

## Hotel Maintenance Management Practices

Karam Mansour Ghazi<sup>1,2\*</sup>

<sup>1</sup>The High Institute of Tourism and Hotels, King Marriott, Alexandria, Egypt

<sup>2</sup>Faculty of Tourism and Hotel Management, Pharos University, Alexandria, Egypt

### Abstract

This study investigates hotel maintenance management practices and the barriers in implementing these practices from maintenance managers' viewpoint in the Egyptian 5-star hotels. The study used the comprehensive sample. A total of 160 questionnaires were distributed to the maintenance managers in the Egyptian 5-star hotels. The results indicated that the practices of 'maintenance management plan' and 'maintenance management team' play the most significant role in influencing their maintenance efficiency. The results also indicate that 'Insufficient fund for maintenance job' and 'Lack of skilled personnel in maintenance departments' are the major barriers responsible for the poor implementation of maintenance management. This study provides guidance and references for better building maintenance management system for Egyptian hotels. It would enable the hotel operators to achieve better maintenance efficiency through various strategies and practices.

**Keywords:** Maintenance; Practices; Barriers; Hotel; Efficiency

### Introduction

Maintenance is the key for providing better built environment to building customers and users. Maintenance of the hospitality building is significant as its effectiveness will directly affect the quality of services, which have direct and significant effect on satisfying customers' wants and expectations. Proper maintenance management is essential for hotel operations for many reasons including [1-12].

To maintain the capital invested, enhance its value and sustain reasonable investment return;

- a) To increase safety and security of hotel guests and employees by ensuring the building, services and facilities are safe and fit for use;
- b) To ensure the availability/reliability of all the assets and services required by the customers;
- c) To keep or increase market share by satisfying the current or impending guests;
- d) To conform with the new trends and technology in the market (e.g. the green movement);
- e) To conserve corporate image, appearance, historical and architectural values;
- f) To increase the operational stability and efficiency of the facilities and systems;
- g) To ensure energy expenditure (improving energy efficiency);
- h) To mitigate the consequences of a natural disaster such as hurricanes and earthquakes;
- i) To meet governmental requirements like Disability Act, health and safety regulations;
- j) To carry on with the competition,
- k) To ensure operation readiness of all equipment required for emergency use at all time;
- l) To increase the life cycle of the property and achieve minimum breakdowns or deteriorations.

Unfortunately, the background suggests that maintenance has

been given a very low priority in most organizations. Such a lack of concern results in under-resourcing of maintenance which further affects building performance. Moreover, maintenance performance has been criticized in literature as being inefficient, unsatisfactory, and slow responsiveness for many reasons which include [13-25].

Insufficient proactive maintenance strategies and as a result much of the manpower is wasted in performing the corrective maintenance.

1. Maintenance personnel are too focused on technical responsibilities than managerial, social, legal, financial, and inter-departmental communication issues.
2. Maintenance performance is generally hard to measure, as it should not only consider quantifiable parameters but also the quality of the performed maintenance and its organization.
3. The lack of building maintenance objectives, which are not properly coordinated and not matching with organizational directions. Operators need to maintain brand image which may clash with owners' revenue targets.
4. Hospitality facilities requires higher maintenance and renovation cost than residential and industrial buildings, as they are more dynamic, complex, in construction and installation.
5. Lack of complete recordkeeping of hotels maintenance activities.
6. Rare research on maintenance for hotel facilities.
7. There is no unique maintenance strategy suitable for all types of buildings due to different characteristics, such as design, purposes, construction forms, uses, building services ...etc.
8. The "African Poor Maintenance Culture". The problem of

\*Corresponding author: Karam M Ghazi, The High Institute of Tourism and Hotels, King Marriott, Alexandria, Egypt; E-mail: [dr.karam.ghazi@gmail.com](mailto:dr.karam.ghazi@gmail.com)

Received May 25, 2016; Accepted June 14, 2016; Published June 21, 2016

Citation: Ghazi KM (2016) Hotel Maintenance Management Practices. J Hotel Bus Manage 5: 136. doi:10.4172/2169-0286.1000136

Copyright: © 2016 Ghazi KM. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

maintenance management practices faces Africa as a whole. The problem with Africa was not its architecture but its poor maintenance practice. The challenge is to start promoting a 'maintenance culture' for all the people, such as to encourage people to love and care for the environment.

9. The maintenance of buildings and its systems are often neglected during the design and planning stage in project construction.
10. Other factors including lack of proper maintenance plans, inadequate funds, lack of knowledge about the maintenance strategies, inadequate maintenance performance standard, and an absence of commitment from top management further exacerbate the problems of building maintenance.

All these factors puts increasing pressure on hotel managers and planners to consider the impact of improper maintenance and develop more effective practices to avoid hazards in the buildings or workplaces. An excellent practice of maintenance management is greatly needed to increase the life cycle of the property and to minimize unexpected breakdowns or deterioration effects, and vice versa. Therefore, the practices of the maintenance management have to be continuously reviewed and analysed in order to ascertain a high quality service [2,9,10,12,25]. This article aims to unveil the challenges that cause poor maintenance in many hotel building.

Despite maintenance importance, there is a lack of empirical research that evaluates the maintenance management practices from maintenance managers' viewpoint in the hotel industry in general and in Egyptian hotels in particular. The study seeks to investigate the maintenance management practices and the barriers in implementing these practices in the Egyptian 5-star hotels.

### Summary of Problem (Statement of Problem)

Therefore, the problem of this study can be formulated in the form of the following questions:

- What are the maintenance management practices hotels operators adopt for efficient delivery of services?
- How maintenance managers perceive the importance of hotel maintenance management practices?
- What are the barriers faced by maintenance managers in implementing hotel maintenance management practices?

### Study Aim and Objectives

The overall aim is studying maintenance-management practices in the Egyptian 5-star hotels from maintenance managers' viewpoint in order to improve the understanding of practices and its efficiency. The specific objectives are to:

1. Identify maintenance management practices adopted for the efficient operation of hotels.
2. Assess the significance of maintenance management practices from maintenance managers' viewpoint.
3. Find out the barriers faced by maintenance managers in implementing hotel maintenance management practices.
4. Develop a model of hotel maintenance management practices for improving maintenance efficiency.

## The Maintenance Conceptualization

### Maintenance definition

According to Seeley, maintenance is defined as 'work undertaken in order to keep, restore or improve every part of a building, its services and surrounds, to a currently acceptable standard, and to sustain the utility and value of the building [26-28]. Maintenance is defined as the combination of all technical and administration actions, including supervision actions, intended to retain an item in, or restore it to a state in which it can perform a required function'. Maintenance is defined as "the effort in connection with different technical and administrative actions to keep a physical asset, or restore it to a condition where it can perform a required function [29,30]. Maintenance as defined by Lee and Flores-Colen *et al.* refers to a combination of any actions carried out to retain an item in, or restore it to, an acceptable condition under BS 3811:1984 and ISO 15686-1 [31]. Lind and Muyingo also stated the meaning of maintenance as "restoring to or retain to a state in which an item can perform an initially specified function and all actions aimed towards this are maintenance activities" [32]. In the same vein, the engineering definition of maintenance by the Business Dictionary, (2016) terms it as 'an actions necessary for retaining or restoring a piece of equipment, machine, or system to the specified operable condition to achieve its maximum useful life. It includes corrective maintenance and preventive maintenance'.

Francis *et al.* defined building maintenance management as: "An operation involving the interaction or combination of technical, social, legal and fiscal determinants that govern and manage the use of buildings" [14]. According to Lee and Scott maintenance is a broad term, which describes maintenance responsibilities and specifies maintenance requirements [10-22]. The main objective is to ensure the building assets are adequately maintained and perform effectively and efficiently. Borsenik and Stuttts defined managing maintenance and engineering systems for hospitality building(s) as: 'design, construction, occupancy and use, repair, renovation, and disposal. Hospitality building engineering and maintenance systems include: life safety; heating; ventilation; and air condition; electrical; water; transportation; exterior; environment; and special facilities equipment' [1]. According to this definition, the basic purpose of the department can be stated as: keeping the structure, its machines, its systems, and its products in an existing or specified state of readiness. This definition assumes that everything is kept in repair that it is operating at a high efficiency level (low energy consumption), and that there are minimal breakdowns [1].

