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Activity Based Costing Model for Effective Process Analysis in Nigerian Healthcare Management System Operations

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Abstract: *Cost studies, productivity, efficiency, and quality of care measures that links between resources and patient outcomes are fundamental issues for healthcare management today. This paper describes the design of a model for process analysis and activity-based costing (ABC) / Management in Health Care Industries in Nigeria as a tool for administrative cost information, strategic decision-making, quality improvement, and cost reduction. The design methodology contains interrelated parts, "Healthcare Process Analysis and Cost Control Analysis". Processes and activities such as health care procedures, consultation, investigations, research, and so on, were identified together with their causal relationship to costs and products/services rendered. Results reveals that the implementation of the ABC Model for Healthcare Management System (HMS) when fully developed will open ways for new possibilities which includes, process and activity analysis, simulation, price calculations/hospital control costs, improved quality and efficiency of the care they provide to patients and management of their resources better.*

Keywords:: *Activity Based Costing, Healthcare Management System, Decision Making, Cost Control.*

I. INTRODUCTION

Healthcare industries have been facing difficulties and challenges in balancing limited resources and costs to provide their demand for services. Medical research has the effect in the introduction of modern medical techniques and medicines, which usually causes the increase of consumed costs.

Many health care organizations are confronted by a challenging and competitive environment. Increased competition, greater focus on the quality of patient care, and the high cost of new technology are among the factors forcing these organizations to re-examine the manner in which they provide service to their patients and the cost of those services.

In order to control costs, hospital administrators need cost information suitable for their decision-making needs. Conventional hospital cost accounting systems, however, frequently fail to provide information regarding the cost of the activities performed to meet patients' needs. Since it is the performance of these activities which cause costs to be incurred, administrators lack the information they need to ensure the financial viability of their organizations. Increasing costs of healthcare systems have the growing demands on the public budgets, and also the patients' expenditures. Many countries start to seek the alternative sources of financing of healthcare systems, because the traditional systems of healthcare insurances are no more sufficient for covering of expansive healthcare services costs. In face of these tendencies, many hospitals are under pressure to become more cost efficient. In this situation, attention is paid to the acceptable accounting and costing systems, in order to improve the efficiency of existing operations in the healthcare industries in Nigeria, Activity Based Costing (ABC) in introduced in healthcare services.

Activity Based Costing (ABC) is one of the new methods began appearing as a costing methodology in the early 1980's. It calculates cost price by determining the usage of resources. In this research study, ABC model will be used for calculating cost price of remedial services in hospitals.

ABC provides more detailed cost information on the activities of the hospital, which could typically result into better cost reduction and management. Information

generated by ABC will significantly contribute to hospital management in planning and managerial control, as they will enable organizational behavioral changes by enhancing the attention focus for activities due to volumes.

Application of the ABC in healthcare industries in Nigeria entails a number of predictable benefits, especially the ability to quantify the actual costs of activities, to identify the relationship between the costs and means of carrying out these activities, to identify the capacity influences on the overall costs of the organization and in the assessment of legislative issues regarding the reimbursement of particular performances, and to also measure the "profitability" of provided operations.

It is necessary to view profitability in this case as an identified discrepancy between the amount of reimbursement for a certain performance and the actual (full) cost after taking into account all overhead costs. The cost price from ABC method significantly differs from tariff method. In addition, high amount of indirect costs in the hospital indicates that capacities of resources are not used properly.

Cost price of remedial services with tariff method is not properly calculated when compared with ABC method. ABC calculates cost price by applying suitable mechanisms but tariff method is based on the fixed price. In addition, ABC represents useful information about the amount and combination of cost price services.

II. LITERATURE REVIEW

From 1850s, medical tariff began in California by using coding method. First results of this information were published in 1956. In this method, a three-number code with a special listing was used for the classification of medical services [1]. Regarding weaknesses in tariff method in the late 1980s, most hospitals made their tariff's calculating method based on" Diagnosis Related Groups (DRG)". In this method, instead of fixed tariffs, cost price of hospital services was calculated based on the opinion of expert [2].

