International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2016): 79.57 | Impact Factor (2017): 7.296

Operations Management Planning and Preventive Maintenance in Grain Milling Companies in Nakuru County, Kenya

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Abstract: ***Machine condition plays a significant role on plant efficiency in the field of manufacturing. For this reason, maintenance has become an integral component of manufacturing. There are various methods of maintenance but preventive maintenance is key in maintaining the condition of plant equipment in manufacturers' state of operation. The general objective of the study was to establish how operations management planning affects preventive maintenance in Grain Milling Companies in Nakuru County, Kenya. Two objectives have been used for this paper, effect of manpower planning and spare parts availability. The target population for the study were grain milling companies which included, Unga millers, United millers, Mombasa maize millers and Milling corporation. The target population comprised of 226 technical staff directly or indirectly involved in machine maintenance. A sample of 113 was selected to participate in the survey using stratified random sampling technique. Questionnaires were used as the main data collection tool among the grain milling companies. Analysis of data was done using both descriptive and inferential statistics. Frequencies, percentages, mean and standard deviations were checked. Pearson moment correlation was used to establish the relationship between the independent and dependent variables and further to test the hypotheses of the study. Correlation analysis was used to determine the planning components that have greater impact on implementation of preventive maintenance. The findings of the study revealed that spare parts availability had the greatest impact on preventive maintenance in graining milling companies. The study therefore recommended that milling companies need to relook into their manpower planning especially for the preventive maintenance departments rather than focusing only on reactive breakdown staffing. Besides, milling companies should invest heavily in enhancing their sourcing strategies for their spare part.***

Keywords: Preventive maintenance, spare parts availability, operations management planning, grain milling

1. Introduction

Maintenance management has grown throughout the years. Automation and mechanization at work place has led to a great reduction in the number of personnel and increased use of capital equipment [1]. This has further led to increase of personnel in the area of maintenance leading to increase in the cost of operation. With an increase in such cost, there is need to determine efficiency in the manufacturing companies in terms of profit, manpower and materials.

To lessen the likelihood of failure of equipment, it is important to regularly perform maintenance. Maintenance entails making periodic inspections to determine the operational condition of equipment [2]. Preventive maintenance on the other hand entails replacing equipment components at intervals while calculating the potential operation lifetime. This is done to prevent breakdown of an equipment hence done when the equipment is still working. Prior planning has to be done if preventive maintenance is to become efficient. Maintenance management include all activities of management that are geared towards attaining the maintenance objective through the aspects of maintenance planning, control and supervision towards the wellbeing of organizations equipment [3].

Today's complex and sophisticated systems need modern maintenance management systems. Condition based maintenance (CBM) had been used by many manufacturing firms. However, this is slowly changing where a new method of using the intelligent predictive decision support system (IPDSS) is currently being adopted [4]. This new system predicts the trend of the descent of the equipment by providing reliable fault diagnosis of the equipment and gives it a self-life before it weakens. IPDSS is a form of preventive maintenance that can be used to pre-plan and also reschedule maintenance works thus reduces unplanned machine and equipment failure. Preventive management ought to look at issues like optimization models, techniques to be used in maintenance, schedules and the information systems to be used. [1].

There is need for frequent maintenance of wind turbines [5]. The current efficiency can be achieved if condition monitoring system (CMS) is adapted. This will lead to better maintenance and increased reliability. This monitoring system is also attractive as it can be used to determine specific maintenance timing.

In developing economies trends in maintenance appear to be different. The main problem faced by developing and under developed countries is the lack of a proper maintenance culture [6]. Maintenance perception and practice has also been significantly affected by culture in developing countries, which according to the world of maintenance embraces culture; some appears quite simple and others complicated. For modern day technologies, learning maintenance takes more time than putting them into practice. Thus, their implementation in most developing countries entails a certain level of literacy, a general skill of the personnel or workforce.

In most developing countries, it is a reality of life that maintenance education and training is hardly ever appreciated. Unfortunately for industries or firms in developing countries, effective maintenance is usually not a high priority and the consequent cost of failure as a percentage of total cost is on the rise. There is evidence of poor maintenance practices in developing countries, further, there is lack of proper maintenance in sectors such as housing, industries, public infrastructure which are characterized by wear off or become a public hazard.

