

A SURVEY CONCERNING THE REQUIREMENTS OF COMPETENCIES FOR A MAINTENANCE MANAGER

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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 maintenance managers of machine manufacturing factories. The resulted job competence model will be able to help the executives to answer the factory’s human resources politics by providing useful information regarding the necessary competences of a maintenance manager. In their future activities, the executives will be able to apply these competences in order to strengthen the maintenance manager’s performances at an optimal level. This model will allow determining the necessary critical competences of the actual success of the maintenance managers and the required critical competences for manager’s future accomplishments.*

Keywords: MAINTENANCE MANAGER, JOB COMPETENCE, MODEL, MANUFACTURING INDUSTRY,

1. Introduction

In the machine manufacturing industry, more and more companies perceive the maintenance department role in the terms of reducing of the production costs. The perception of the 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 continuously grown in the Romanian machine manufacturing factories

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]

The maintenance managers have now more responsibilities in accounting and business then 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 maintenance manager.

2. Problem discussion

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 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 fulfil all the assignments of the job.

This problem will be theoretically and empirically investigated through a case study, 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 maintenance manager?

The authors in this research domain argue that a 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 maintenance managers.

3. Objective and research methodologies

The main purpose of this work is to develop a competencies model for an effective performance of maintenance managers in the machine manufacturing industry. The competent components relevant for designing such a 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) and “ The Requirements and Rules to achieve an EFNMS Certificate as a European Expert in Maintenance Management”(1998) and discussion with the maintenance managers. Based on this initial study and on the “Model of Professional Competence by Cheetham and Chivers (1998) “A Job Competence Model for Maintenance Managers “was developed.

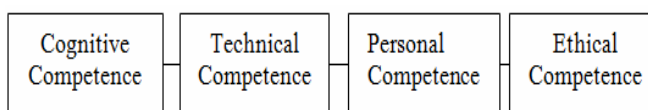


Fig.1. Professional competence: core components [2]

At the core of the model are four key components of professional competence. This is illustrated in the fig. 1.

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]

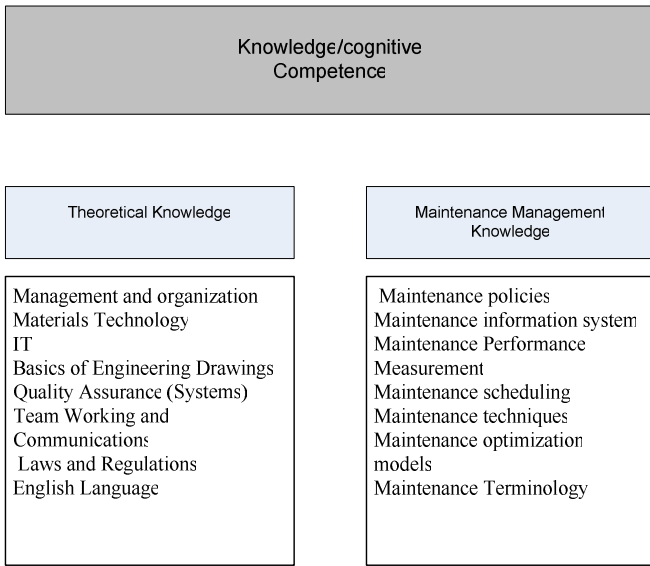


Fig.2 Core component: Knowledge/Cognitive Competence

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]

