Competencies Requirements for a School Laboratory/ Workshop Maintenance Manager in Colleges of Education, in North-Eastern Region, Nigeria

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Abstract: The purpose of this paper is to describe the necessary competences and to develop a job competence model for an effective performance of school laboratory/ workshop maintenance managers in colleges of education in the north-eastern region, Nigeria. The study employed a descriptive survey design and instrument used for the data collection was a researcher developed instrument which was validated and trial tested. the internal consistency of the instrument was found to be 0.83 using Cronbach Alpha method. Mean was used to answer the research questions. All the listed competencies were viewed important by the respondents. The resulted job competence model will be able to help the executives to answer the school's human resources policies by providing useful information regarding the necessary competencies of a school laboratory/ workshop maintenance manager. The executives will be able to apply these competencies in order to strengthen the maintenance manager's performances at an optimal level. This model will allow determining the necessary critical competencies of the actual success of the maintenance managers and the required critical competencies for manager's future accomplishments.

Keywords: Job Competency, Maintenance Manager, Model, School Laboratory/Workshop,

Introduction

Maintenance is the actions necessary for retaining or restoring a piece of equipment, machine, or system to the specified operational condition to achieve its maximum useful life [7]It includes corrective maintenance , preventive maintenance and operational maintenance. Payne, Chelsom and Reavill [7] stated that there are three types of maintenance in use: 1) Preventive maintenance, where equipment is maintained before break down occurs. Preventive maintenance is maintenance performed in an attempt to avoid failures, unnecessary production loss and safety violations. The effectiveness of a preventive maintenance schedule depends on the RCM analysis which it was based on, and the ground rules used for cost-effectivess. 2) Corrective maintenance, where equipment is maintained after break down. This maintenance is often most expensive because worn equipment can damage other parts and cause multiple damages. It is a maintenance task performed to identify, isolate, and rectify a fault so that the failed equipment, machine, or system can be restored to an operational condition within the tolerances or limits established for in-service operations. 3) Operational maintenance, where equipment is maintained in using. It is maintenance is the care and minor maintenance of equipment using procedures that do not require detailed technical knowledge of the equipment's. The person responsible for maintenance task in any organization is the maintenance manager.

In a school industry, more people perceive the maintenance department role in the terms of reducing of the production costs. The perception of the school workshop maintenance manager's role also suffered changes over the time. They are no longer compared to the remedial chief in charge, being obvious the evolution of the function in terms of increasing the total efficacy of equipments. The maintenance managers are considered now one of the primary strategic resources of an organization, due to the fact that in the informational era the human capital replaces the financial capital as a strategic resource. Therefore, the demand for experts in maintenance continues to grow in the school laboratory/workshop. The maintenance managers are responsible for the entire success of the maintenance and service activities of the equipments and facilities, also taking into consideration all the restrictions imposed by the planning activities, the quality requirements and safety requirements. This equipment maintenance activity may be resumed to routine inspection, overhaul, complex inspection or obligatory inspection, as the control of the lifting installations. This kind of maintenance may be resumed to routine inspection and revision. All the above are known as the preventive maintenance [1] cited by [8]. The maintenance managers have now more responsibilities in accounting and business than they ever had. The maintenance expenses must be monitored in order to assure that the proposed objectives are accomplished. In the

same manner, the opportunities of cost reducing must be analyzed. Often computerized maintenance systems are integrated with production systems or accounting systems. The inventory and the acquisitions may be analysed and recorded in ERP systems, as SAP. Thus, the problem addressed in this paper is: identifying the knowledge field and the aptitudes necessary for managing the maintenance activities and detecting the required competencies of a school workshop maintenance manager.

When we turn to the definitions of maintenance management, we will find that the maintenance management competency is the capability of managing efficiently all the maintenance activities by establishing the objectives and priorities, the strategies and the responsibilities of the maintenance activities and by implementing them through planning, control and supervision, the improvement methods taking into consideration several economical aspects of the organisation. Maintenance management competencies require knowledge and experience in this field [1], [5]. In the case of a competency- based approach of the job description, the school organisations need a friendly job competence model, which to identify the required components of knowledge, aptitudes, abilities, traits and behaviours that allow a person to fulfill all the assignments of the job. This problem will be theoretically and empirically investigated using quantitative research methodologies. The problem can be formulated as: What are the necessary knowledge fields and the required aptitudes for managing the maintenance activity and what are the competencies of a school laboratory/workshop maintenance manager? The competency based approach in an organisation gives the following benefits:

(1) Selection benefits — by defining one candidate as more effective and superior to another, thus creating a better fit;

(2) Provides performance benefits — by clarifying and raising the bar on what is expected; and

(3) Provides developmental benefits — by setting individual goals that employees can strive to reach that are aligned with the business strategy

The detection of these abilities and competencies as well as finding the right mechanisms to achieve this kind of knowledge may represent an instrument useful in training of the school laboratory/ workshop maintenance managers.

