieve their goals and objectives. The performance may be measured in terms of the end result which has to do with financial measurement or in terms of processes leading to the end result. Performance measurement is the process of collecting, analysing and/or reporting information regarding the performance of an individual, group, organization, system or component (Upadhaya, Munir & Blount, 2014). It can involve studying processes/strategies within organizations, or studying engineering processes/parameters/phenomena, to see whether output are in line with what was intended or should have been achieved (Osuchukwu, 2012). Performances of organizations are influenced by different factors depending on the type of organization. Service organizations performance is mostly influenced by employees and their capability while manufacturing and processing firm's performance are mostly influenced by their equipment and machineries.

The focus of the study is on processing firms (Rice Mills) and therefore their performance is measured in terms of how well their machine and equipment perform, the life span of the equipment, how efficient and effective they are and how reliable they are. This is because their competitiveness depends on these things. Maintenance performance measurement indicators are hinged on three pillars i.e. RAMS parameters (Reliability, Availability, Maintainability and Safety), a cost model and the human factor (Galar, Parida, Kumar, Baglee & Morant, 2012). Maintenance in industries according to Komonen (2002) has two essential objectives, i.e. high availability of production equipment and Low maintenance costs. These above stated objectives and other indirect impact of maintenance on the economic performance of organizations have been clearly established (Mobley, 2004). Amaeshi, Okorocha and Akujor (2015) posit that the competitiveness of manufacturing firms depends on the availability, reliability and productivity of their production facilities. Frequent machine breakdown and low plant availability are threats to a manufacturing concern as it affects the chances of meeting customers' requirements via cost of operations, product quality, quantity and on-time delivery, which are the baseline for profit determination (Baglee & Morant, 2012).

2.1.4 Machine Availability

The study focusing on manufacturing firms and the maintenance strategy or culture adopted and how it affects their performance, it is only natural to look at the machines production capacity which is influenced by the length of time such a machine is available and fit to work. Daya et. al, (2000) state that machine availability is a measure of a firm's operational success. Buttressing the importance of machine availability to organizational performance, Amaeshi, Okorocha and Akujor (2015) state that frequent machine breakdown and low plant availability are threats to a manufacturing concern as it affects the chances of meeting customers' requirements via cost of operations, product quality, quantity and on-time delivery, which are the baseline for profit determination.

Availability here means readily obtainable, capable of being used for accomplishment of a purpose. Machine availability is the ability of the machines to be capable of being used for production; being readily obtainable when needed for production purposes. Fore and Zuze (2010) posit that availability is the effectiveness of the operation to make equipment available to perform production activity. Therefore, availability is a measure of how long (time) an asset is running out of the total time it would be able to be used. It is a measurement of whether a system is ready to be used immediately; whether the system is up and running at any given moment (Amaeshi, Okorocha & Akujor, 2015).

2.2 Theoretical Framework

This study is anchored on the Theory of Constraints credited to Goldratt in 2011. The theory's position is that every system, organization or machinery has something that thwarts and inhibits its optimum performance. According to the theory, every system no matter how well it performs has at least one constraint that limits its performance.

Constrains here represent things that inhibits, lowers or thwarts the performance of something. In this context therefore, constraints are seen as things that makes machines not to perform well, makes the equipment not to be as effective and efficient as possible therefore putting into question the reliability of the equipment. Osama (2010) opines that constraints are

things that limit the system from achieving higher performance relative to its purpose. The objective of firms could be increased productivity and customer service and response time through reduced equipment breakdown and increased reliability and efficiency which are subjects to constrains such as maintenance approach or culture adopted by the organization. There are however other constraints which could be internal or external. For the purpose of this study, the focus is on internal constraints. Even the internal constrains could also be divided into various parts as noted by Dave (2002) who states that internal constraints of a business organization are made of three elements – people, policy and equipment.

This theory links to this study because it focuses on the need to identify the bottleneck in a system that determines the performance of the system and to develop means to improve performance. These bottlenecks to performance could be in the approach of maintenance adopted like repair maintenance which could affect performance and may be made evident in frequent machine breakdown and reduced availability.