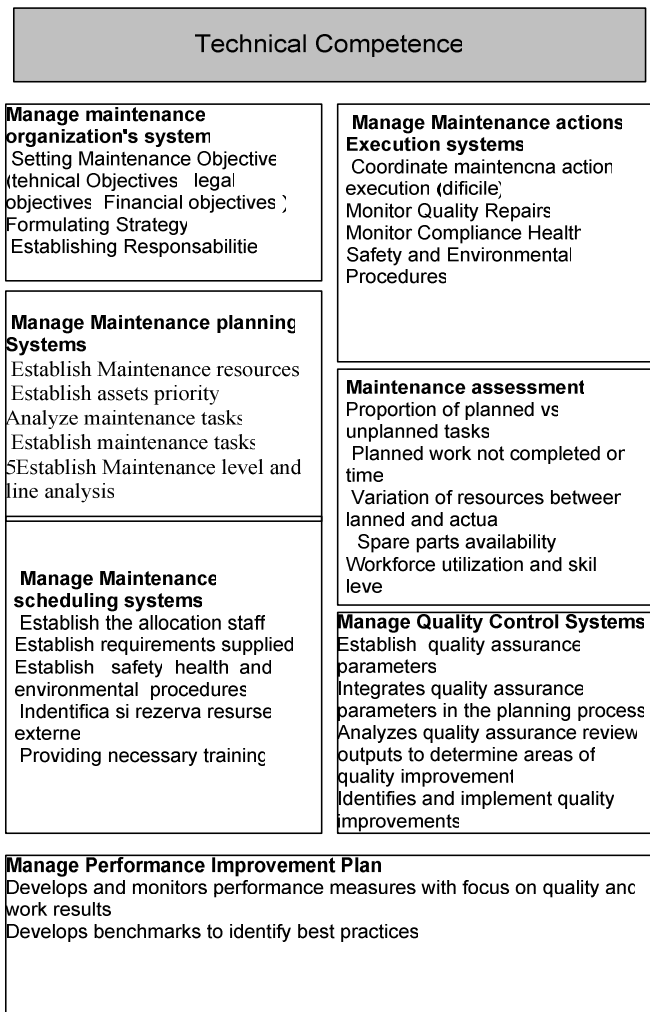


Fig.3. Core competence: Technical Competence

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 etc (fig.4)[2,34]

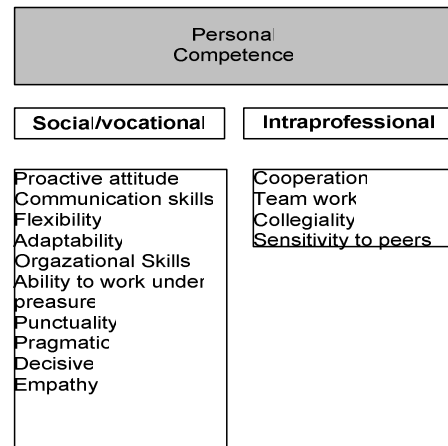


Fig.4. Core component: Personal Competence

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

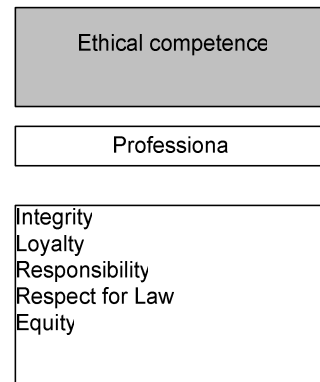


Fig. Core component: Ethical Competence

An initial list of 78 competence variable was compiled based on these two specifications. This list was circulated to all maintenance managers at the enterprises for comment and additional competence which they deemed. All 78 competence component listed in the model are accepted. The validated model, which contained the full list 4 core competences and 78 components are shown in figure.21 de respondents from enterprises participated in this study. Details of the sampling are illustrated in Table 1

Table 1 Sample distribution

No of Company	Sample	Actual responses	Response
21	21	20	95.23 %

These competencies are divided into two sub-sets. The first sub-set constitutes of the competences that are extremely important and second sub-sets consists of competences components that are simply important for job competence model for maintenance manager.

The criteria set for including competent component in the two sub-sets are:

Criterion 1 for set of critically important competence component Average score ≥ 4.0

Criterion 2 for set of important competent competence: Average Score ≥ 3.0 % Avg. < 4

The perception of the respondent maintenance managers over the validity and the importance of the competence components criteria were measured on the basis of their response to a five point Likert scale. The five points were scaled as: 1= Not be required; 2= very little important; 3= important; 4= very important, 5= critically important;

4. Results and Discussions

4.1 Cognitive competencies

The score for the constituents of cognitive competence have been given in Table 2 and Table 3.

From analyses of Table 2 and Table 3 it is concluded that all competence components received a mean score of over 3, so all of them were considered important. The reason as cited by maintenance managers from company is that a manager must have generally very good knowledge on how to set up a company 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.

Table 2 Constituents of Cognitive Competence (general)

N=20, Min =1, Max=5	
Goal, strategies	4.80
Management policy	4.80
Organization	4.80
Economical control	4.80
LCC/LCP techniques/methods	4.80
Logistics	4.80
Human resources development policy	4.05
Actual European Standards	3.00
Materials Technology	3.00
Wear and Tear Mechanism	3.00
Protective Methods	3.00
Non-destructive Testing	3.00
Operating systems	3.25
ERP systems	3.55
Office Software	3.40
Mechanical design	3.35
Wiring and piping diagrams	3.25
Electrical and electronic diagrams	3.05
QA Standards, Terminology	2.95
Basics of Quality Assurance	3.10
QA techniques and procedures	2.95
Authority and Responsibility	3.25
Basics of Labour Law	3.35
Law and regulation in SSM	3.65
Equipment Safety Systems	3.15
English Languages	4.10

Table 3 Constituents of Cognitive Competence (contextual)

N=20, Min =1, Max=5	
Objectives, Tasks, Significance	4.60
Policies on maintenance	4.60
Investment consideration, LCC/DOM	4.20
The Maintenance system	3.30
The wear and Tear Process	3.20
Preventive and Corrective Maintenance Choices	3.35
Techniques (VBM, BSC, QFD other)	3.75
Overall equipment effectiveness (OEE)	3.75

Maintenance scheduling (CBM, Predictive, PM)	3.05
Maintenance scheduling -Wear out component	3.70
Maintenance techniques (PM, CBM, TPM, CMMS, RCM other)	3.75
Maintenance optimization models (Bayesian, Simulation, Petri-nets, Monte Carlo)	3.70
Improvement Techniques (concept definition, scope)	3.15
Root Cause Analysis	3.20
Fault Finding Techniques	3.20
Administration of spare parts	3.15
Maintenance terminology	4.35

4.1 Technical competencies

The score for the constituents of technical competence have been given in Table 4.