Purpose of the Study

The main purpose of this work is to develop a competencies model for an effective performance of maintenance managers in laboratory/ workshop of a school. The specific objectives of the study are:

1. Determine the cognitive competencies required of a school laboratory/ workshop maintenance manager.
2. Determine the technical competencies required of a school laboratory/ workshop maintenance manager.
3. Determine the personal competencies required of a school laboratory/ workshop maintenance manager.
4. Determine the ethical competencies required of a school laboratory/ workshop maintenance manager.

Research Questions

1 What are the cognitive competencies required of a school laboratory/ workshop maintenance manager?

2 What are the technical competencies required of a school laboratory/ workshop maintenance manager?

3 What are the personal competencies required of a school laboratory/ workshop maintenance manager?

4 What are the ethical competencies required of a school laboratory/ workshop maintenance manager?

Methodology

The study employed a descriptive survey design in which the competent components relevant for designing a competency-based maintenence model were gathered from review of academic literature on maintenance management, studying the practice of competency modelling and existing maintenance management competency models, analyzing the content of the specification for requirements of a European maintenance specialist (2001). Based on this survey and on the Model of Professional Competence by [3] cited by [8], a Job Competence Model for school laboratory/ workshop maintenance managers was developed. At the core of the model are four key components of professional competence. This is illustrated in the fig. 1.

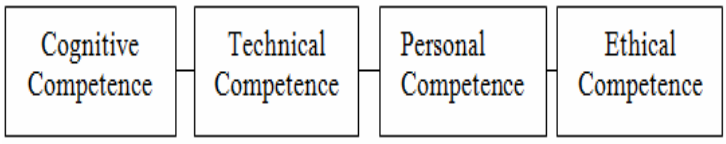

Fig.1.Professional competence: core components [2]

a) Cognitive competencies, that regard the use of the theory and of the concepts, as well as tacit knowledge achieved through experience (fig. 2). [2], [3], [4]

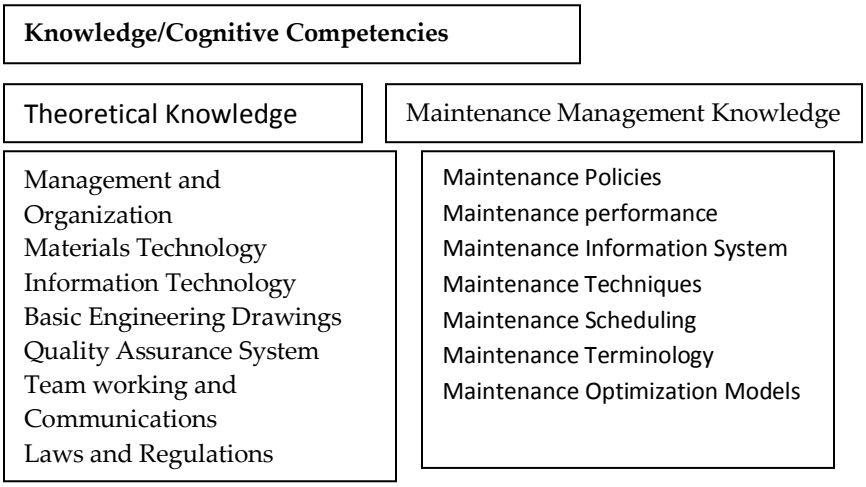

Fig.2 Core components of Knowledge/Cognitive Competencies

b) Technical competences targeting the use of knowledge and skill in the exercise of, practices required for successful accomplishment of a business, job, or task (fig. 3). [2], [3], [4]