2.3 Empirical Review

Amaeshi, Okorocha and Akujor (2015) examined the effects of production facilities maintenance on the competitive advantage of selected process manufacturing firms in Nigeria focusing on the reactive, preventive, predictive, reliability centre and total productive maintenance strategies and their relationship to cost of manufacturing operations, product quality, productivity target, on-time delivery and profitability. The study adopted the descriptive survey method. Thirty copies of a structured questionnaire on five points Likert scale with Crombach alpha of 0.703 was used to obtain data from the study population of thirty (30) respondents across the various units in the study organizations and analyzed the data obtained with E-views software package in co-integration statistics. It was found out that reactive maintenance strategy has direct and indirect cost implications on manufacturing operations; positive significant relationship exists between preventive maintenance strategy and product quality determination; predictive maintenance strategy exerts positive influence on productivity target; reliability centre maintenance significantly accounts for on-time delivery in meeting customers' expectation and total productive maintenance was equally found out to have positive effect on profit contribution. The study therefore recommended that every manufacturing firm should integrate maintenance budgets into organizational objectives and have functional maintenance centres; Manufacturing firms should be committed to high maintenance culture to minimize production losses and wastes. Preventive maintenance education and training should be given to every machine operator on regular basis and implementation of preventive maintenance actions be monitored by the head of maintenance department to reduce the chances of machine breakdown.

Tijani, Adeyemi and Omotehinshe (2016) examined the effect of lack of maintenance culture in Nigeria through review of archival materials and participative observations. They stated that the lackadaisical attitude of Nigerians on maintenance culture has negatively affected infrastructural development which is critical and essential to a Nation's development. They posited that poor maintenance culture has drawn the nation a thousand steps backward and one of the stride actions that could salvage the country from the total mess of infrastructural decay is maintenance. Poor leadership, corruption, attitudinal problem and lack of maintenance policy were identified as major causes of the menace. The paper recommended the inclusion of maintenance culture in national educational curriculum, maintenance policy formulation and appointment of facility managers among others as necessary steps towards making the country among the comity of developed nations.

Nwele (2016) examined the economics of rice production and marketing in Nigeria a study of Ebonyi State. The costs and returns, marketing margin, and constraints associated with rice production and marketing were also examined by the study. Seven states and nine markets were selected for investigations. Stratified random sampling techniques were used to collect data from forty-five respondents. The simple descriptive statistics and farm firm budget techniques were the major tools used in analyzing the data. Result of the analysis showed that the rice Farmers made a 68% gross income while the net income was at 43% which is indicative that the middlemen did not make excessive profit at the expense of the primary producers. Constraints associated with rice production include high cost of labour and inputs in terms of machinery while that of marketing included high cost of transportation and inadequate storage facilities. The study therefore suggested an improvement of farm inputs and equipment, the road network system and provision of agricultural credit to enable rice farmers and traders expand the volume of their operations.

Maletic, Maletic, Al-Najjar and Gomiscek (2014) examined the role of maintenance in improving company's competitiveness and profitability. The paper aimed to discuss the potential improvement areas from the company perspective and to examine maintenance impact on company's business. An empirical case study was utilised aimed to provide an understanding of the role of maintenance in improving company's business. The empirical data for the study was collected from a Slovenian textile company. A gap analysis was used in order to address the research problem and to identify potential improvement areas. Based on the gap analysis, the results suggested that from respondents' points of view, maintenance practices related to condition based maintenance (CBM) approach represent the highest opportunity for improvement. The most notable empirical results of the study showed that

around 3% of additional profit could be generated at weaving machine, especially if all unplanned stoppages and loss of quality due to decrease in the productivity would be prevented.

Otieno (2016) determined how the different corrective maintenance practices have an impact on the operational performance of manufacturing firms listed in the Nairobi Securities Exchange. It also sought to establish the extent of application of the various corrective maintenance practices by the firms and the remedial actions taken. A questionnaire was designed and administered in order to achieve the above objectives. Data collected was analyzed using MS excel and Statistical Package for Social Sciences (SPSS). The findings reveal that 23.1% of the respondents use purely corrective maintenance while the rest use either preventive maintenance or a combination of the two maintenance policies. The study also shows that most of the firms use planned corrective maintenance strategies and not unplanned. A relationship was also established between corrective maintenance practices and the various variables of operational performance.

Given the attention paid to agriculture and the urge for the nation to attain self-sufficiency in Rice production of which rice milling is a critical part of, this study is pertinent and important at this point. This is because the maintenance strategies of the selected companies have not really been examined critically to know the role it plays in machine availability which is a huge gap in literature at this point.

3. METHODOLOGY

3.1 Research Design

This work adopted a Correlational Survey Research Design because of the nature of the work which is to identify the extent of relationship that exists between the various variables of the study and a Correlational Survey Research Design mostly suits it.

The population of the study consist of both the owners and operators of the studied Rice Mills in Ebonyi state which is put at 1024 people.