Technology is becoming an increasingly important element of competitiveness. The acceleration in the rate of technological change and the pre-requisites necessary to participate effectively in globalization have made it more difficult for many developing countries to compete [7]. As a result, developing countries must develop more technological capability and greater flexibility to succeed in the more demanding and asymmetric global environment. One of the key aspects of dealing with technology is to have proper maintenance strategies that allow its sustenance.

In Kenya, majority of manufacturing companies give little emphasis on preventive maintenance. A study conducted among sugar firms in Kenya revealed that the priority given to preventive maintenance in sugar factories was less compared to other types of maintenance. Further, the maintenance tasks were found to have meaningful effects on the achievement of factory performance indicators [8].

In most Grain Milling Companies in Nakuru County, maintenance practice is based on total productive maintenance. In this system the company's focus on three major pillars that build up maintenance plan: Autonomous maintenance in which the basic maintenance is conducted by the operators. Here operators check on change in equipment performance, slight vibrations, overheating parts then call in maintenance personnel to rectify the abnormality. They also tighten loose parts, do cleaning of machine parts and tag any abnormality that needs to be rectified.

Secondly is the preventive maintenance (PM) which is handled by the maintenance personnel. These companies have a laid out structure for their PM where all the machines are scheduled into four categories of maintenance. These categories are: planned monthly- for basic maintenance conducted by maintenance team; Planned quarterly which is more advanced than planned monthly. Planned half-yearly- this is more of semi-overhaul of the equipment. Half of the machine critical parts are opened, serviced and returned back.

Finally, those planned yearly in which all the equipment is opened, all the parts checked for wear, serviced and returned back. Besides, some of the companies in the County employ Kobetsu Kaizen where they focus on repeated abnormalities; a team is formed, brain storms on causes of this abnormality and comes up with preventive and corrective countermeasures.

Preventive maintenance has to be planned before it is undertaken. This can result to increase in operational costs, low production during the maintenance period and increased production backlog. It is upon this back drop that the study sought to understand operations management planning and preventive maintenance in milling companies in Nakuru.

2. Statement of the Problem

There is increased emphasis on maintenance function in most manufacturing firms. They attribute this emphasis on improved equipment reliability, increased productivity and quality of goods manufactured [1]. Due to this, managers in charge of maintenance have tried to coordinate their activities and align production schedules to fit with maintenance function. There has been a conflictual relationship between production and maintenance [9]. Lack of communication regarding the scheduling requirement of each function is attributed to strain in the relationship. Maintenance at times is not appreciated due to its consumption of time. Milling Companies in Nakuru County have tried to implement preventive maintenance strategies for enhancing equipment availability for production. The companies have invested heavily in maintenance workshops, tools, manpower, maintenance personnel protective equipment, internal & external trainings, E-maintenance systems and spares & consumables.

Despite the implementation and effort, grain milling firms in Nakuru have not been able to maintain a production schedule that can enable planning and adherence of timing and sizing requirements of production. It is expected that 10 years after its implementation, a feasible master production schedule should be in place to enable the maintenance manager be able to plan and schedule for production while carrying out maintenance work. The milling firms are at times still caught in reactive maintenance yet it is expected that preventive maintenance should have gained grounding ten years later [10]. There is need to link maintenance planning function with aggregate production planning and master production scheduling activities. Grain milling firms are yet to realize that maintenance activities go hand in hand with production plan. Research on the factors contributing to the success of preventive maintenance in manufacturing firms in Kenya remain blurred. Therefore, this study sought to analyze the role played by operations management planning on effective of preventive maintenance in Milling Companies in Nakuru County, Kenya.

Research Hypotheses

H_0: $\mu_1 = \mu_2 \mu_1 - \mu_2 = 0$manpower planning has no effect on preventive maintenance in Grain Milling Companies in Nakuru County.

H_0: $\mu_1 = \mu_2 \mu_1 - \mu_2 = 0$Spares part availability does not affect preventive maintenance in Grain Milling Companies in Nakuru County.

3. Literature Review

Manpower Planning and Efficiency in Preventive Maintenance

Decision making remains key to man power planning [11]. Management of industrial design is important yet it is still much neglected. Man power planning entails planning for management planning in operations management environment, decisions to be undertaken and the tools to be used.