Many hospitality operations defined maintenance by its areas of responsibility. Other operations rely on normal dictionary definitions. In some hospitality companies, the term has been combined under the heading of facilities management or facilities engineering [1,20,25]. Regardless of the definition or responsibilities of an organization, four key components emerge from the development of the maintenance definition in both types of literature:

1. Maintenance is not simply a series of technological or craft activities, but also requires considerable administrative and managerial expertise.
2. Actions are those relates to the physical execution of maintenance work, initiation, financing and organization and implementation.
3. It includes two processes: 'retaining', i.e. work carried out in anticipation of failure, referred to as 'preventive maintenance'

and ‘restoring’, i.e. work carried out after failure, referred to as ‘corrective maintenance’.

4. The setting of standards is also clearly identified as a requirement for the delivery of maintenance appropriate to the organization for which it is being undertaken.

### The similarity of the maintenance and renovation concepts in hotels

Seeley described renovations as a kind of maintenance which ‘consist of work done to restore a structure, service and equipment by a major overhaul to the original design and specification, or to improve on the original design, [Renovation] may include limited additions and extensions to the original building’. Renovation is the process of retaining or improving the hotel image by modifying the tangible products, due to many reasons. This process is confirmed by Lind and Muyingo when they stated that the meaning of maintenance as “restoring it to or retain a state in which an item can perform an initially specified function and all actions [32]. This is done through changes in the hotel layout; such changes come in the form of new extensions and /or any additions or replacement of materials and furniture, fixtures and equipment.

From the hospitality point of view, Stipanuk and Roffmann defined renovation as ‘the process of renewing and updating a hospitality property to offset the ravages of use and modify spaces to meet the needs of changing markets’ [33]. Hassanien and Baum, from hotels’ perspectives, viewed renovation as ‘the process of retaining or improving the hotel image by modifying the tangible product, due to a variety of reasons through any changes in the hotel layout (e.g. property structure-new extension) and/or any additions or replacement of materials and furniture, fixture and equipment’. In addition, renovation incorporates replacement, restoration and redesigning. This makes it a function of facility management that deals with the physical aspects of hospitality and not ‘soft’ service element. This definition is therefore similar to maintenance because it requires inputs from many parts and levels of the organization.

### Facility management and maintenance management

The International Facilities Management Association (2004) defined facilities management as, ‘The practice of coordinating the physical workplace with the people and work of the organization. It integrates the principles of business administration, architecture and the behavioral and engineering sciences’. The association also described facilities management as ‘a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology’ [34]. Chan identifies that the main areas of concern for facility management functions are organization, people and building facilities. Hassanien and Losekoot provided another definition as ‘the responsibility for coordinating efforts to ensure that buildings, technology, furniture and organizational trends are responded to, over time’. Okoroh *et al.* expressed a view on the relationship between facilities management and hotels [35]. He defined facilities management in hotels as, ‘the management of constructed facilities and organizational assets to improve their efficiency and add value to their performance and services’.

Facility management involves various types of disciplines and recent studies discuss its very broad definitions [36-38]. Although the scopes of facility management are very broad, it is more than the building operations and maintenance. Nutt defines facility management

as the management of infrastructure resources and services to support and sustain the operational strategy of an organization [39]. Thus, building operation and maintenance is within the facility management functions.

### Classification of maintenance management

Seeley believes that maintenance comprises three separate components namely;

1. Servicing. This is essentially a cleaning operation undertaken at regular interval of varying frequency and is sometimes termed day-to-day maintenance.
2. Rectification. This work usually occurs fairly early in the life of the building and arises from shortcomings in design, inherent faults in or unsuitability of components, damage of good in transit installation and incorrect assembly. Rectification represents a fruitful point at which to reduce the cost of maintenance, because it is avoidable.
3. Replacement. Replacement problems involve items that degenerate with use or with the passage of time and those that fail after a certain amount of use or time. Items that deteriorate are likely to be large and costly (e.g., machine tools, trucks, ships...etc.).

As shown in Figure 1, Seeley divided building maintenance into ‘planned maintenance’ and ‘unplanned maintenance’. According to Chanter and Swallow, there are various categories of building maintenance as stated below [20]:

1. Planned maintenance: “The maintenance is well organized and carried out with forethought, control and the use of records to a predetermined plan.”
2. Unplanned maintenance: “The maintenance implemented without predetermined plan.”
3. Preventive Maintenance: “The maintenance carried out at predetermined intervals of time or period and intended to reduce the probability of failure or unsatisfactory performance of an item.” This type of maintenance relies on the predicted probability that the system, equipment or even a part of it will breakdown in a specific period of time.
4. Corrective maintenance: “The maintenance implemented after failure has occurred and intended to restore or repair an item to the state that can perform its required function.” No maintenance work is carried out until there is failure. For

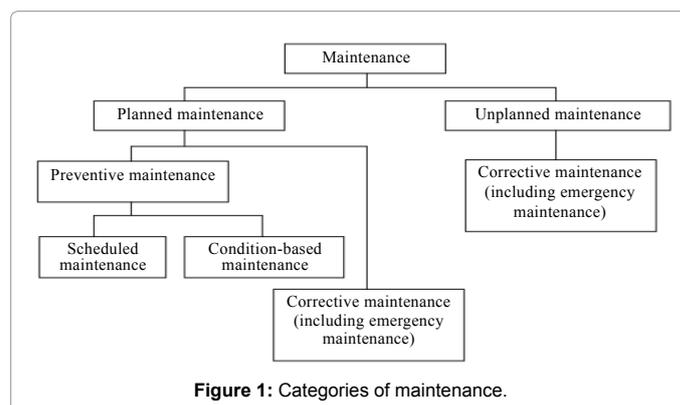


Figure 1: Categories of maintenance.

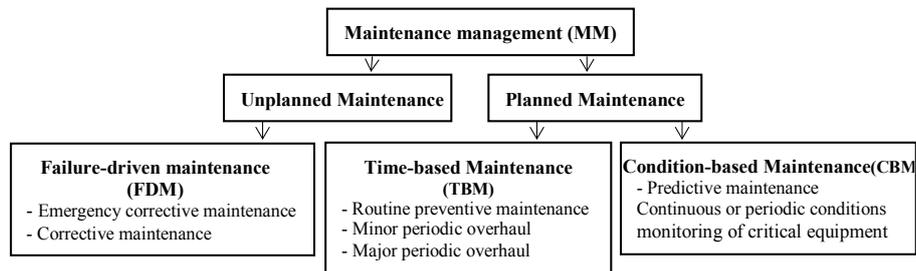


Figure 2: Three commonly used maintenance management approaches.

instance, the water pump or centrifugal pump of the swimming pool is damaged and requires repair work to restore it.

5. Emergency maintenance: “The necessary maintenance to be implemented immediately in order to prevent further damage or serious impacts on an item.” For example, the repair of serious structural cracks in a building is necessary to avoid further cracking or collapse.
6. Condition-based maintenance: “The preventive maintenance initiated as a result of knowledge of the condition of an item from routine or continuous monitoring and inspection.”
7. Scheduled maintenance: “The preventive maintenance implemented to a predetermined interval of time, number of operations, mileage and others.” For example, change of light bulbs or tubes for best performance according to their lifetime.

Maintenance management has also been categorized by many writers into three maintenance procedures. Corrective maintenance (unplanned) approach which is a failure-driven maintenance referring to running equipment until unexpected event breakdown of equipment or malfunctioning. Preventive maintenance (planned) which entails time-based maintenance requiring regular task of maintenance irrespective of the condition of the item and thirdly condition-based maintenance which also entails periodic inspection of equipment to check it and replace it when a faulty condition is observed before breakdown [40] (Figure 2).

Chan further classified management of maintenance activities in hotels into four main categories: routine, corrective, preventive, and emergency. Routine maintenance refers to the daily activities with repetitive nature, such as taking meter readings, lubricating, monitoring, start-up, and shut-down. Corrective maintenance works are scheduled or unscheduled activities to restore the equipment to as-built functions. Preventive maintenance includes scheduled activities of inspection, adjustment, replacement and overhaul to prevent system breakdown and extend its useful life. Emergency maintenance refers to immediate actions to avoid further equipment damage and adverse consequences, such as loss of business.

**Summary: What is hotel maintenance?**

1. Hotel maintenance is the performance of general, preventative, corrective and emergency maintenance for a given hotel facility. It involves a combination of technical and administrative actions carried out to retain an item, equipment, system, plant or machine in order to restore it to an acceptable working condition.

2. Maintenance Management is the planning, organizing, directing, staffing, controlling and evaluating functions of management applied to

maintenance activities. Maintenance management involves managing the functions of maintenance.

**Study Methodology**

This study investigates hotel maintenance management practices from maintenance managers’ viewpoint through assessing the significance of practices and assessing barriers responsible form poor implementation of these practices in the Egyptian five-star hotels.