Using Krejcie and Morgan (1970) sample size determining formula, the population was pruned down to 279. The formula is given below:

$$s = \frac{x^2 NP(1-P)}{d^2(N-1) + x^2 P(1-P)}$$

To determine the appropriate number of questionnaire to be distributed having in mine the individual population strength of the studied Mills, Bowley's proportional allocation formula was adopted.

A 5-point Likert scale structured questionnaire was adopted for the purpose of eliciting relevant data. The scales used are as follows: Strongly Agree (5), Agree (4), Disagree (3), Strongly Disagree (2) and Undecided (1).

To ensure that the instrument of data collection measures what it intends to measure, the instrument was put through face and content validity. To test for internal consistency, the questionnaire instrument was subjected to Cronbach Alpha reliability technique. From the result obtained, it showed that an 87% reliability was obtained (0.872).

The data collected was analysed using Pearson Product Moment Correlation Coefficient. This is owing to the fact that the relationships existing between the variables were established. The study used 5% (0.05) level of significance. This guided the interpretation of result for hypothesis test.

4. DATA PRESENTATION AND ANALYSIS

4.1 Analysis of Questionnaire Distribution

Table 1: Questionnaire Distribution

S/N	BANKS	Distributed	Collected	Lost	Analysed
1	Abakaliki Rice Mill	263	232	31	211
2	Government Rice Mill Iboko	6	6	0	6
3	Government Rice Mill Ikwo	5	5	0	5
4	Government Rice Mill Oseda	5	5	0	5
	Total	**279(100%)**	**248 (89%)**	**31 (11%)**	**227 (81%)**

Source: Field Survey, 2017

Table 1 gives detail of the questionnaire distribution schedule. From the table, it is seen that a total of 279 copies of questionnaire were distributed to the studied milling firms in proportion to their population. At the end, 248 copies were retrieved while 31 copies were lost. A total of 227 copies were finally analysed.

Research Question One:

What is the extent of relations that exists between corrective maintenance and machine availability?

Table 2: Range of Scores for Corrective Maintenance

Remarks	Range of Scores	N	Percentage
Poor scores on corrective maintenance	**8-23**	45	**20**
Good scores on machine maintenance	**24-40**	182	**80**
	Total	**227**	**(100%)**

Source: Field Survey, 2017.

Table 2 indicates the range of score on Corrective Maintenance in the selected Rice Mills in Ebonyi State. From the table, it shows that 45 respondents representing 20% had a poor score on the variable while 182 respondents representing 80% had a good score on the variable ranging from 8-23 and 24-40 respectively.

Table 3: Range of Scores for Machine Availability

Remarks	Range of Scores	N	Percentage
Poor scores on machine availability	**8-23**	65	**29**
Good scores on machine availability	**24-40**	162	**71**
	Total	**227**	**(100%)**

Source: Field Survey, 2017.

Table 3 indicates the range of score on Machine Availability in the selected Rice Mills in Ebonyi State. From the table, it reveals that 65 respondents representing 29% had a poor score on the variable while 162 respondents representing 71% had a good score on the variable ranging from 8-23 and 24-40 respectively.

Correlation Analysis for Corrective Maintenance and Machine Availability

Table 4: Correlation Result

		CORMAIN	MAVAILA
CORMAIN	Pearson Correlation	1	.984**
	Sig. (2-tailed)		.000
	N	227	227
MAVAILA	Pearson Correlation	.984**	1
	Sig. (2-tailed)	.000	
	N	227	227

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

Source: Field Survey, 2017.

Table 4 shows the correlation analysis result between corrective maintenance and machine availability in the selected Rice Mills in Ebonyi State. The result indicates that a high positive relationship exists between corrective maintenance and machine availability with a correlation coefficient of .984 and that the relationship existing between the variables are statistically significance owing to the fact that the p-value obtained was lesser that the significance level of 0.05. Therefore, the alternate hypothesis is accepted.

5.1 DISCUSSION OF FINDINGS

From the result obtained, it was observed that a statistically significant relationship exists between corrective maintenance and machine availability. Corrective maintenance being the independent variable and machine availability being the dependent variable, it was seen that a correlation exists between both variable. Incidentally, the relation observed between both variable was a positive one. From the test of significance, it was seen that this relationship is not by chance or error as it is statistically significant. Ideally, corrective maintenance was expected to lead to decrease in machine availability because with corrective maintenance, the machines are allowed to run down or breakdown before maintenance takes place. But with this result, it showed that the more corrective maintenance is practiced, the more the machines are available. This could be as a result of not stopping machines to do scheduled or intermittent maintenance when the machines have probably not