Manpower planning has shift its focus from manpower planning to the knowledge era. The work of education was to develop skills that were needed in African countries [12]. This led to manpower planning, which has been constantly changing to accommodate rate of return of the input by the manpower. Knowledge is becoming the most important factor of production where manpower has to be planned for and additionally the manpower has to translate its output into a tangible investment that can be counted back as profit. Manpower utilization and machine efficiency contribute to production line efficiency. Advocacy should be done towards measuring of machine efficiency and manpower planning to be accurate and to enable organizations make accurate projections too [13]. When machines are not maintained properly, they result into increased maintenance costs and low standards of production [14]. Maintenance activity require close attention of the management to work together with the appropriate personnel in ensuring machines are used as required and further reduce on machine wastage due to machine stoppage.

Human beings are important in ensuring organizational targets are met [13]. Humans can be categorized into two; operators in production line and workers in the supporting department. The latter deals with the processes in the industries. Capability and duration of work makes human performance to vary, a drop in performance leads to a drop in output produced. To increase production, there is need to properly monitor workers. The attitude of workers is crucial in ensuring maximum productivity is reached and a reduction in planned production time.

Maintenance manpower planning's major objective is to have right number of workers with needed capabilities in maintenance areas [15]. In their study, the manpower was accorded categories such as maintenance area, craft type, training levels, in house verses contractual agreement and lastly centralized verses decentralized system while trying to come up with the most ideal type of manpower to use at work place.

Spares Part Planning and Efficiency in Preventive Maintenance

Kumar and Knezevic look at the availability based spare optimization using renewal process [16]. The paper has developed a mathematical model for spare part components. Through use of the model, a prediction of the required number of spare parts for a system to achieve specified inherent availability can be done. Optimization here is used to check on the system's cost and weight.

Any inventory in spare part is not a final product to be sold to customers. Spare parts inventory policies are different from those that govern work in progress (WIP) and other inventories [17]. The literature in this study concentrates on management issues, replacement basing on the age of the equipment, obsolesce problems and the spare parts to be repaired. The study concludes by indicating a need for future research need for spare parts and preventive maintenance subject matter.

Failed components that surpasses the critical levels calls for maintenance of an equipment [18]. There is usually a set up time that calls for all replacement of components by spares. Availability of a system will largely depend on three components, these are: spare part stock level, maintenance policy and repair capacity. Maintenance and spare parts inventories are treated separately or in a sequence in industries. Stock level of spare parts depends on maintenance policies [19]. Asimulation optimization approach using genetic algorithms (GAs) has been proposed where joint optimization of preventive maintenance (PM) and spare provisioning policies of a manufacturing system operating in the automotive sector can be introduced. The study conducted a factorial experiment with the aim of identifying the parameters that could be used for GA. These included: probabilities of crossover and mutation, the population size, and the number of generations. Through the study, it was concluded that there is a significant cost reduction and an increase in the throughput of the manufacturing system using the given parameters.

De Smidt-Destombes, van der Heijden and van Harten in a different study look at joint optimization of spare part inventory, maintenance frequency and repair capacity for k-out-of-N systems [20]. To them, there is need to make relevant decisions on the choice of frequency of preventive maintenance, spare part inventory levels and spare part repair capacity a high system with minimal costs is to be achieved. To them inferior results are yield by an extension of the metric method as both the availability and costs are not necessarily monotonous functions of the decision variables. The study thus recommends that there is need for an adjusted marginal analysis as this leads to better numerical experiments.

The operational conditions of machines determines how reliable a machine becomes. The intervals between the maintenance and provision of spare parts need to be adapted to individual load collective if the reliability of the machine is to be achieved [21]. According to this study, there lacks a comprehensive approach that can quantify how loads are effected and further ensure the given actions have been adapted. Using a stochastic optimization algorithm reliability model the paper gives a suggestion how optimal time for preventive mechanism and spare part provision can be done.

There is need for an interval between identification of potential failure and the actual failure. This needs to be longer than the lead the required part. For a spare part to be ordered, there is need to critically look at the remaining useful life of the spare part [22]. This can be obtained through use of two important criteria; assessing the age of the component and use of condition indicators.

Nosoohi and Hejazi uses a multi-objective approach to simultaneous determination of spare part numbers and preventive replacement times [23]. They note that the focus of previous studies was on classical cost objective. They depart from that approach and instead look at a multi objective model for preventive replacement of a part over a planning horizon. In this model, different objectives are considered. They further give practical solutions for the challenges faced in the different objectives. Through its initial planning phases, number of spare parts can be determined. The model is applicable in equipment that requires replacement of faulty parts. They further use a numerical example to indicate how preferred solutions can be reached in the absence of a decision maker.