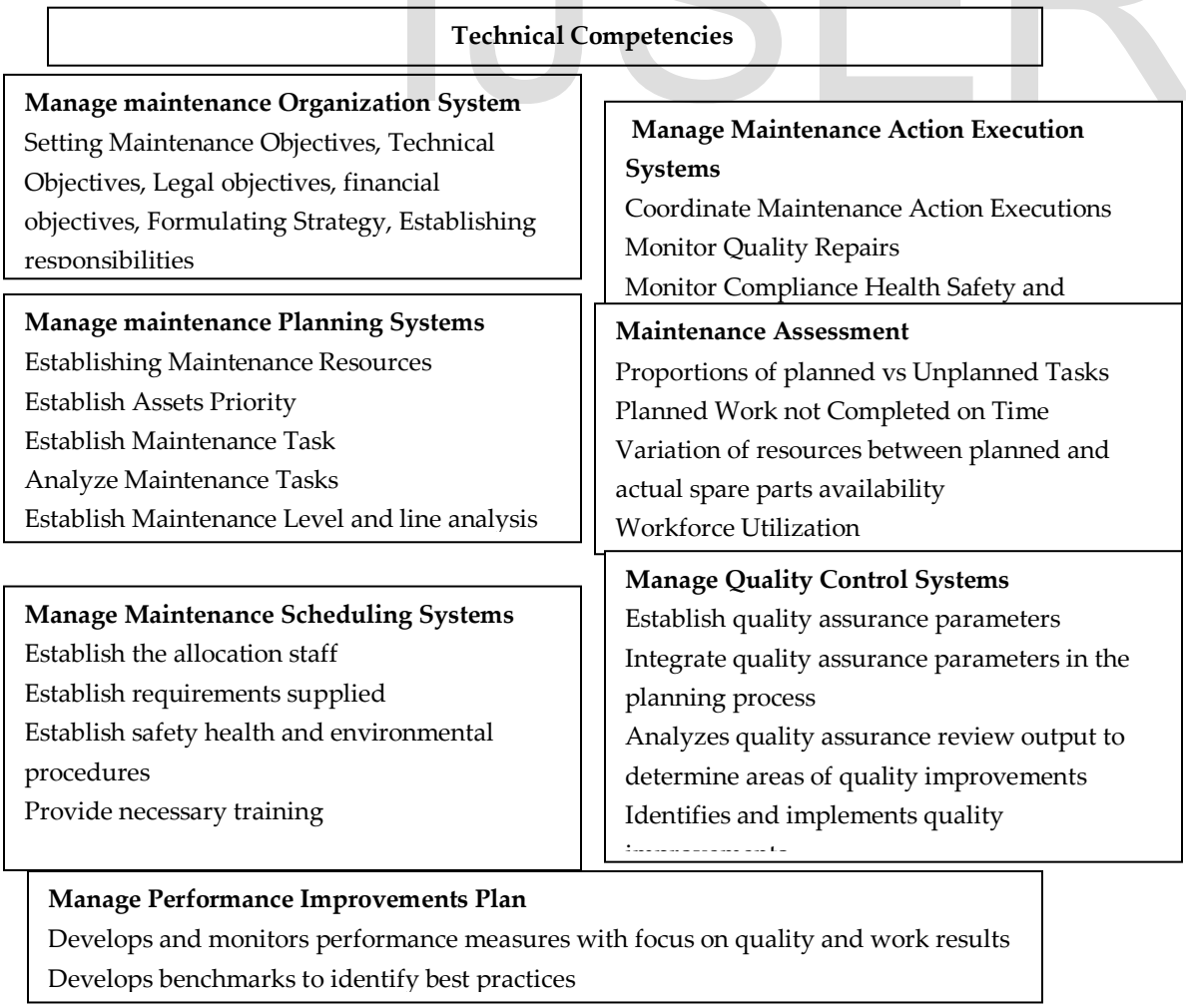

Fig.3 Core Technical Competencies

c) Personal competencies that regard the capacity of adopting an attitude and/or an adequate behaviour in a particular situation. These competencies include communication skills, team work capabilities amongst others. (fig.4) [8],

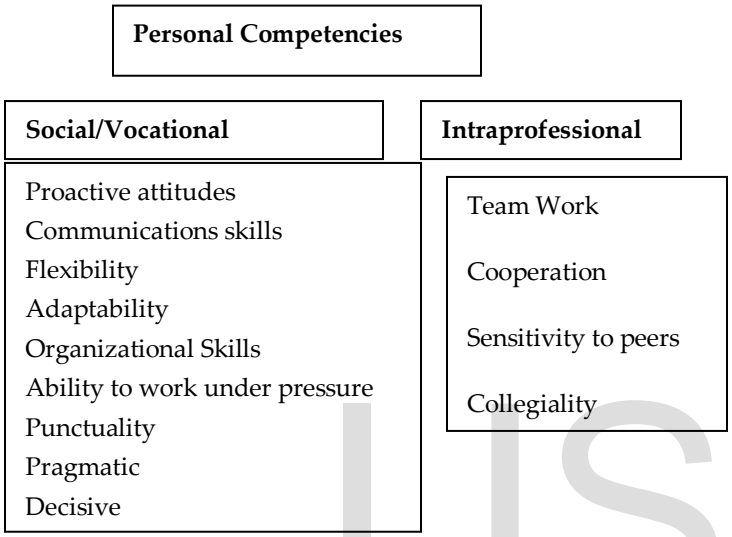

Fig.4. Core Personal Competencies

Fig 5. Ethical Competencies

d) Ethical competencies, that assumes that personal and professional values are existent.(fig 5) [2], [3],