developed fault. If this is the case, then machines may be available more. The down part of this is that when the machines finally breaks down, the repair cost could be more as huge and expensive things may have spoilt or worn out and this may lead to the machines being packed for a very long time. This result is consistent with the findings of Amaeshi, Okorocha and Akujor (2015) who examined the effects of production facilities maintenance on the competitive advantage of selected process manufacturing firms in Nigeria focusing on the reactive, preventive, predictive, reliability centre and total productive maintenance strategies and their relationship to cost of manufacturing operations, product quality, productivity target, on-time delivery and profitability. From the result of the analysis of the study, it was revealed that reactive maintenance strategy has direct and indirect cost implications on manufacturing operations. Also aligning with the findings of this study is that of Maletic, Maletic, Al-Najjar and Gomiscek (2014) who carried out a study to examine the role of maintenance in improving company's competitiveness and profitability. Their results suggested that from respondents' points of view, maintenance practices related to condition based maintenance (CBM) approach represent the highest opportunity for improvement. Also, the most notable empirical results of the study showed that around 3% of additional profit could be generated at weaving machine, especially if all unplanned stoppages and loss of quality due to decrease in the productivity would be prevented. If all unplanned stoppages are stopped through maintenance, then this will increase machine availability which will in turn boast the performance of the organizations.

5.2 Conclusion

Haven carried out the relevant tests on the hypothesis of the study and obtained relevant empirical results, the study concludes that maintenance culture has a vital role to play in the performance of manufacturing outfits like the studied Milling Organizations. This is sequel to the fact that the maintenance strategy studied in this work had a relationship with the performance indicator adopted in the study. Following this findings, the study makes bold to state that maintenance culture has a relationship with performance in Rice Milling Organizations.

5.3 Recommendations

The study recommends that:

1. Maintenance of equipment in the studied firms should not be done when there is total shutdown as this will amount to stoppage of work.
2. Allowing machine to breakdown first could amount to huge capital outlay for repair and therefore should be avoided by the studied firms.

REFERENCES

Al-Najjar, B. (1997), Condition-based maintenance: Selection and improvement of a cost- effective vibration-based policy in rolling element bearings. Doctoral thesis, ISSN 0280- 722X, ISRN LUTMDN/TMIO—1006—SE, ISBN 91-628-2545-X, Lund University, Inst. of Industrial Engineering, Sweden.

Al-Turki, O., Ayar, T., Yilbas, B.S.., & Sahin, A.Z., (2014), Maintenance in Manufacturing Environment: An Overview .Integrated Maintenance Planning in Manufacturing Systems, Springer Briefs in Manufacturing Surface Engineering.

Amaeshi, U. F., Okorocha, K. A., & Akujor, J. C. (2015). Effects of Production Facilities Maintenance on Competitive Advantage of Selected Firms in Nigeria. *International Journal of Research in Management, Science & Technology, 3*(4), 177-190.

Baglee, D., &Knowles, M., (2010), Maintenance strategy development within SMEs: the development of an int egrated approach. Control and Cybernetics, 39(1), 2 75 -303.

Bolaji, B. O., & Adejuyigbe, S. B. (2012). Evaluation of Maintenance Culture in Manufacturing Industries in Akure Metropolitan of Nigeria. *Journal of Information Engineering and Applications, 2*(3), 37-44

Chalifoux, A., & Baird, J. (1999). Reliability centered maintenance (RCM) guide: Operating a more effective maintenance program. US Army Corps of Engineers, Construction Engineering Research Laboratories, CERL Technical Report 99/41, 99.

Chiang, L. H., Russell, E. L., & Braatz, R.D. (2001). Fault Detection & Diagnosis in Industrial System. Springer Publisher.

Cooke, F. I. (2000). Implementing total productive maintenance in plant maintenance: Some organizational barriers. *International Journal of Quality and Reliability Management, 7*(9), 1003-1016.

Crespo, M. A, (2007). *The maintenance management framework: Models and methods for complex systems maintenance*. London: Springer Verlag.

Cross, M. (1988a). "Engineering maintenance Organization Performance an Assessment of the Evidence from over 200 sites", Management Research News , 11(1/2), 20-23.

Dave, N. (2002). How to compare six sigma, lean and the theory of constraints. A framework for choosing what's best for your organization. American Society for Quality, 72-78.

Eti M. C., Ogaji S. O. T., & Probert S. D. (2004). Implementing total productive maintenance in Nigerian manufacturing industries. Applied Energy 79(4), 385 – 401. Engineering Tool Box http://www.engineeringtoolbox.com.

Eti, M. C., Ogaji, S. O. T., & Probert, S. D. (2006). Strategic maintenance-management in Nigerian industries. Applied Energy, 83(3), 211-227.