Spare parts and maintenance are closely related activities where Maintenance generates the need for spare parts. Planned preventive maintenance activities leads to the need for more spare parts [24]. The paper thus advocates for optimization of decision variables like ordering quantity, ordering interval and inspection interval. Using the delayed time concept, the failure process is divided into two-stage process with the intention of optimizing the expected cost per unit time using the three variables given. Using a block base inspection policy, checking of components is done at the same time notwithstanding the ages of the components. From this exercise, the time of failure which is known as forward time can be detected.

4. Methodology

A survey design was used for the study with the main focus being on Grain Milling Companies in Nakuru County. This design is preferred because it provides for a wider coverage of the industry therefore enable generalization of results (Bryman & Bell, 2011). The target population for the study was 226 technical staff of four main grain milling companies in Nakuru County Namely: Unga Limited, United Millers, Milling Corporation and Mombasa Millers.

The study used a sample size of 113, stratified random sampling technique in which the strata was based on individual companies was undertaken. Primary data was collected using questionnaire. Questionnaires were preferred in this study because they allow investigation with an ease of accumulation of data in a highly economical way [25]. The data collection tools were piloted in a sample of 5 selected technical staff of the United Millers in Nakuru.

In order to obtain authority to conduct the study, the researcher first obtained an introductory letter from the Kenyatta University. This was used to obtain research permit from the National Commission for Science Technology and Innovation. This was then used to seek a research authorization letter from the management of Grain Milling Companies. The researcher then personally paid field pre-visit to meet with the various heads of technical staff to understand the distribution of staff across shifts and to book appointments. Sampling was then done and questionnaires distributed to the sampled respondents using the drop and pick later method.

Raw data from the field was first cleaned then coded before being entered into the computer for analysis using Statistical Package for Social Sciences (SPSS) version 21.0. Both descriptive and correlation analysis was undertaken. Analysis of data was done according to the research objectives: to analyze each objective, responses were summarized into frequencies and percentages, and a computation of the mean for the purposes of weighting them.

5. Results

Manpower Planning on Preventive Maintenance

Table 1: Manpower Planning in Preventive Maintenance

	Mean	Std. Deviation
The company prepares forecasted manpower plans based on the maintenance schedules	2.54	1.071
The company has recruited enough staff in equipment maintenance department	2.56	1.468
Staff in maintenance department have the necessary skills for the job	3.49	1.062
Staff in maintenance are recruited on merit of education qualifications	3.30	1.281
Maintenance staff are well experienced on the job	3.68	.911
The company provides adequate on the job skills training for its staff	2.08	.992
The company organizes for specialized trainings for the maintenance crew	2.23	.998
The maintenance staff are provided with all the essential tools for maintenance activities	2.24	.991
There is adequate technical support from equipment manufacturers on maintenance	2.19	.874
The maintenance crew is well motivated to perform their duties	1.77	.666

Source: Survey Data (2017)

According to the findings in Table 1 on manpower planning in preventive maintenance the findings revealed Maintenance staff are well experienced on the job as indicated by a mean of 3.68 and a standard deviation of 0.911 which implied the variations were not widely dispersed. The higher score of the level of experience compared to education shows that experience was considered as a more critical aspect in maintenance staffing compared to education.

Regarding the skills of the maintenance teams, it was indicated that the staff in the maintenance department have the necessary skills for the job indicated by a mean of 3.49 and a standard deviation of 1.062 which implied that variations of the responses were 1 point dispersed away indicating a slight variability.

Majority of the staff were in disagreement that their companies prepared forecasted manpower plans based on the preventive maintenance schedules (Mean 2.54). This shows that the practice of manpower planning based on preventive maintenance schedules was less practiced in majority of the grain milling companies in Nakuru County, Kenya.

Concerning whether grain milling companies have recruited enough staff in equipment preventive maintenance department, majority of the staff were in disagreement as indicated by the moderate mean of 2.56 and a standard deviation of 1.468. This implies that majority of the milling companies were understaffed in the maintenance departments.

Regarding the criteria used in staff recruitment, the study indicated with a high mean of 3.30 and a standard deviation of 1.281, the staff in maintenance department are recruited on merit of education qualifications. This shows though to a large extent education was considered in recruitment of maintenance staff but in some instances, education was not considered as key.