In the recent decade, by increasing varieties of complex activities and the importance of cost price in hospitals for managers and governments, understanding these changes and evaluating their effects on cost price are very important. Traditional costing methods, especially methods used in hospitals cannot practically meet these expectations. These methods determine cost price of offered services based on fixed price regardless of conditions in hospitals. Therefore, using proper and effective methods of costing is a fundamental necessity. For this research purpose, "Activity Based Costing" (ABC) is introduced for calculation of cost price. ABC is one of the new costing methods with an increasing application throughout the world. In calculating the cost price, ABC applies complexity, variety, and specific features. A distinct feature of this method is the ability to diagnose exact cost and to present the non-financial information to improve the performance and efficiency of activities [3]. In addition, by applying ABC method, organizational unused capacity resources can be diagnosed and decreased [4].

In "General Zonal Hospital" Argentina, the ABC method was used to determine costs of patient care in 1998. This hospital provides services to 190,000 patients in 26 treatment units. Finally, cost price of services was calculated based on the kind of disease, it was very different from the available methods at that time [5]. A study was also performed by a group of quality guarantee in America as ordered by WHO for the possible applicability of ABC method in developing countries. To apply this method, the group chose a center of health service in Peru, called "Maxlud". Results revealed that ABC could be used as an efficient method in health centers in developing countries [6].

The main advantage of ABC lies in that it provides a more accurate and real cost computation, especially in situations in which product diversity is important and in which the indirect costs, not directly traceable to the products, represent an important proportion of the total costs. In addition, ABC also allows a deeper level analysis of product costs by explaining the relationship between products and activities. The improved accuracy of perception of the cost structure of products and the continuous process improvements in the various departments of an enterprise provide the substance of activity-based management (i.e. using ABC to improve a business).

III.METHODOLOGY

To apply the Activity Based Costing (ABC) model to hospitals; the hospital's services units will be divided into several departments like administrative, diagnostic, pharmacy, etc. Secondly, the activity centers will be defined by the activity analysis method. Thirdly, costs of administrative activity centers will be allocated into diagnostic and operational departments based on the cost driver. Finally, with regard to the usage of cost objectives from services of activity centers, the cost price of medical services will be calculated by the enhanced Hospital Management System using the activity based costing model.

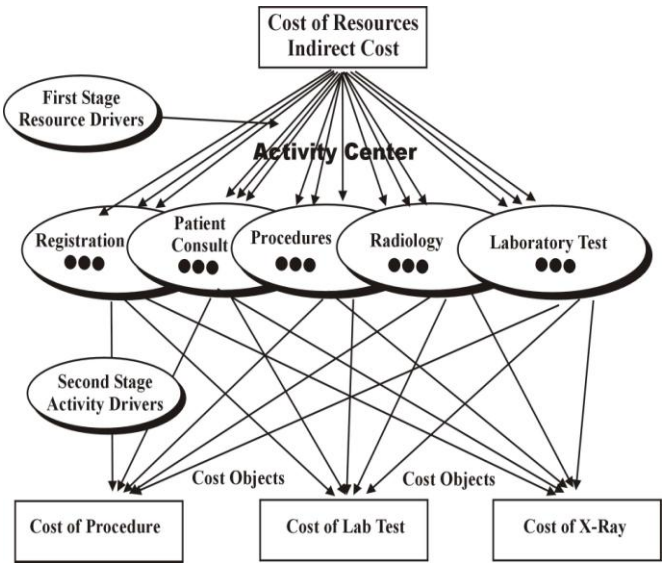

Figure 1: Propose Activity Based Costing (ABC) Model for Hospital

Figure 1 depicts the proposed model activities in hospitals, which will be observed for a given period of time before relevant data will be collected in different parts of the hospital. Then, the ABC system will be designed based on the financial information of the hospital in the past years.