Galar, D. Parida, A. Kumar, U. Baglee, D., & Morant, A. (2012). "The measurement of maintenance function efficiency through financial KPIs," *in Journal of Physics: Conference Series*, 012112.

Goldratt, E. M., & Jeff, C. (2011). The goal: A process of on- going improvement. Massachusetts: North Rivers Press.

Komonen, K. (2002). A cost model of industrial maintenance for profitability analysis and Benchmarking. International Journal of Production Economics 7, 15-31.

Kutucuoglu, K. Y., Hamali, J., Iran, I. & Sharp, J. M. (2001). A framework for managing maintenance using performance measurements systems. *International Journal of Operations and Production Management, 21*(1), 173-195.

Liker, J. K. (2004). The Toyota Way: 14 Management principles from the world's greatest manufacturer. Madison: McGraw-Hill.

Madu, C. (2000). Competing through maintenance strategies. *International Journal of Quality and Reliability Maintenance, 17*(9), 691-698.

Maletic, D., Maletic, M., Al-Najjar, B., & Gomiscek, B. (2014). 'The role of maintenance in improving company's competitiveness and profitability: a case study in a textile company'. *Journal of Manufacturing Technology Management, 25*(4), 441-456.

Márquez A. C. (2007). The maintenance management framework: models and methods for complex systems maintenance. Springer-Verlag, London Ltd., 333.

Mobley R. K. (2004). Maintenance Fundamentals, 2nd Edition. Elsevier Butterworth Heinemann.

Mulugeta, A. A. (2009). Evaluation of Maintenance Management through Benchmarking in Geothermal Power Plants. An M.Sc thesis submitted to the Department of Mechanical and Industrial Engineering, University of Iceland.

Nwele, J. O. (2016). Economics of Rice Production and Marketing in Nigeria: A Study of Ebonyi State. *International Journal for Research in Business, Management and Accounting*, 2(5), 17-37.

Oluka, S. I., & Nwani, S. I. (2013). Models for Repair and Maintenance Costs of Rice Mills in Southeastern States of Nigeria. *Journal of Experimental Research, 1*(1), 10-15.

Osama, T. R. A. (2010). Total productive maintenance review and overall equipment effectiveness measurement. *Jordan Journal of Mechanical and Industrial Engineering, 4*(4), 517-522.

Osuchukwu, O. A. (2010). An Assessment of the Performance and Maintenance Culture of the Ahmadu Bello University, Samaru, Zaria Water Treatment Plant. A Thesis Submitted to the School of Postgraduate Studies Ahmadu Bello University Zaria in Partial Fulfilment of the Requirements for the Award of Master of Science Degree in Mechanical Engineering, Department of Mechanical Engineering, Faculty of Engineering Ahmadu Bello University Zaria, Nigeria.

Otieno, M. (2016). Corrective Maintenance Practices and Operational Performance of Manufacturing Firms Listed in the Nairobi Securities Exchange. A Research Project Submitted in Partial Fulfilment of the Requirement for the Award of the Degree of Masters of Business Administration, School of Business, University of Nairobi, Kenya.

Parida, A., & Kumar, U., (2006), Maintenance performan ce measurement (MPM): issues and challenges. Jo urnal of Quality in Maintenance Engineering, 12(3), 239-251.

Pradhan, M. K., & Bhol, J. P. (2006). Trends and perspectives in industrial maintenance management. Industrial Maintenance Management, 27-35.

Rastegari, A., & Salonen, A., (2013), Strategic maintenance management: Formulating maintenance strategy.

Srivastava, S. K (2004). *Maintenance Engineering and Management*. New Delhi: S. Chund and Company Ltd.

Tijani, S. A., Adeyemi, A. O., & Omotehinshe, O. J. (2016). Lack of Maintenance Culture in Nigeria: The Bane of National Development. Civil and Environmental Research, 8(8), 23-30.

Upadhaya, B., Munir, R., & Blount, Y., (2014).Association between Performance Measurement Systems and Organisational Effectiveness. *International Journal of Operations & Production Management, 34*(7), 2-2.

Wilkins, R.H. (1994). The Quality-Empowered Business, Prentice-Hall, Englewood Cliffs, NJ. 367 -369.

Cite this Article: Onyeizugbe CU, Orogbu LO, Enaini SO and Okafor P (2018). Maintenance Culture and Performance of Selected Rice Mills in Ebonyi State**.** Greener Journal of Business and Management Studies, 8(1): 001-009, http://doi.org/10.15580/GJBMS.2018.1.033118053**.**