The extent to which grain milling companies invested in providing training to its maintenance crew was also assessed and found out that majority of the companies (Mean 2.23) had little investment in staff training for their maintenance teams. The standard deviation was 0.998 which indicated a fairly low dispersal of the variables. The situation on training was even dire in the provision of specialized trainings for the maintenance crew where a great majority of the staff (mean 2.23) cited that their company did not provide specialized training for its maintenance crew. This shows that grain milling companies had very little investments on training of its maintenance crew for better performance.

Maintenance support from equipment manufacturers was also not good in grain milling companies as indicated by a low mean of 2.19 and a standard deviation of 0.874 which indicated the level of dispersal was low. Motivation of the maintenance crew was poorly rated. With a very negligible mean of 1.77 and a standard deviation of 0.666 it was noted that the respondents disagreed on the assertion that the maintenance crew is well motivated to perform their duties. This shows that grain milling companies hardly planned for motivation of the maintenance crew as opposed to other staff.

Spares Availability on Preventive Maintenance

Table 2: Spare Part Availability

	Mean	Std. Deviation
The maintenance team prepares plans on the expected spares for use in preventive maintenance	2.24	1.231
There is an inventory of spares maintained in the company for preventive maintenance	2.25	1.233
Allocation of spares for preventive maintenance is done differently from those for corrective maintenance	1.49	.621
Allocation of spare parts to work orders is done smoothly	1.92	.818
The procurement team avails spares for equipment maintenance on time	1.74	.876
The quality of spares availed by the procurement team is good enough compared to original parts	2.51	1.205
Reliance on imported spares does not affect equipment down time	1.70	.733
There is little time incurred in obtaining spares from the warehouses	1.92	.789
There are no bureaucracies in the approval of spares for use in equipment maintenance	1.60	.686
Organization of the spares warehouse makes it easy to locate spares when needed	3.46	1.097
The company has efficient system of monitoring and controlling the spares inventory	3.75	.892
The spares management personnel have adequate technical skills	4.45	.571
There is 24 hour access to the spares warehouse	4.07	.887

Source: Survey Data (2017)

The findings on spares availability in preventive maintenance shown in Table 4.5 revealed that he spares management personnel have adequate technical skills as indicated by a mean of 4.45 which was considered big enough as it had its indications towards ‘strongly agreeing’. Its standard deviation was 0.571 which showed the variables were not widely dispersed.

It was also established that there was a 24-hour spare part accessibility (mean 4.07). This imply that spare parts can be accessed throughout the shifts hence production mostly should not be hampered as a result of lack of spare part. The findings further disagreed on the assertion that there is little time incurred in obtaining spares from the warehouse as presented by a mean of 1.92 and a standard deviation of 0.789. This implies that available time for obtaining spare parts from the warehouse is usually adequate.

On the monitoring of spares inventory, a great majority (Mean 3.75) were of the view that their companies had efficient systems of monitoring and controlling the spares inventory. This implies that control measures are usually undertaken if need be by the organization when it came to spare part availability. Replacement action using spare part inventory control and due date constraints are initiated as a result of degradation. Which can only be done as a result of having efficient monitoring and control system.

The level of organization of the spares warehouse made it easy to locate spares when needed according to a moderate mean of 3.46 and a standard deviation of 1.097. This therefore shows that 48.1% of the millers had their spares stores efficiently organized while the rest were not.

The quality of spares was also interrogated, with a slightly smaller mean of 2.51 and a standard deviation of 1.205 which implied the variances were 1 point dispersed away indicated that the quality of the spare part availed by the procurement team was not good enough compared to original products.

Planning of the expected spares for use in preventive maintenance was rated poorly (2.24 and a standard deviation of 1.231. This implies that planning preventive maintenance spares was less practiced in grain milling companies in Nakuru County.

As to whether companies maintained inventory of spares for preventive maintenance, it was established that there was a relatively low mean of 2.25 and a standard deviation of 1.233. This implies that there were no spares inventories for preventive maintenance. In addition, a great majority (mean 1.92) disagreed that the allocation of spare parts to work orders was done smoothly. This implies that majority of the grain milling companies in Nakuru County experienced challenges of maintenance and issuance of spares for preventive maintenance operations. Reliance on imported spares was adversely cited as a challenge in preventive maintenance as it affects the equipment down time (mean 1.70).

Correlation Analysis

A correlation analysis was thus undertaken to check whether there was a relationship and the strength of the relationship between the variables.