**Study hypotheses**

This study proposed that maintenance management practices significantly influence maintenance performance (efficiency). The study has two hypotheses:

Hypothesis 1 of this study is to test whether the maintenance management practices are statistically significant or not in improving maintenance management efficiency. Hence, the null and alternate of Hypothesis 1 are:

- $H_0$  —There is no a statistically significant relationship at 0.05 level between the maintenance management practices and improving maintenance efficiency ( $H_0: \mu < 3; p > 0.05$ ).
- $H_1$  —There is a statistically significant relationship at 0.05 level between the maintenance management practices and improving maintenance efficiency ( $H_1: \mu \geq 3; p \leq 0.05$ ).

This hypothesis is tested by one sample t-test analysis:  $H_0: \mu < 3; p > 0.05$  versus  $H_1: \mu \geq 3; p \leq 0.05$ .

Hypothesis 2 of this study is to test whether the influential barriers are statistically significant or not in poor implementation of maintenance management practices. Hence, the null and alternate of Hypothesis 2 are:

- $H_0$  —There is no a statistically significant relationship at 0.05 level between the influential barriers and poor implantation of maintenance management practices. ( $H_0: \mu < 3; p > 0.05$ ).
- $H_1$ —there is a statistically significant relationship at 0.05 level between the influential barriers and poor implementation of maintenance management practices. ( $H_1: \mu \geq 3; p \leq 0.05$ )

This hypothesis is tested by one sample t-test analysis:  $H_0: \mu < 3; p > 0.05$  versus  $H_1: \mu \geq 3; p \leq 0.05$ .

**Study variables**

34 Maintenance management practices and 10 maintenance barriers are the independent variables; meanwhile, maintenance efficiency and poor implementation are the dependent variables (Figure 3).

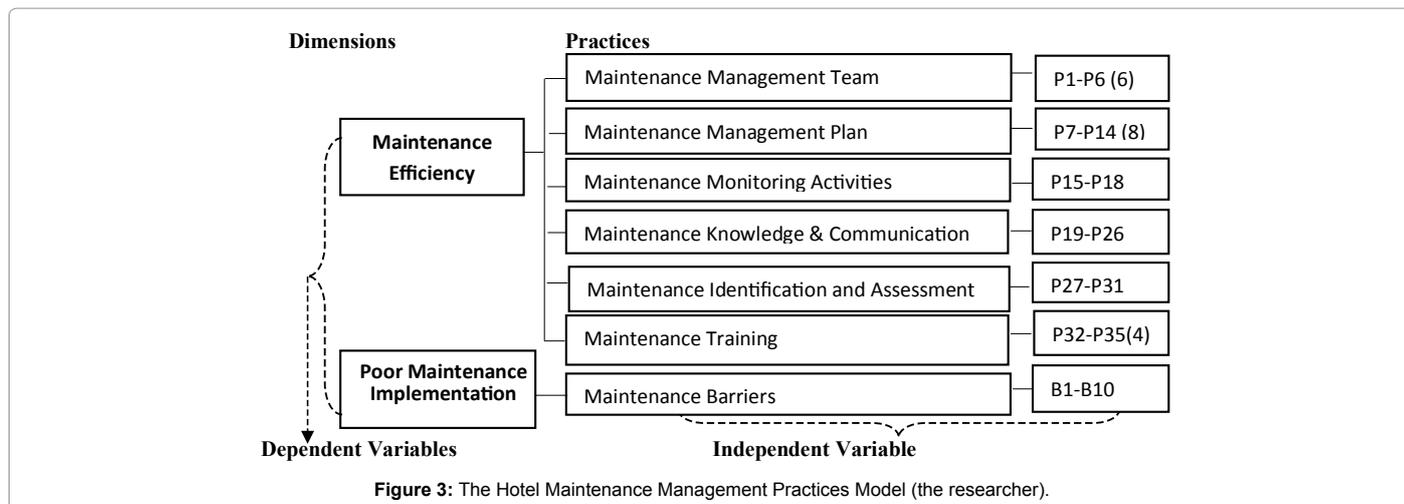


Figure 3: The Hotel Maintenance Management Practices Model (the researcher).

### Research type and approach

This study uses Multi-method data collection. The study objectives and hypotheses revealed that this research study is primarily a descriptive-analytical study with qualitative and quantitative approaches. This research also has an exploratory aspect which included interviews with hotel managers from the industry. Furthermore, this study used deductive approach, since it develops a theory and hypotheses and then designs a research strategy to test the validity of hypotheses against the data. If the data are consistent with the hypothesis then the hypothesis is accepted; if not it is rejected. It moving works from the more general to the more specific (this call a top-down approach). This study used two approaches to data collection namely;

1. **Desk survey (secondary data source):** The desk survey (literature review) forms an essential aspect of the research since it sets the pace for the development of field survey instruments using questionnaires, and interview. Secondary sources of information were identified and collected in books, articles, and professional periodicals, journals and databases on the subject of the study [41].

2. **Field survey (primary data source):** The field survey is involved with the collection of empirical data. Fieldwork can be associated with three practical approaches; the survey approach, the case study approach and the problem-solving approach (action research) [42]. To achieve research objectives, a written survey questionnaire was chosen as the primary method of quantitative data collection to investigate maintenance management practices through assessing the importance level of practices and barriers. The researcher used surveys because according to Robson (2002), surveys are used for relatively large number of respondents within a limited time frame. This appears to be the most convenient way to obtain highest participation as people would be able to fill in the questionnaire during free time. Questionnaire survey enhances consistency of observations and improves replication due to its inherent standardized measurement and sampling techniques [43]. The need for generalization in the findings across the hotel buildings influenced the choice of questionnaire survey.

A combination of data collection methods provides a way to gain in depth insights and adequately reliable statistics. The mixed methods approach allows researchers to address more complicated research questions and achieve higher reliability and validity for the research [44]. Patton noted that using more than one data collection instrument strengthens and gives credibility to the study [45]. As shown in

Figure 4, the study was conducted in three phases over the time period of February 2016 to April 2016.

### Data collection instrument

The questionnaire was developed based on the scale development procedures outlined by Hinkin for developing reliable and valid measurement instruments in any hospitality industry field research setting (Figure 4). As shown in Figure 4, Hinkin have provided a seven-step process guide for scale development and analysis in the hopes that hospitality researchers will utilize a systematic approach to item and scale creation. The final data-collection instrument consisted of three-parts [46]:

1. The first part assessed the significance of maintenance management practices in maintenance efficiency from maintenance managers' viewpoint in the Egyptian five-star hotels. It consists of 34 practices representing six dimensions of maintenance management. Respondents were asked to rate each practice of the 34 practices in terms of the level of importance in maintenance management using a Likert scale ranging from 1-very unimportant (least) to 5-very important (highest). The significance of the variables (practices) used was tested with the aid of t-test statistical tool at a critical value of 3. The variables (practices) were also ranked with the aid of the mean responses of the interviewed respondents.

2. The second part of this study assesses the significance of barriers responsible for poor implementations of maintenance management practices from maintenance managers' viewpoint. It consists of 10 barriers responsible for poor implementation of practices. It examined the importance level managers assigned to each barrier using a Likert scale ranging from 1-very unimportant (least) to 5-very important (highest). The significance of the variables (barriers) used was tested with the aid of t-test statistical tool at a critical value of 3. The variables were also ranked with the aid of the mean responses of the interviewed respondents.

3. The third part containing questions about demographic characteristics for members of the study sample. A cover letter in the message explained the purpose of the survey, due dates, contact information, and general directions.