3.1 Proposed ABC Model Design Guidelines

The following steps should be taken in designing and applying our proposed ABC model in the software application design for healthcare management system:

Step 1: Separating the hospital based on services

In this stage, the hospital services should be divided into three or more parts based on the offered services to patients, such as:

- **Operational divisions**: these divisions offer services to hospitalized patients, such as recovery, operating room, heart surgery, and emergency units.
- **Diagnostic divisions**: they offer diagnostic services to hospitalized patients such as laboratory, radiology, etc.
- **Administrative and Service divisions**: These units prepare facilities and offer services to all hospital units, such as accounting, cashier/billing, management, and administrative units.

Step 2: Defining and analyzing Activity centers

In this stage, necessary activities in providing services to patients should be identified, such as activities related to services in surgery department (unit level and batch level activities) should be displayed as seen in figure 2. A surgery operation consists of activities requiring numerous sources involving some costs. Only the unit level and batch level should be displayed as seen in figure 2.

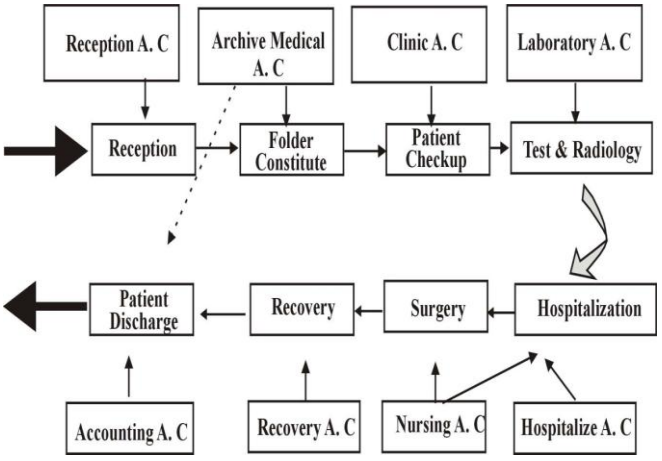

Figure 2: Activity centers and the process of offering service to patients

Step 3: Defining activity centers

Definition of different activity centers in hospital departments (administrative, diagnostic, and operational).

In "administrative units", services to patients are not offered directly. Then, based on its assigned duties in the hospital, each subdivision can be considered as an activity center. For instance, the "accounting department" can be divided to three activity centers:

1. Patients accounting
2. Salary accounting
3. Capital goods accounting as shown below

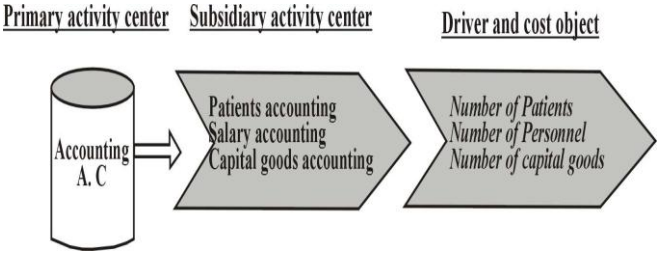

Figure 3: Activity centers and cost assignment in accounting department

Thus, its costs should not be allocated to these activity centers. Activity center of "patients accounting" only provides services for released patients. It is obvious that all costs of these centers should be allocated only to discharge patients (cost object). However, "salary accounting" activity center accounts the personnel's salary in the hospital. So, its costs should be allocated to the personnel of this division.

In "diagnostic divisions", activity centers should be defined based on the kind of the services rendered. For example, the laboratory service is based on the number of "accomplished tests" or radiology division is the number of "accomplished radiological procedure". Therefore, the laboratory and radiology divisions should

be defined as two separate units. Of course, each activity center is divided into some sub centers with specific outputs. For example, the laboratory activity center is divided into hematology activity center, cytology activity center, Serology Activity center, Microbiology Activity Center etc.

Activity centers in "operational divisions" should be defined according to the kind of services it offers to patients. For example, the hospitalized departments offering services to patients' pre and post-surgery operation were considered as an activity center. Activity center output in such units was identified based on the "occupancy bed per day".