The instrument used for the data collection was a structured questionnaire developed by the researcher which contained the full list of four core competences (cognitive competencies, technical competencies, personal competencies and ethical competencies). The instrument was validated by two experts from Science and Technology Education departments, Modibbo Adama University of Technology, Yola, Adamawa State and was trial tested on 12 respondents from Federal collge of Education (Technical) Bichi, Kano State. The internal consistency of the instrument was found to be 0.83 using Cronbach Alpha formula.120 respondents from colleges of education in North-Eastern Nigeria participated in this study. The details of the sample is illustrated in Table 1

Table 1: Sample distribution of the respondents

S/N	Name of Colleges	Workshop maintenance managers
1	Federal College of Education (Technical), Gombe	20
2	Federal College of Education (Technical), Potiskum	20

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3	Federal College of Education, Yola	04
4	College of Education, Azare	16
5	College of Education, Hong	16
6	College of Education, Jalingo	16
7	College of Education, Waka-Biu	04
8	College of Education, Gashua	04
9	Sir Kashim Ibrahim College of Education, Maiduguri	04
10	Umar Ibn Ibrahim El-kanemi College of Education Science and Technology Bama	16
	Total	120

Source: Establishment Division of various Colleges (2015)

The perception of the respondents over the validity and the importance of the competence components were measured on the basis of their response to a five point Likert scale. The five points were weighted as: 1= Not be required; 2= very little important; 3= important; 4= very important, 5= critically important. Statistical mean was used to answer the research questions. Any item with mean response equal to 3.0 and above is considered important while any item with mean less than 3.0 is regarded as not important.

Results and Discussions

The result for this study is presented according to the research questions.

Research Question One: What are the cognitive competencies required of a school laboratory/ workshop maintenance manager?

Table 2: Mean Responses of Respondents on Constituents of Cognitive Competencies

S/N	Items	Mean	Remarks
1	Management policy	4.80	Required
2	Organization	4.25	Required
3	Economical control	3.85	Required
4	LCC/LCP techniques/methods	4.00	Required
5	Human resources development policy	3.75	Required
6	Logistics	3.25	Required
7	Materials Technology	3.10	Required
8	Wear and Tear Mechanism	3.80	Required
9	Protective Methods	4.25	Required
10	Non-destructive Testing	3.75	Required
11	ERP systems	3.50	Required
12	Office Software	3.20	Required
13	Mechanical design	4.15	Required
14	Wiring and piping diagrams	3.20	Required
15	Electrical and electronic diagrams	3.50	Required
16	Quality Assurance Standards , Terminology	4.10	Required
17	Basics of Quality Assurance	3.85	Required
18	Quality Assurance techniques and procedures	3.90	Required
19	Authority and Responsibility	3.65	Required
20	Basics of Labour Law	3.50	Required
21	Equipment Safety Systems	4.00	Required
22	English Languages	3.75	Required
23	Policies on maintenance	4.45	Required
24	Investment consideration, LCC/DOM	3.65	Required
25	The Maintenance system	3.10	Required
26	The wear and tear process	3.75	Required
27	Preventive and Corrective Maintenance Choices	4.50	Required
28	Techniques(VBM, BSC, QFD other)	3.70	Required
29	Overall equipment effectiveness (OEE)	3.50	Required
	Grand Mean	3.53	Required

a) The scores for the constituents of cognitive competence is shown in Table 2. Above. From analyses, it is found that the all competency components received a mean score of over 3.0, so all of them were considered important. The grand mean stood at 3.53, implying that cognitive competency is important for a school workshop manager to function effectively. This study agreed with the study conducted by [8] who found that maintenance managers from any industry must have generally very good knowledge on how to set up a industry management, to formulate the maintenance policy within a company, to formulate the maintenance goal , to organize the maintenance activities, to determine the human and material resources, to speak very well English and overall, is essential to have knowledge about the theories and methods that are used to optimize the mix between corrective maintenance, preventive maintenance (predetermined or conditions based) and modifications. Ability to have sound cognitive competencies makes a good school laboratory/ workshop maintenance manager.

Research Question Two: What are the technical competencies required of a school laboratory/ workshop maintenance manager?