### Measurement questionnaire reliability and validity

The researcher rationing/legalize the questionnaire before

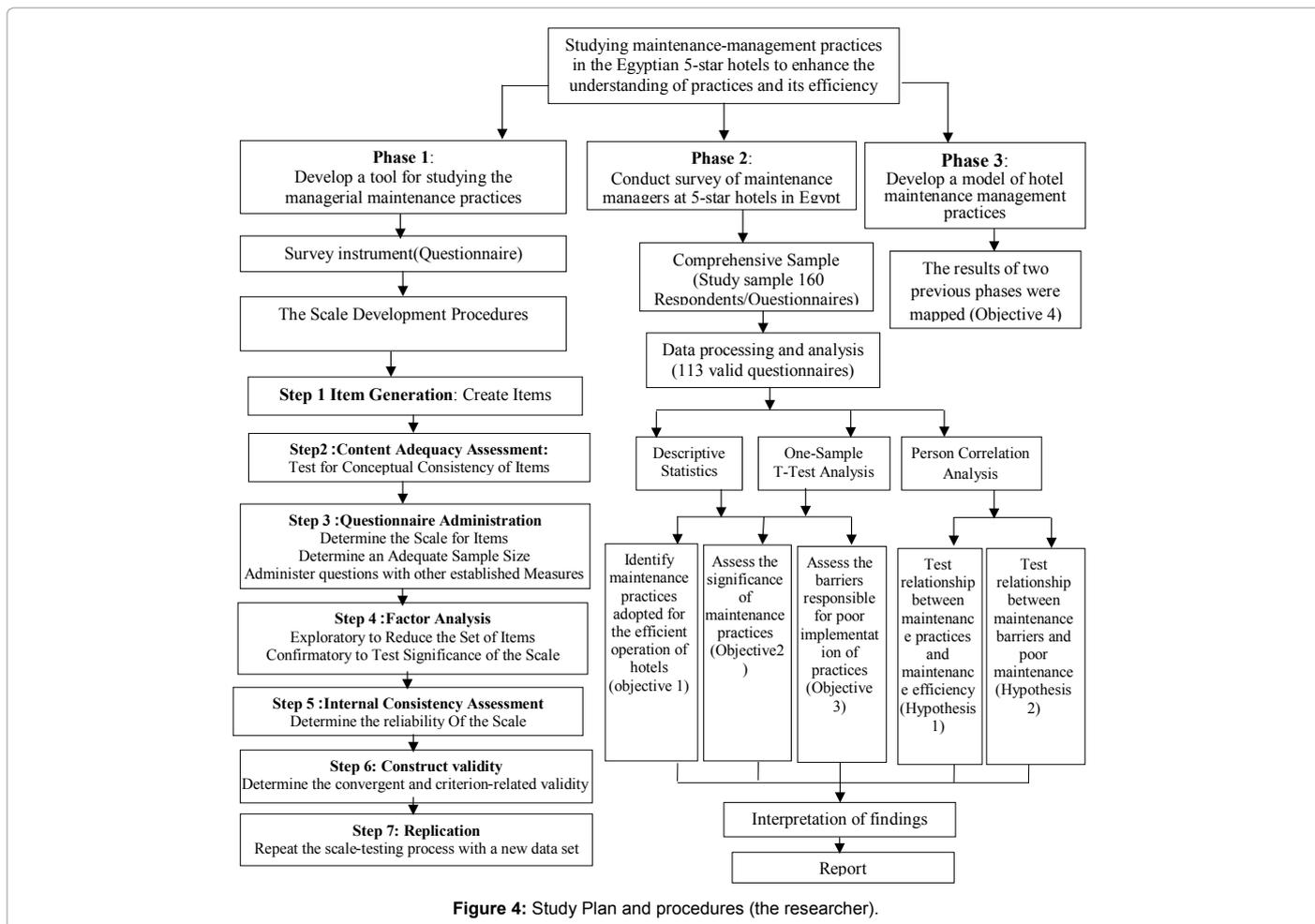


Figure 4: Study Plan and procedures (the researcher).

distribution to the study sample, so as to make sure of the validity and reliability of paragraphs as follows:

**Measuring validity:** In order to verify validity, the researcher relied on two forms of validity:

**Content validity (believe arbitrators):** The first version of survey questionnaire was judged by a group of arbitrators. A panel of four expert judges reviewed the measurement practices and its dimensions. Interviews with 4 experienced people in the field of hotel maintenance were done. These interviews were supplementary to the main data collection phase involving administration of a survey questionnaire to the study population. The interview observations have been used to assist with proposition development, questionnaire design and interpretation of survey findings. Revisions to the questionnaire were made based on feedback from the arbitrators. The researcher responded to the views of the jury and performed the necessary delete and modify in, after the light of the proposals recorded in the model is set up. Factors or questions with 80% approval and higher were only considered. The result was a revised version of the questionnaire with a smaller set of items. The changes made the statements more specific and easier to understand. 34 measures representing 8 dimensions has finally identified in the questionnaire. Therefore, bringing out the questionnaire in its final form to apply to the study sample.

**Construct validity:** The researcher used two types of analysis for determining construct validity:

- a. Correlational analysis.
- b. Factor analysis, a multivariate technique that confirms the dimensions of the concept that have been operationally defined, as well as indicating which of the items are most appropriate for each dimension [41].

The researcher calculates the internal consistency of the attributes (practices) of the questionnaire by surveying it to the initial sample size of 24 respondents of the total members of the study population, and it calculates the correlation coefficients between each attribute (practice) of the questionnaire, and the total score for the domain dimension that belongs to him that attribute (practice) (the correlation coefficients between each practice of the first dimension and total score of practices of that dimension). The results showed that the value of the correlation coefficients of practices is ranged between (0.868, 0.620), and is statistically significant at the level of significance (0.05). Hence, the practices (attributes) of each dimension (factor) are considered honest/valid to measure its role in maintenance management. Since all practices (factors) are linked to each other and to the total degree of questionnaire, and this confirms that the questionnaire has a high degree of honesty/validity and internal consistency, and therefore there is not deleted any paragraph of the questionnaire which tolling (34) items. In addition, the factor loading for each practice is above 0.5.

**Measuring reliability:** The reliability of a measure indicates the extent to which it is without bias (error free) and hence ensures

consistent measurement across time and across the various items in the measurement [41].

**Inter-item consistency reliability:** It is a test of the consistency of respondent's answers to all the items in a measure. The most popular test of inter-item consistency reliability is Cronbach's coefficient alpha. The higher the coefficient, the better the measuring instrument. According to Sekaran and Bougie almost in all cases, Cronbach's coefficient alpha can be considered a perfectly adequate index of the inter-item consistency reliability. The researcher conducted reliability steps on the same initial sample using Cronbach's alpha coefficient. The results illustrated that the high reliability coefficients for questionnaire attributes (practices) were ranged from (0.7953, 0.8443). This means that all value coefficients is very high, so it is an indicator of the validity of the study tool (questionnaire) for application in order to achieve its objectives by answering its questions, suggesting the possibility of the stability/reliability of the results that can result from the tool. The strong internal consistency reliability for the revised scales indicated that the retained items measure the same constructs. Thus, the researcher may be sure of the validity and reliability of the questionnaire, and it became valid in its final form for application to the basic study sample.

### Sampling plan and procedures

The target population of this study was the maintenance managers at the Egyptian five-star hotels. The study used the comprehensive sample (complete enumeration) to ensure that the results represent the total number of maintenance managers. The study sample included all members of study population which totaling 160 maintenance manager in all the five-star hotels in Egypt (the Egyptian Hotel Guide 2010-2011). The questionnaire was distributed to members of the sample with rate 100% of the original members of the study population. A total of 160 questionnaires were distributed to the managers in the hotel sample in February, 2015. From the sample, 122 questionnaires were returned, with a response rate of 76 %. Out of these 122 questionnaires, 9 were not included because of incompleteness. The valid number of questionnaires for analysis was 113, and the response rate was 70%. Researcher faced some obstacles marked by the refusal of some respondents fill in the questionnaire and the travel of some managers. This necessitated intensification of researcher visit to hotels more than once in an attempt to persuade respondents need to mobilize the questionnaire.

The surveyor contacted with each hotel in the sample and asked to meet the maintenance manager or the highest ranking maintenance's employee in cases where there was no such manager. The surveyor gave him (or her) a written survey questionnaire. The manager could, complete the questionnaire on the spot and return it to the surveyor or ask the surveyor to return at a later time to pick the questionnaire. To assure an adequate response rate, an accompanying (cover) letter explained that the questionnaire was sponsored by Faculty of Tourism and Hotels as well as by Alexandria University. Additionally, the letter emphasized the significance of the issue under investigation, promised to release major findings to the respondents upon completion, and ensured confidentiality and appreciation for participating in the research. The token of appreciation was handed out to the respondents to encourage them to complete the questionnaire and to reduce the rate of incomplete questionnaires, which would not be valid.

Senior management was selected as the informant level because of the key role these individuals play in maintenance management. They do this by promoting an organizational maintenance culture by providing the leadership needed to manage maintenance. In sum, the

surveys were directed at senior level managers due to the nature of their role as chief executive decision-makers in maintenance management.

### Ethical assurances

Privacy and confidentiality were critical to the success and integrity of the study. The use of Informed Consent was practiced. Additionally, each participant received a cover letter that reiterated the information in the Informed Consent form, but also stressed that participation in the study was voluntary. The respondents were advised that the data collected would be used solely for the purpose to address the research topic. There were no anticipated risks to the respondents who participated in the study. Before completing the report, the removal of any personal identifying information or data was the means to maintain confidentiality.