Step 4: Activity analysis in activity centers

The purpose of activity analysis is to acquire necessary information about the kind of activity, activity level, activity purpose, resources, and the time of activity accomplishment. Activity analysis is an important and fundamental stage in (ABC) model. In this stage, activities related to goals should be identified. In addition, the amount of consumed materials and the equipment depreciation should also be calculated and considered in the development of the Activity-Based Costing Hospital Management System.

Step 5: calculating activity center costs

In this stage, by using the information of activity analysis and the accounting data, the cost of each activity center consisting of material, manpower, equipment depreciation cost etc., can be identified based on unit level, batch level, hospital level and sustaining level cost as shown in figure 4.

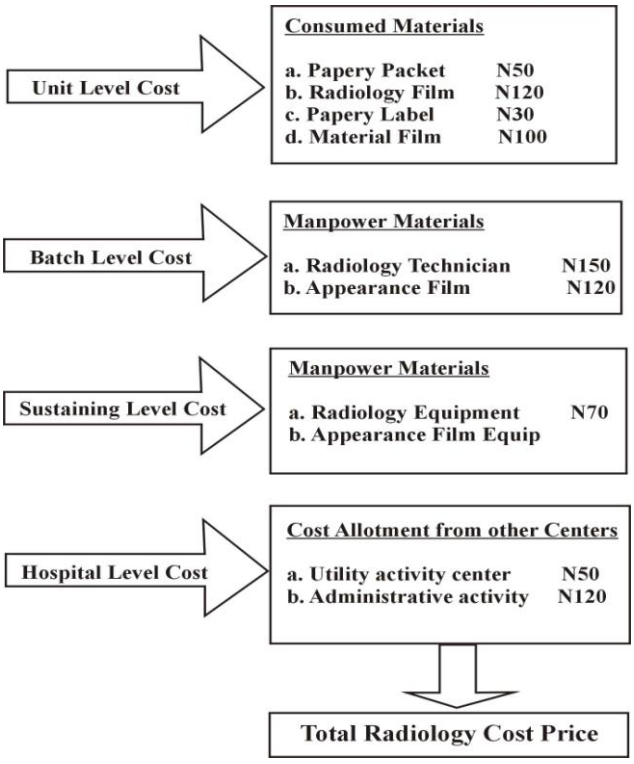

Figure 4: Hierarchical costs in radiology activity center

Step 6: Allocating costs of administrative activity centers

In this stage, the cost of administrative center should be allocated to other activity centers based on services rendered. For example, the cost of drugstore activity center can be allocated according to the "number of prescriptions".

Regarding the use of numerous bases to allocate cost in the ABC method, in this research work, "concurrent equations" can be used to determine service load in each activity center. Finally, allocated cost to other activity centers should be identified regarding collected cost of each activity center.

Step 7: Allocating resource costs to activities

In this stage, the cost of consumed resources should be allocated to activities. For example, activities in radiography include patient reception, radiography operations, and preparation of the final service. In this stage, the cost of each activity should be calculated separately. Then, according to total of cost activities, cost price of services will be computed.

Step 8: Calculating cost price of services

In this stage, cost price of remedial services (cost object) should be calculated based on the usage of services in activity centers. Moreover, cost price can be determined according to the hierarchical cost.

IV. RESULTS

The results obtained from this research works are as follows:

i. A more robust Hospital Management System that will be leverage on Activity based Costing model to cost services for patients in healthcare industries in Nigeria can be built.

ii. A proper model to determine the cost price of services offered to patients can be computed.

iii. A warehouse of information to standardized activities and appraisal of performance for management decision can be developed.

V. CONCLUSION

The concept of activity based costing in Healthcare industries cannot be over-emphasized. The ABC Model can be used in enhancing the scope and services of a Hospital Management System when fully developed. The ABC/HMS will go a long way in solving the problems of costing services rendering to patients in the healthcare sector.

However, it is important to note that even with the advantages of using ABC model to develop HMS, the process of achieving ABC Model in Nigerian Hospitals is cumbersome and time consuming but it is worthwhile considering the benefits and the impacts it will have on both the patients and the hospitals when developed.

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