The reason as cited by maintenance managers from the investigated companies is that a manager should have generally very good skills of applying the theoretical knowledge in management of maintenance organization systems, maintenance planning, maintenance scheduling systems, maintenance execution systems, quality control quality. It is essential to know very well the maintenance terminology.

Table 4 . Constituents of Technical Competence

N=20, Min =1, Max=5	
Setting Maintenance Objective	4.80
Formulating Strategy	4.85
Establishing Responsibilities	4.85
Establish Maintenance Resource	3.50
Establish Assets Priority	3.30
Analysis Maintenance Tasks	3.65
Establish Maintenance Tasks	3.65
Establish Maintenance Level	3.85
Establish the allocation of staff	3.60
Establish requirements supplied	3.40
Establish Safety, Health and Environmental Procedure	4.00
Identify external resources	3.00
Providing necessary training	3.75
Coordinate Maintenance Action Execution	3.80
Monitor Quality Repairs	3.90
Monitor Compliance Health, Safety and Environmental Procedures	3.75
Establish quality assurance parameters	3.30
Integrates quality assurance parameters	3.30
Analyzes quality assurance	3.30
Identifies and implement quality improvements	3.00
Evaluates proportion of planned vs. unplanned tasks	4.45
Evaluates planned work not completed on time	4.45
Evaluates variation of resources between planned and actual	4.45
Evaluates spare parts availability	4.45
Evaluates workforce utilization and skill level	4.45
Develops and monitors performance measures	3.55
Develops benchmarks to identify best practices	3.60

4.3 Personal competencies

Table 5 is the list of accepted and at the same time required competencies that regard adapting the personal attitudes, the behaviour as well as the communication skills to any given situation.

The reason for demanding this competency, as cited by maintenance managers from the investigated companies, is that a manager that has a proactive attitude is a manager that is going to be a step forwards the others, due to his implicit necessity of being very well informed and very well prepared for all situations. Persons with this quality are able to have initiative, to make relevant motions, to anticipate the results and the effects of a maintenance activity.

Table 5. Constituents of Personal Competence

N=20, Min =1, Max=5	
Proactive attitude	4.85
Communication skills	4.45
Flexibility	3.90
adaptability	3.85
Organizational Skills	4.20
Ability to work under pressure	3.40
Punctuality	4.45
Pragmatic	3.65
Decisive	4.05
Empathy	3.40
Cooperation	3.25
Team work	3.75
Collegiality	3.25
Sensitivity to peers	3.10

4.4 Ethical Competencies

From de analysis of the Table 6, it is observed that the managers should be devoted to the company.

Table 6. Constituents of Ethical Competence

N=20, Min =1, Max=5	
Integrity	3.25
Loyalty	4.50
Responsibility	4.20
Respect for the law	4.00
Equity	3.95

The reason as cited by maintenance managers from company are that un maintenance manager must act during their relationship with other departments managers and clients professionally, competent, honest, responsible. They are not supposed to promote and carry on unethical management practices. They must be devoted to the company and work to accomplish the strategic objectives of the organisation.

5. Conclusion

This study provides information for the practice of competency-based management.

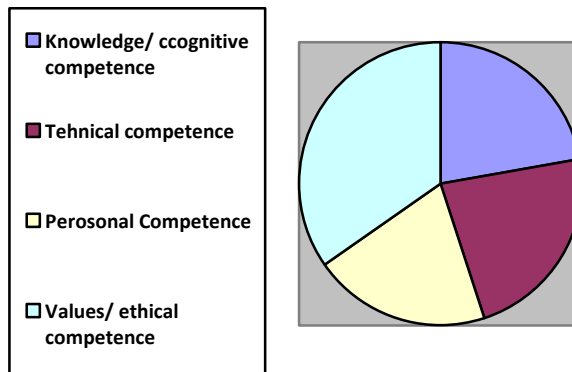


Fig.4 Professional competence mix: maintenance manager model

A better understanding of the relative importance of each component of the maintenance manager function or other position in the organisation administrative scheme can improve the development of a training plan by focusing of different critical competencies.

The Job Competence Model for Maintenance Managers is presented in fig. 4, that shows a classification and an hierarchy of the importance level of the 4 components. We can conclude that the competencies mix resulted after this study undertaken in 20 factories in the machine manufacturing industry shows us that a efficient maintenance manager must have, along the technical cognitive competencies must have a very high level of ethical competencies that involve personal and professional values.

6. References

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