### Data analysis

The questionnaire survey analyzed using SPSS (Statistical Package for Social Sciences) statistical program. Data collected from the questionnaire was entered into SPSS (version 19) data sheet and all analyses were performed. The principal statistical tool utilized was the non-parametric statistical testing using descriptive statistics and one-sample t-test. The significance of the variables (practices-barriers) used was tested with the aid of t-test statistical tool at a critical value of 3. The relative importance/significance of the maintenance management practices and barriers was ranked through three stages:

1. Rank by the P.Value, so that the variables that have the less P.value, have greater importance and vice versa. If the variables are equal in the P.Value, these variables have ranked according to the second stage.
2. Sort by the value of the arithmetic mean of the sample. So that the variables that have the higher average, have greater importance. If some variables are equal in the average value of the arithmetic, discover which is better by the third phase.
3. Sort by the value of the standard deviation, so that the elements that have the less standard deviation, have greater importance. The result is presented in Table 1.

Finally, interpretation of the results was done at 5% level of significance; where the value of  $p \leq 0.05$  were considered as being significant and  $p \leq 0.01$  was considered as being highly significant.

### Definition of key terms

**Maintenance management:** The interaction or combination of technical and administrative actions to ensure the items and elements of a building in an acceptable standard to perform its required function.

**Maintenance management practices:** the measures and tactics adopted for the efficient operation of hotels. The measures include technical, administrative, social, legal, and financial procedures designed to increase the life cycle of the property and to minimize unexpected breakdowns or deterioration effects.

**Maintenance barriers:** The obstacles and challenges faced by maintenance managers in implementing maintenance management practices.

**Maintenance efficiency,** keeping items and elements in repair and operating at a high efficiency level (low energy consumption and minimal breakdowns).

Hotel Maintenance Management Practices and its Role in Maintenance Efficiency	One-Sample T-Test			Correlation	
	Mean <sup>a</sup>	T value <sup>b</sup>	Rank	Person <sup>c</sup>	Rank
<b>1. Maintenance Management Team (MMT)</b>	<b>(4.26)</b>	<b>(8.23<sup>***</sup>)</b>	<b>(2)</b>	<b>(0.80)</b>	<b>(2)</b>
1. Have a sufficient & multifunctional MMT responsible for maintenance work	4.42	8.59 <sup>***</sup>	4	0.72	5
2. Appoint a MMT leader or a similar individual for all aspects of maintenance.	4.24	7.65 <sup>***</sup>	11	0.65	27
3. Have an organizational administrative structure for maintenance management	4.25	7.85 <sup>***</sup>	10	0.55	29
4. Conduct regular MMT meetings between senior management/maintenance staff	4.21	7.43 <sup>***</sup>	14	0.67	11
5. Use specialized out-source contractors for some maintenance work	4.22	7.54 <sup>***</sup>	13	0.56	28
6. Recruit skilled technicians with good behavior and neat appearance	4.23	7.58 <sup>***</sup>	12	0.70	8
<b>2. Maintenance Management Plan (MMP)</b>	<b>(4.41)</b>	<b>(8.65<sup>***</sup>)</b>	<b>(1)</b>	<b>(0.82<sup>***</sup>)</b>	<b>(1)</b>
7. Have a written MMP including maintenance policy, standard procedures/strategy	4.46	8.76 <sup>***</sup>	1	0.75	3
8. Approving/commitment of top management (owner/operator) to MMP execution	4.43	8.63 <sup>***</sup>	3	0.76	2
9. Involvement maintenance department in developing the maintenance plan	4.35	8.14 <sup>***</sup>	9	0.71	7
10. Involvement maintenance experts at the design and pre-construction stage	4.37	8.25 <sup>***</sup>	8	0.71	6
11. Review and update the MMP regularly at least annually	4.42	8.54 <sup>***</sup>	5	0.73	4
12. Set aside yearly budget reserves for financing maintenance programs	4.44	8.65 <sup>***</sup>	2	0.78	1
13. Well inform key employees about maintenance planning, resources and tools	4.38	8.33 <sup>***</sup>	7	0.57	26
14. Commitment of manufacturers/suppliers to provide complete technical documentation to maintenance staff	4.40	8.48 <sup>***</sup>	6	0.58	25
<b>3. Maintenance Monitoring Activities (MMA)</b>	<b>(3.80)</b>	<b>(6.71<sup>***</sup>)</b>	<b>(4)</b>	<b>(0.78)</b>	<b>(4)</b>
15. Carrying out daily maintenance activities with repetitive nature, such as taking meter readings, start-up/shut-down chillers, etc (Routine maintenance approach)	3.80	6.51 <sup>***</sup>	20	0.59	23
16. Carrying out the scheduled or unscheduled activities after a failure has occurred to restore to normal functions (Corrective/failure-driven maintenance approach)	3.79	6.12 <sup>***</sup>	24	0.66	13
17. Carrying out regular/scheduled activities at predetermined intervals of time (Preventive/time-based maintenance approach)	3.82	6.63 <sup>***</sup>	19	0.67	12
18. Carrying out immediate maintenance actions of unexpected defects to avoid further damage or adverse consequences. (Emergency maintenance approach)	3.79	6.25 <sup>***</sup>	23	0.58	24
<b>4. Maintenance Knowledge-sharing and Communication (MKC)</b>	<b>(3.74)</b>	<b>(6.42<sup>***</sup>)</b>	<b>(5)</b>	<b>(0.79)</b>	<b>(3)</b>
19. Have computerized maintenance information system to organize maintenance work	3.84	6.88 <sup>***</sup>	17	0.69	10
20. Have maintenance procedure checklists, protocols, work rules	3.82	6.76 <sup>***</sup>	18	0.63	14
21. Have a well-equipped maintenance command center	3.80	6.42 <sup>***</sup>	21	0.62	15
22. Have a toll-free maintenance hotline for guests and employees	3.80	6.36 <sup>***</sup>	22	0.60	20
23. Any worker that sees a fault can initiate a printed or electronic work order.	3.65	5.19 <sup>***</sup>	28	0.51	34
24. Schedule maintenance work which comprises the frequency and all details	3.66	5.28 <sup>***</sup>	27	0.59	22
25. Recordkeeping maintenance of buildings, services, facilities, agreements, ...etc.	3.60	4.99 <sup>***</sup>	29	0.60	21
<b>5. Maintenance Identification and Assessment (MIA)</b>	<b>(3.48)</b>	<b>(6.15<sup>***</sup>)</b>	<b>(6)</b>	<b>(0.69)</b>	<b>(6)</b>
26. Identify and categorize current and potential maintenance problems and impacts due to facility management by brainstorm employees, examine history,...etc.	3.45	4.42 <sup>***</sup>	33	0.61	16
27. Identify effective and quick means for reporting faults or problems occur	3.50	4.54 <sup>***</sup>	32	0.53	31
28. Define and identify equipment and material needed, its specifications and default age (virtualization), as well as maintenance history, skilled labor needed, costs, implementation means and funding sources	3.41	4.22 <sup>***</sup>	34	0.52	32
29. Evaluate and measure maintenance performance, follow-up actions, by using many methods such as post-occupancy evaluation, time variance, cost variance, system breakdown rate and others.	3.52	4.83 <sup>***</sup>	30	0.61	17
30. Encourage building customers and employees to provide their evaluation opinions on the maintenance services provided by using many methods such as the feedback comment and complaint form, and others.	3.50	4.78 <sup>***</sup>	31	0.60	19
<b>6. Maintenance Training (MT)</b>	<b>(3.81)</b>	<b>(7.45<sup>***</sup>)</b>	<b>(3)</b>	<b>(0.72)</b>	<b>(5)</b>
31. Conduct maintenance training (drills, seminars, workshops) on a regular basis at least annually to improve staff skills as well as to learn new technology	3.92	7.11 <sup>***</sup>	15	0.69	9
32. Train new staff members when they join	3.70	5.48 <sup>***</sup>	26	0.52	33
33. The commitment of the manufacturers or suppliers to provide training sessions	3.88	7.06 <sup>***</sup>	16	0.61	18
34. Train housekeeping staff to help with maintenance delivery (especially at night) to change locks and batteries, fix of bulbs, when maintenance staffs have closed.	3.74	5.91 <sup>***</sup>	25	0.54	30
<b>Total</b>	<b>3.91</b>	<b>8.25<sup>***</sup></b>	<b>-</b>	<b>0.81</b>	<b>-</b>

<sup>a</sup> Mean scale: 1—very unimportant to 5—very important.

<sup>b</sup> T tabular value at a degree of freedom (112) and the level of significance 0.05 equal 1.97 (significant: \*p ≤ 0.05; \*\*p ≤ 0.01).

<sup>c</sup> Correlation between maintenance practices and improving maintenance efficiency at a degree of freedom (111) and the level of significance 0.05 equal 1.59 (significant: \*p ≤ 0.05; \*\*p ≤ 0.01).