Table 3: Correlation Matrix

		manpower planning	spares part availability
manpower planning	Pearson Correlation	.726**	.454**
	Sig. (2-tailed)		.000
	N	106	106
Spares part availability	Pearson Correlation	454**	1
	Sig. (2-tailed)	.000	
	N	106	106

Source: Survey Data (2017)

On manpower planning towards preventive maintenance, a correlation analysis was used to check the relationship between the two variables. The results of the study indicate that r= .726 indicating a positive strong correlation between manpower planning and preventive maintenance. Further the relationship was significant at p= 0.00<α (0.05). The implication deduced is that planning for manpower has an influence on preventive maintenance. As planning for manpower increases so does preventive maintenance. The null hypotheses stating manpower planning has no effect on preventive maintenance in Grain Milling Companies in Nakuru County was tested. The P value (0.00) being less than the alpha value of (0.05) led to the hypotheses to be rejected and conclusions were drawn that manpower planning has an effect on preventive maintenance in grain milling companies in Nakuru County.

On the effects of spare part availability on preventive maintenance, it was established that r= .454 indicating a positive moderate correlation between spare part availability and preventive maintenance. The relationship is further significant at p=0.00< α (0.05). The hypothesis was tested and since the p value was less than the alpha value, it led to a rejection in the hypotheses and the alternative hypotheses was adapted indicating that spares part availability does have an affect preventive maintenance.

Table 4: 10 Summary of Hypotheses Test

Hypothesis	Accepted α Values	Computed p-values for variables	Conclusion
H_0: $\mu_1 = \mu_2$ $\mu_1 - \mu_2 = 0$ manpower planning has no effect on preventive maintenance in Grain Milling Companies in Nakuru County	α = 0.05	0.00	Null hypothesis rejected
H0: μ1 = μ2 μ1 - μ2 = 0 Spares part availability does not affect preventive maintenance in Grain Milling Companies in Nakuru County	α = 0.05	0.00	Null hypothesis rejected

Source: Survey Data (2017)

6. Summary

The first objective of the study was to establish the effect of manpower planning on preventive maintenance in Grain Milling Companies in Nakuru County. The findings revealed that: Majority of the companies did not prepare forecasted manpower plans based on the preventive maintenance schedules. Besides majority of the milling companies were understaffed in the maintenance departments although the current staff in maintenance departments to a large extent had the relevant skills to perform their jobs. Education level was taken into consideration in recruitment of maintenance staff but in some instances, education was not considered as key. Motivation of the maintenance crew was poorly rated. Regression results however revealed that manpower planning played a significant role in ensuring efficiency in preventive maintenance in milling companies.

The second objective for the study was to assess the effect of spares availability on preventive maintenance in Grain Milling Companies. The findings revealed that; the planning of the expected spares for use in preventive maintenance was rated poorly which implies that planning preventive maintenance spares was less practiced in grain milling companies. Allocation of spares for preventive maintenance was not done differently from those for corrective maintenance. It was also revealed that majority of the grain milling companies in Nakuru County experienced challenges of maintenance and issuance of spares for preventive maintenance operations. Majority of the companies experienced challenges of timely acquisition of spares for preventive maintenance as well as quality of spares. Reliance on imported spares was adversely cited as a challenge in preventive maintenance. Even within the company premises, the lead time in getting spares to the shop floor was still high. The level of organization of the spares warehouse in most companies made it easy to locate spares when needed.

7. Conclusion

The study concluded that manpower planning played a significant role in ensuring effectiveness in preventive maintenance. However, it was not given proper attention in majority of the milling companies.

Spares availability played a significant role in ensuring efficiency of preventive maintenance in grain milling companies. However, the availability of spares still presented challenge to preventive maintenance in grain milling companies in Nakuru County owing to their lack of ready availability, and delays in acquisition.

8. Recommendation

The grain milling companies need to prepare focused plans that can be used for preventive maintenance schedules. These plans will enable manpower planning in the different departments of preventive maintenance which eventually will solve the problem of understaffing. Further, these plans will enable the organization plan on how to motivate their maintenance crew leading to better performance.

Spare parts should be availed at the needed time. This can be done through having timely requisition that will enable their availability. Unga feeds should work towards updating their spare part inventory. The store keeper needs to have an updated record each time spare parts are released to enable the company restock with ease.

9. Future Scope

The study recommends further comparative research to be done to understand how companies come up with priority strategies for preventive maintenance. This study should also be performed in milling companies in other regions to enhance the generalizability of the study to all grain milling companies in Kenya.

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