Table 3: Mean Responses of Respondents on Constituents of Technical Competencies

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S/N	Items	Mean	Remarks
30	Setting Maintenance Objective	4.65	Important
31	Formulating Strategy	4.45	Important
32	Establishing Responsibilities	4.30	Important
34	Establish Maintenance Resource	4.20	Important
35	Establish Assets Priority	4.20	Important
36	Analysis Maintenance Tasks	4.50	Important
37	Establish Maintenance Tasks	4.30	Important
38	Establish Maintenance Level	4.00	Important
39	Establish the allocation of staff	4.10	Important
40	Establish requirements supplied	3.40	Important
41	Establish Safety, Health and Environmental Procedure	4.00	Important
42	Identify external resources	3.00	Important
43	Providing necessary training	3.30	Important
44	Coordinate Maintenance Action Execution	3.80	Important
45	Monitor Quality Repairs	3.45	Important
46	Monitor Compliance with Health, Safety and Environmental Procedures	3.65	Important
47	Establish quality assurance parameters	3.65	Important
48	Integrates quality assurance parameters	3.50	Important
49	Analyzes quality assurance	4.00	Important
50	Identifies and implement quality improvements	3.90	Important
51	Evaluates proportion of planned vs. unplanned tasks	6.60	Important
52	Evaluates planned work not completed on time	4.40	Important
53	Evaluates variation of resources between planned and actual	4.30	Important
54	Evaluates spare parts availability	4.30	Important
55	Evaluates workforce utilization and skill level	3,75	Important
56	Develops and monitors performance measures	3.75	Important
57	Develops benchmarks to identify best practices	3.40	Important
	Grand Mean	3.75	Important

The scores for the constituents of technical competence have been given in Table 4. All the constituents' items were considered important technical competencies by school laboratory/workshop managers. They should have generally very good skills of applying the theoretical knowledge in the management of maintenance organization systems, maintenance planning, maintenance scheduling systems, maintenance execution systems, quality control and host of others.

Research Question Three: What are the personal competencies required of a school laboratory/ workshop maintenance manager?

Table 4: Mean Responses of Respondents on Constituents of Personal Competencies

S/N	Items	Mean	Remarks
58	Communication skills	4.30	Important
59	Organizational Skills	4.45	Important
60	Proactive attitude	4.35	Important
61	Flexibility	3.80	Important
62	Adaptability	3.45	Important
63	Ability to work under pressure	4.00	Important
64	Punctuality	3.50	Important
65	Pragmatic	4.10	Important
v66	Decisive	3.47	Important
67	Empathy	4.30	Important
68	Cooperation	3.26	Important
69	Team work	4.00	Important
70	Collegiality	3.60	Important
71	Sensitivity to peers	3.40	Important
	Grand Mean		Important

Table 4 is the list of accepted required competencies regarding to adapting the personal attitudes, behaviour as well as the communication skills to any given situation. All the items were considered important because their mean were above 3.0. This shows that for a school lab/workshop manager to be competent or function effectively, personal competency attributes are very essential. This conjured with the studies by [8] who stated that the reason for demanding personal competency, as cited by maintenance managers from the industries, is that a manager that has a proactive attitude is going to be a step forwards ahead of the others, due to his implicit necessity of being very well informed and very well prepared for all

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situations. Persons with this quality are able to have initiative, to make relevant motions, to anticipate the results and the effects of maintenance activities.

Research Question Four: What are the ethical competencies required of a school laboratory/ workshop maintenance manager?

Table 4: Mean Responses of Respondents on Constituents of Ethical Competencies

S/N	Items	Mean	Remarks
72	Integrity	3.70	Important
73	Loyalty	4.10	Important
74	Responsibility 4.20	4.25	Important
75	Respect for the law	3.90	Important
76	Equity	3.40	Important

From the analysis of the Table 6, it is observed that the managers should be devoted to the school and maintained a good professional ethics. The reason as cited by maintenance managers from the school workshop are that maintenance manager must act during their relationship with other department's managers and clients professionally, competent, honest and responsible. They are not supposed to promote and carry on unethical management practices. They must be devoted to the school and work to accomplish the strategic objectives of the school.

Conclusions

This study provides information for the practice of competency-based management. A better understanding of the relative importance of each component of the school workshop maintenance managers' function or other position in the school organisation administrative scheme can improve the development of a training plan by focusing of different critical competencies. The Job Competence Model for a school laboratory/ workshop maintenance managers is presented in fig. 4, which shows a classification and the hierarchy of the importance level of the 4 components. The study concluded that the competencies mix resulted from this study shows that efficient school laboratory/workshop maintenance managers must have, along the technical cognitive competencies a very high level of ethical competencies that involve personal and professional values.

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