**Table 1:** Maintenance practices and its role in improving maintenance efficiency.

## Study scope and limitations

The study seeks to explore the maintenance management practices and the barriers in implementing these practices in the Egyptian 5-star hotels. The focus of research is limited to the 5-star hotels in Egypt.

- The first limitation of this study is that it is limited to Egypt.
- The second limitation of this study was the sample population. The study findings are limited to the maintenance managers of the Egyptian 5-star hotels. Therefore, the findings cannot be generalized beyond this target population or to a broader population.
- A third limitation is that the maintenance practices used in this study do not represent all possible measures that may be taken. In addition, because of the wide variety in the types, sizes, and locations of hotels, not all suggested measures will be relevant or applicable. The ability to implement them at any specific facility will vary. The ideal number and structure of measures and dimensions could be different depending on the type of industry being studied, the service firm in question or the circumstances under which studies are rendered.
- Final limitation was the potential for researcher bias. Additional research should focus on these potential limitations in order to assure the most precise results.

## Results and Discussion

### Maintenance practices and its role in improving maintenance efficiency

As shown in Table 1, the importance mean scores of the 34 practices varied from 4.46 (the highest) to 3.41 (the lowest) out of a possible range of 1.0 to 5.0, with 1.0 indicating very unimportant and 5.0 indicating very important. Nevertheless, there was a distinction between the 34 practices and a priority of importance was evident.

- Fourteen (14) practices were perceived as most important with a mean greater than 4.20 ( $M > 4.20$ , on a 1 to 5 scale). It should be noted that these practices are related to two dimensions; "Maintenance Management Plan, and Maintenance Management Team". Hotel managers believed that these measures play the most significant role in influencing their maintenance. This finding implied that hotel managers focus on these practices as the number one of priority. It is a managers' top priority in maintenance which should also be the priority of hoteliers. Hence, hotel operators should put in more effort and attention to improve these practices when managing maintenance.

- Meanwhile, 20 practices were perceived as important with a mean greater than 3.40 and less or equal to 4.20 ( $4.20 \geq M > 3.40$ , on a 1 to 5 scale). It should be noted that these measures are related to four dimensions; "Maintenance Knowledge-sharing and communication, Maintenance Monitoring Activities, Maintenance Training, and Maintenance Identification and Assessment". This finding implied that hotel managers focus on these dimensions as the number two of priority. It is a managers' second top priority in maintenance management which should also be the second priority of hoteliers. It should be noted; Hotel managers believed that these measures play a significant role in influencing their maintenance, but to a lesser extent. It should be noted, however, that these practices were also deemed important, but to a lesser extent and shouldn't be disregarded when managing maintenance. Hence, hotel operators ought to take them into consideration and put in more effort and attention to improve these measures when managing maintenance.

- Overall, it should be noted that the average importance mean of all maintenance management practices was ranged from 4.46 (the highest) to 3.41 (the lowest), which is greater than 3 (center-neutral) and also reached the significance level value of 0.000, which is less than 0.05. This finding indicates the significance role of all 34 practices in improving maintenance efficiency in the Egyptian 5-star hotels.

- The rankings in descending order of the importance mean scores of the 6 dimensions of the practices model in terms of its impact on improving hotels maintenance efficiency were as follow: Maintenance Management Plan (4.41), Maintenance Management Team (4.26), Maintenance Training (3.81), Maintenance Monitoring Activities (3.80), Maintenance Knowledge-sharing & Communication (3.74), and Maintenance Identification & Assessment (3.48). The results indicated that the highly important measures are related to two dimensions; 'Maintenance Management Plan, and Maintenance Management Team' ( $M > 4.20$ , on a 1 to 5 scale). While, the important practices are related to four dimensions; 'Maintenance Monitoring Activities, Maintenance Training, Maintenance Knowledge-sharing & Communication, and Maintenance Identification & Assessment' ( $4.20 \geq M > 3.40$ , on a 1 to 5 scale). Overall, it should be noted that the average importance mean of all maintenance management dimensions was ranged from 4.41 (the highest) to 3.84 (the lowest), which is greater than 3 (center-neutral) and also reached the moral level value of 0.000, which is less than 0.05 (the morale level). This finding indicates the significance role of all 6 dimensions in improving maintenance efficiency in the Egyptian 5-star hotels.

- Respondents agree with the significance of practices because the calculated absolute value of T is greater than the spreadsheet value of T which is equal to 1.97 when the degree of freedom 112 (n-1) and level of significance 0.05 (or the significance level less than 0.05). This means that the percentage of the answers to (important or very important) is greater than the percentage of the answers (....., not important or very unimportant).

Due to constraints of resources, hotels are forced to prioritize their maintenance practices. In economics, maintenance prioritization helps to utilize the available maintenance funds judiciously. The prioritization helps in deciding the best maintenance strategies and practices to adopt for managing the building assets [47-50].

### Barriers Responsible for Poor Implementation of Maintenance Management Practices

As shown in Table 2, the importance mean scores of the 10 barriers varied from 4.25 (the highest) to 3.66 (the lowest) out of a possible range of 1.0 to 5.0, with 1.0 indicating very unimportant and 5.0 indicating very important. Nevertheless, there was a distinction between the 10 barriers and a priority of importance was evident:

- Two barriers were perceived as most important with a mean greater than 4.20 ( $M > 4.20$ , on a 1 to 5 scale). It should be noted that these two barriers are 'Insufficient fund for maintenance job', and 'Lack of skilled personnel in maintenance department'. This result indicates that the managers believed that these two factors are the major barriers responsible for the poor implementations of maintenance. Hotel managers believed that these barriers play a significant role in influencing their maintenance implementation. This finding implied that hotel managers focus on these barriers as the number one of priority. It is a managers' top priority in poor maintenance implementation which should also be the priority of hoteliers. Hence, hotel operators should put in more effort and attention to avoid these barriers when managing maintenance.

Poor Maintenance Barriers	One-Sample T-Test			Person Correlation	
	Mean <sup>a</sup>	T value <sup>b</sup>	Rank	Person <sup>c</sup>	Rank
B1. Attitude of users and misuse of facilities	4.10	7.57**	4	0.68	5
B2. Insufficient fund for maintenance job	4.25	7.96**	1	0.71	3
B3. Natural deterioration due to age and environment	3.77	6.55**	8	0.61	10
B4. Inflation of the cost of maintenance by the operatives	3.66	5.95**	10	0.62	9
B5. Lack of skilled manpower to maintain work in buildings designed and constructed by expatriates	3.78	6.74**	7	0.67	6
B6. Frequent shortage of materials and spare parts due to inefficient inventory system or unavailable fund	3.85	7.19**	6	0.67	7
B7. Lack of skilled personnel in maintenance department	4.21	7.76**	2	0.78	1
B8. Hotel owner/operator reluctance	4.15	7.61**	3	0.74	2
B9. Inadequate and de-emphasize training, retraining & continue education	3.92	7.28**	5	0.70	4
B10. Lack of discernable maintenance culture in the country	3.73	6.22**	9	0.64	8
<b>Total</b>	3.94	8.11**	-	0.80	-

<sup>a</sup> Mean scale: 1—very unimportant to 5—very important.  
<sup>b</sup> T tabular value at a degree of freedom (112) and the level of significance 0.05 equal 1.97.  
<sup>c</sup> Significant Correlation: \*p ≤ 0.05; \*\*p ≤ 0.01

**Table 2:** Barriers responsible for poor implementation of maintenance practices.

• Meanwhile, 8 barriers were perceived as important with a mean greater than 3.40 and less or equal to 4.20 ( $4.20 \geq M > 3.40$ , on a 1 to 5 scale). It should be noted that these 8 barriers are ‘Hotel owner/operator reluctance’, ‘Attitude of users and misuse of facilities’, ‘Inadequate and de-emphasize training, retraining and continue education’, ‘Frequent shortage of materials and spare parts due to inefficient inventory system or unavailable fund’, ‘Lack of skilled manpower to maintain work in buildings’, ‘Natural deterioration due to age and environment’, ‘Lack of discernable maintenance culture in the country’, and ‘Inflation of the cost of maintenance by the operatives’. This finding implied that hotel managers focus on these 8 barriers as the number two of priority. It is a managers’ second top priority in poor maintenance implementation which should also be the second priority of hoteliers. It should be noted, however, that these practices were also deemed important, but to a lesser extent and shouldn’t be disregarded when managing maintenance. Hence, hotel operators should put in more effort and attention to avoid these barriers when managing maintenance.

• Overall, it should be noted that the average importance mean of all barriers was ranged from 4.25 (the highest) to 3.66 (the lowest), which is greater than 3 (center-neutral) and also reached the significance level value of 0.000, which is less than 0.05. This finding indicates the significance role of all 10 barriers in poor implementation of maintenance efficiency in the Egyptian 5-star hotels. Respondents agree with the significance of barriers because the calculated absolute value of T is greater than the spreadsheet value of T which is equal to 1.97 when the degree of freedom 112 (n-1) and level of significance 0.05 (or the significance level less than 0.05 and the relative weight greater than 60%). This means that the percentage of the answers to (important or very important) is greater than the percentage of the answers (....., not important or very unimportant).

**Testing hypotheses**

As shown in Table 1, the results of the Person correlation indicated a positive and statistically significant relationship at 0.05 level ( $p \leq 0.05$ ) between the level of importance managers assigned to each practice and its role in improving maintenance efficiency. The Person correlation coefficient between all 34 practice and it role in improving maintenance efficiency ranges from 0.78 to 0.51 and a significance level 0,000 which is less than 0.05. Similarly, there is a positive and statistically significant relationship between all six dimensions and its role in maintenance efficiency, which ranges from 0.82 to 0.69 and a

significance level 0,000 which is less than 0.05. Since, the correlations for the all 34 practices, and also for the six dimensions, are all positive and statistically significant at 0.05 levels (at  $p \leq 0.05$ ):

• Hence, the null hypothesis 1 which proposed an absence of relationship was therefore rejected. Meanwhile, the alternate hypothesis 1 which proposed an existence relationship was therefore accepted.

• This finding indicated that there is agree between hotel managers on the significance role of these 34 practices (and its six dimensions) in improving maintenance efficiency in the Egyptian 5-star hotels. This finding indicated that managers are overall consistent in the importance (significance) role of these 34 practices in improving maintenance management efficiency. There is a certain level of consistency in the maintenance management behavior of managers. These practices were the challenges and require the most attention by hotel managers in their efforts to make some maintenance improvement. By understanding and investigating those practices. It is easier for management to control and take corrective action to reduce the difference between the importance and usage level of practices. These practices should command more attention and that need to be improved. This finding implied that further improvement resources and efforts should concentrate here. Therefore, hotel planners should consider allocating resources (i.e., money, time...), especially on these 34 practices of maintenance management, to yield a higher return.

As shown in Table 2, the results of the Person correlation indicated a positive and statistically significant relationship at 0.05 level ( $p \leq 0.05$ ) between the levels of importance managers assigned to each barrier and its role in poor implementation of maintenance practices in the Egyptian 5-star hotels. The Person correlation coefficient of 10 barriers is ranges from 0.78 to 0.61 and a significance level 0,000 which is less than 0.05. The p-value (significance level) to all barriers is less than 5% (significance level). Since, the person correlations for the 10 barriers are all positive and statistically significant ( $p \leq 0.05$ ).

• Hence, the null hypothesis 2 which proposed an absence of relationship was therefore rejected. Meanwhile, the alternate hypothesis 2 which proposed an existence relationship was therefore accepted.

• This finding indicated that there is agree between hotel maintenance managers on the significance role of these 10 barriers in poor implementation of maintenance practices in the Egyptian 5-star hotels. This means that all barriers are significance in poor implementation of maintenance practices in Egyptian 5-star hotels

from maintenance managers' viewpoint. This result implied that there is a certain level of consistency in the poor maintenance management behavior of managers. This finding indicated that managers are overall consistent and that they consider the significance of these barriers in poor implementation of maintenance practices. These barriers were the shortfalls (challenges) and require the most attention by hotel managers in their efforts to make some maintenance improvement. By understanding and investigating those barriers. It is easier for management to control and take corrective action to avoid these gaps. These barriers should command more attention and that need to be improved. This finding implied that further improvement resources and efforts should concentrate here. Therefore, hotel planners should consider allocating resources (i.e., money, time...), especially on these 10 barriers of maintenance management, to yield a higher return.

### Demographics

All the respondents are found to be male (there is no female). Males are more likely to be employed in the maintenance department rather than females. 80 % of respondents were maintenance managers, while 15 % were assistant maintenance managers, and 5% were senior maintenance supervisors. Working experience is also one of the factors that affect the quality of maintenance system (efficiency). The results shown that are not many of respondent possess a long working experience. The results shows that only 15 % of them have 6 to 10 years working experience, and majority of the personnel have less 4 years experienced in that field (64%). Peoples with more experience tend to do their work confidently and effectively while less experience peoples may need somebody to assist them. Only a few of them have some working experience in this field. Hiring skilled maintenance personnel is difficult. In order to resolve this problem the Building Management Team should provide skill training to those staff without essential academic qualifications. It is also the responsibility of the employer to provide employees with appropriate training if they are not competent enough to carry out tasks. Staff evaluation systems, staff motivation programs and staff trainings are an effective ways to improve employees' maintenance skills and should be practiced more often to bring out the best out of them. As for academic qualification, most hotels do not have full skilled maintenance personnel. Some of them are high-school leavers that do not possess the necessary skills to do maintenance job. Only three-fourth of them has suitable qualification such as degrees or diplomas. A large number of them are back up with technical certificates as their education level. Most of respondents (67%) are with technical certificate and are considered as skilled staffs that fulfills the building maintenance requirements. Only 9% have management certificate. This indicates that hotels focus on technical skills than management skills in recruiting maintenance managers. In this respect, the modern maintenance manager will have to rely as much on knowledge of the managerial and social sciences as on the traditional technique knowledge base of building construction and deterioration.

### Conclusion and Recommendations

This study investigates hotel maintenance management practices from maintenance managers' viewpoint through assessing the significance of practices and assessing barriers responsible form poor implementation of these practices in the Egyptian five-star hotels. The maintenance managers of the Egyptian 5-star hotels were given 34 practices ad 10 barriers to choose between very unimportant and very important. The significance of the variables (practices- barriers) used was tested with the aid of t-test statistical tool at a critical value

of 3. The results indicated that the average importance mean of all maintenance management practices was ranged from 4.46 (the highest) to 3.41 (the lowest), which is greater than 3 (center-neutral) and also reached the significance level value of 0.000, which is less than 0.05. This finding indicates the significance role of all 34 practices in improving maintenance efficiency in the Egyptian 5-star hotels. The results of the Person correlation indicated a positive and statistically significant relationship at 0.05 level ( $p \leq 0.05$ ) between the levels of importance managers assigned to each practice and its role in improving maintenance efficiency. Hence, the null hypothesis 1 which proposed an absence of relationship was therefore rejected. Meanwhile, the alternate hypothesis 1 which proposed an existence relationship was therefore accepted. On the other hand, the results indicated that the average importance mean of all barriers was ranged from 4.25 (the highest) to 3.66 (the lowest), which is greater than 3 (center-neutral) and also reached the significance level value of 0.000, which is less than 0.05. This finding indicates the significance role of the 10 barriers in poor implantation maintenance practices in the Egyptian 5-star hotels. This shows the importance of barriers in the poor implementation of practices. The results of the Person correlation indicated a positive and statistically significant relationship at 0.05 level ( $p \leq 0.05$ ) between the levels of importance managers assigned to each barrier and its role in poor implantation of maintenance practices in Egyptian 5-star hotels. Hence, the null hypothesis 2 which proposed an absence of relationship was therefore rejected. Meanwhile, the alternate hypothesis 2 which proposed an existence relationship was therefore accepted.

This research study is important because not only would it be contributing to the knowledge by adding a theoretical model of maintenance management practices, but will also contributes to good maintenance management practice in the Egyptian 5-star hotels, particularly. The study will assist the management of hotels to enhance the understanding of maintenance practices and their efficiency. The study would enable hotel managers to determine which practices of maintenance should require more attention on achieving efficiency and effectiveness as a significant way for managing maintenance. It will also endeavor to investigate the barriers that contributed to the poor implementation of maintenance management practices. The practices described in this paper would hopefully be applied to provide guidance and references for better building maintenance management system for Egyptian hotels. The findings of this research are expected to (contribute) enable the hotel operators to achieve better maintenance efficiency through various strategies and practices. The results of study provide useful recommendations for hotel managers or policy makers for improving and developing maintenance management strategies and practices in the future. This study serves as an impetus for additional studies in other nations and locations that will enhance the understanding of hotel maintenance practices and their effectiveness.

### Future Research Recommendations

Future research should examine the generalizability of these results. As technology improves and maintenance features are expanded, additional research may be necessary to further validate these findings.

1. Studying maintenance practices from both tenants and staff viewpoint
2. Future studies can extend the same examination to other locations and other tourism and hotel sectors (e.g., airline, restaurant industries) to improve the robustness of the findings.
3. This research can be extended to include broader types of

hotels (e.g., 3, and 4-star hotels) to test whether the guests' importance level and performance level of security measures will vary between types of hotels.

4. It can be expanded to include a broader application of IPA for a comparison of safety and security measures for independent versus chain hotels, male versus female, leisure versus business, and 4-star versus 5-star hotels. The aim is to test whether the perceived importance and performance of a hotel's security measures differ depending on these twin variables.

5. Future research studies should identify and examine the maintenance management knowledge and training necessary for hotel staff.

6. Research is needed on the relationship between the levels of maintenance management practices, and hotel's size, star rating, branding or nationality.

7. Studying the difference between planning of maintenance types; scheduled maintenance, corrective maintenance, proactive maintenance, reactive maintenance.

8. The need to measuring the performance of maintenance, particularly in these indicators such as time, cost, and quality. Discusses four measurement indicators for maintenance performance. The development of performance measurement in management is to improve quality and service, as well as meeting cost parameters. Measurement of maintenance performance is an assessment that helps to identify the strengths and weaknesses of the maintenance activities

#### Acknowledgement

I thank Allah (God) for granting me the guidance, patience, health and determination to successfully accomplish this work. I would like to consider maintenance in more depth in a forthcoming special issue and would welcome any comments on how this might best be structured.

#### References

- Borsenik F, Stutts A (1997) The management of maintenance and engineering systems in the hospitality industry (4thedn). USA.
- Chan KT, Lee RHK, Burnett J (2001) Maintenance performance: a case study of hospitality engineering systems. 19: 494-504.
- Chan KT, Lee RHK, Burnett J (2003) Maintenance Practices and Energy Performance of Hotel Buildings. *Strategic Planning for Energy and the Environment*. 23: 6-28.
- Hassanien A, Losekoot E (2002) The application of facilities management expertise to the hotel renovation process. 20: 230-238.
- Hassanien A, Baum T (2002) Hotel repositioning through property renovation. *Tourism and Hospitality Research*. 4: 144-157.
- Mattila AS, O'Neill JW (2003) Relationships between hotel room pricing, occupancy and guest satisfaction: A longitudinal case of a midscale hotel in the United States. *Journal of Hospitality & Tourism Research* 27: 328-341.
- Henley Jr JA, Cotter MJ, Herrington JD (2004) Quality and Pricing in the Hotel Industry. *International Journal of Hospitality & Tourism Administration*. 5: 53-65.
- Powell PH, Watson D (2006) Service unseen: The hotel room attendant at work. *International Journal of Hospitality Management*. 25: 297-312.
- Chan K (2008) An empirical study of maintenance costs for hotels in Hong Kong. *Journal of Retail and Leisure Property*. 7: 35-52.
- Lee H, Scott D (2009a) Strategic and operational factors' influence on the management of building maintenance operation processes in sports and leisure facilities. *Journal of Retail & Leisure Property*. 8: 25-37.
- Kamaruzzaman SN, Zawawi EMA (2010) Development of Facilities Management in Malaysia. *Journal of Facilities Management*. 8: 75-81.
- Lai G (2013) An analysis of maintenance demand, manpower, and performance of hotel engineering facilities. *Journal of Hospitality and Tourism Research*. 37: 426-444.
- Lee R, Wordsworth P (2001) *Lee's Building Maintenance Management (4thedn)* Oxford: Blackwell Science Ltd.
- Francis WH, Yik WL, Lee, Ng CK (2001) Building Energy Efficiency and the Remuneration of Operation and Maintenance Personnel. 20: 406-413.
- El-Haram MA, Horner MW (2002) Factors Affecting Housing Maintenance Cost. *Journal of Quality in Maintenance Engineering*. 8: 115-123.
- Tse PW (2002) Maintenance Practices in Hong Kong and the Use of the Intelligent Scheduler. *Journal of Quality in Maintenance Engineering*. 8: 369-380.
- Guiding C (2003) Hotel owner/operator structures: implications for capital budgeting process. *Management Accounting Research*. 14: 179-199.
- Eti MC, Ogaji SOT, Probert SD (2006) Development and Implementation of Preventive-Maintenance Practices in Nigerian Industries. *Applied Energy*. 83: 1163-1179.
- Wu S, Clements-Croome D, Fairey V, Albany B, Sidhu J et.al., (2006) Reliability in the Whole Life Cycle of Building Systems. *Engineering Construction and Architectural Management*. 13: 136-153.
- Chanter B, Swallow P (2007) *Building Maintenance Management*. Blackwell Publishing. UK.
- Ruslan N (2007) Campus Facilities Management Experience. Paper presented at the National Asset and Facilities Management (NAFAM) Convention. National Asset and Facility Management Development.
- Lee H, Scott D (2009b) Overview of maintenance strategy, acceptable maintenance standard and resources from a building maintenance operation perspective. *Journal of building appraisal*. 4: 269-278.
- Syed AH, Kamaruzzaman J (2008) Facility Management Challenges and Opportunities in the Malaysian Property Sector. *Journal of Sustainable Development*. 1: 79-85.
- Zawawi EMA, Kamaruzzaman SN (2009) Personnel characteristics of maintenance practice: A case of high rise buildings in Malaysia. *Journal of Sustainability Development*. 2: 111-116 .
- Zawawi EM, Kamaruzzaman S, Ali A, Sulaiman R (2010) Assessment of building maintenance management in Malaysia: Resolving using a solution diagram. *Journal of Retail & Leisure Property*. 9: 349-356.
- Seeley H (1976) *Building maintenance*. Macmillan press Ltd.
- Seeley H (1985) *Building Maintenance*. Macmillan Publishers Ltd.
- Seeley H (1987) *Building Maintenance (2ndedn)* New York.
- BSI (1991) Glossary of maintenance management terms in terotechnology. British Standards BS 3811: 1964.
- BSI (1993) Glossary of maintenance management terms in terotechnology. British Standards BS 3811: 1964.
- Flores-Colen I, de Brito J, Freitas V (2010) Discussion of Criteria for Prioritization of Predictive Maintenance of Building Façades: Survey of 30 Experts. *Journal of Performance of Constructed Facilities*. 24: 337-344.
- Lind H, Muyingo H (2009) Investment theory and why do we need the concept of maintenance. Licentiate Thesis in Building and Real Estate Economics. Stockholm.
- Stipanuk DM, Roffmann H (1996) *Facilities Management*. Educational Institute of American Hotel & Motel Association.
- International Facilities Management Association (IFMA) (2016).
- Okoroh MI, Jones C, Ilozor BD (2002) FM application in the hospitality sector. 20: 239-250.
- Pitt M, Hinks J (2001) Barriers to the operation of the facilities management: Property management interface. 19: 304-308.
- Best R, Langston C, De Valence G (2003) *Workplace Strategic and Facilities Management*. London: Butterworth-Heinemann.
- Chotipanich S (2004) Positioning facility management. 22: 364-372 .
- Nutt B (2004) *Infrastructure and Facilities: Forging Alignments Between Supply*

- 
- and Demand. Conferences Proceeding of Future in Property and Facility Management II. A two-day International Conference. London.
40. Richard C, Peter TP, Ling L, Fung F (2000) Enhancement of maintenance management through benchmarking. *Journal of Quality in Maintenance Engineering*. 6: 224-240.
41. Sekaran U, Bougie R (2013) *Research Methods for Business: A Skill Building Approach* (6th edn) West Sussex: John Wiley & Sons Ltd.
42. Naoum SG (2007) *Dissertation Research and Writing for Construction Students* (2nd edn) Butterworth-Heinemann.
43. Oppenheim AN (2003) *Questionnaire Design, Interviewing and Attitude Measurement*. Continuum International Publishing Group.
44. Yin RK (2009) *Case Study Research: Design and Methods*. 4<sup>th</sup> SAGE Publications.
45. Patton MQ (2002) *Qualitative Research and Evaluation Methods*. Sage Publications.
46. Hinkin T, Tracey J, Enz C (1997) Scale construction: developing reliable and valid measurement instruments. *Journal of Hospitality and Travel Research*. 21: 100-119.
47. Tranfield D, Denyer D (2004) A framework for the strategic management of long term assets. *Management Decision*. 42: 277-291.
48. Chan MW (1997) *Facilities Management-Demystified*. Building Surveying Division Annual Conference. Hong Kong .
49. International Facilities Management Association (IFMA) (2004).
50. Robson C (2002) *Real World Research: A Resource for Social Scientists and Practitioner-Researcher*. Oxford. Blackwell Publishing.