Evaluating Healthcare Governance Using Knowledge-based System to Enhance Quality Management

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Yousuf N. Al Khamisi[1] , M. Khurshid Khan[2] and Eduardo M. Hernandez[3]

***Abstract* - Governance perspective plays a vital role in the success of Quality Management in Healthcare Environment (QMHE). In fact QMHE has adopted and applied different quality tools and models in recent times, with some even developing their own quality-based initiatives.**
This paper will present an original and novel approach (KB/ES coupled with GAP analysis) to evaluate the effectiveness of governance body in QMHE. The KB system inserts GAP for benchmarking and evaluating the current practices with the desired ones.
The KB system will benchmark the current position of governance perspective as part of QMHE with the ideal benchmark one. The results will help healthcare practitioners to improve the governance boy's gaps and take the correct decisions.

***Index Terms* – Healthcare Governance, Quality Management in Healthcare Environment (QMHE), Knowledge Based (KB), Gauge Absence Perquisite (GAP).**

I. INTRODUCTION

The Agency for Healthcare Research and Quality (AHRQ) defines it as "*doing the right thing for the right patient, at the right time, in the right way to achieve the best possible results*" [1].

The first level that must be involved in any quality management initiative is governance body. According to ACI [2] the governance should be discussed from 4 themes which are effective governing body, clear direction for the organization, supporting the organization to achieve its mandate and achieving sustainable results. There is an entity or a group of identified individuals responsible for overseeing the organization's operation.

It is, also, accountable for providing quality health care services to its community or to the population that seeks care. This entity's responsibilities and accountabilities are described in a document that identifies how they are to be carried out [3].

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Therefore, the originality of this paper is to integrate the use of KBS with GAP to design an integrated KB-QMHE to be used in healthcare environment. This will accomplish the necessities of investigating quality problems and recommend suitable solutions according to international best practices.

A. Quality Management in Healthcare Environment (QMHE)

According to Irfan and Ijaz [4] the high level of patients' expectations about the service quality had pressured the healthcare service providers to detect the key factors that are essential to raise healthcare services that improve patients' satisfaction and decrease time and money involved in managing a patients' complaints.
Brown and Patterson [5] raised a major controversy in the famous report, *To Err is Human*. The report recognized healthcare error as a major public health subject leading to the death of at least 44,000 and perhaps as many as 98,000 Americans each year in US hospitals.
The National Health Service (NHS) in the UK distributed a report in 2000 detecting the important effect of adverse events in the NHS [6] and [7]. Integrated health systems are commonly considered to run trustable performance in terms of quality and patient safety as a result of effective communication and standardized protocols within hospitals [8]. They concluded that health plans used in the care delivery system are related to clinical performance measures and not considered patient perceptions of care which is proposed to be considered by this project system.

B. KBS and GAP

Quinn [9] defined an Expert System as '*an interactive computer program that asks the same questions a human expert would ask, and from the information given to it by the user, provides the same answer the expert would provide'*. According to Khan, et al. [10], the terms ES and KBS have the same meaning; therefore, most scholars use them synonymously. There was a realisation that the ES was not truly reaching the knowledge, experience and wisdom of human experts and it was a misnomer to call it ES. However, since it contains a strong element of knowledge, it was later named (more accurately) as Knowledge-Based system.

The final goal of KBS is to capture the experts' knowledge and experience into a single knowledge base

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[11]. It is the input from various sources such as human expert, research papers, and books [12] where this paper aims to improve Governance body by using this system.

In this paper, the researcher will use GAP analysis to compare between the current practice and the desired ones based on the KB system. The results of this GAP analysis will be divided into two reports: all positive elements and procedures (Good Points – GPs) already existing in one report and all negative elements (Bad Points – BPs) representing non-existence of data, poor systems in the other report [13].

II. Research Background

This paper aims to evaluate the governance perspective using of a KB to assist healthcare quality managers and practitioners during decision making in the healthcare environment to achieve the best practice in quality management.

It proposes a conceptual framework for QMHE which will be the model for designing a KBS that used GAP method.

The KB-QMHE system will then be arranged in a decision level hierarchy in which the Key Performance Indicators (KPIs) are considered. This process will be done in order to produce KB production rules which are the corner stone of the proposed system [14].

III. Evaluating Governance Body by KB System

This paper focuses on suggesting a new methodology of evaluating governance body to enhance the QMHE using KB system. Based on [15] and [14], the KBL6σ-QMHE conceptual model has been verified and validated in a conference paper. The feedback obtained is used to refine the model and consequently the related development steps as part of the verification process. In addition, an extensive discussion has been carried out with the research supervisors and healthcare quality managers. The review with these experts has been extended to assure the critical selection of the KB Key Performance Indicators (KPIs). This will enhance the project mission towards achieving the desired academic quality. The verification and validation process will be conducted once again, for the overall system after accomplishing the development of KB rules, through published and real hospital cases.

The KB-QMHE model is converted into a suitable conceptual model as shown in Figure 1. The related KPIs will be utilized to generate the KB rules for different variables of QMHE based on organisational hierarchy Levels of decision making. Finally, the rules will be stored in the KB database and facilitated by integration with the GAP analysis methodology to achieve optimal analysis and assessment outcomes of the decision making process. The design of the model is set to assess the organisational capabilities from different perspectives, starting from a broad strategic Level and narrowing down to the most operational Level.

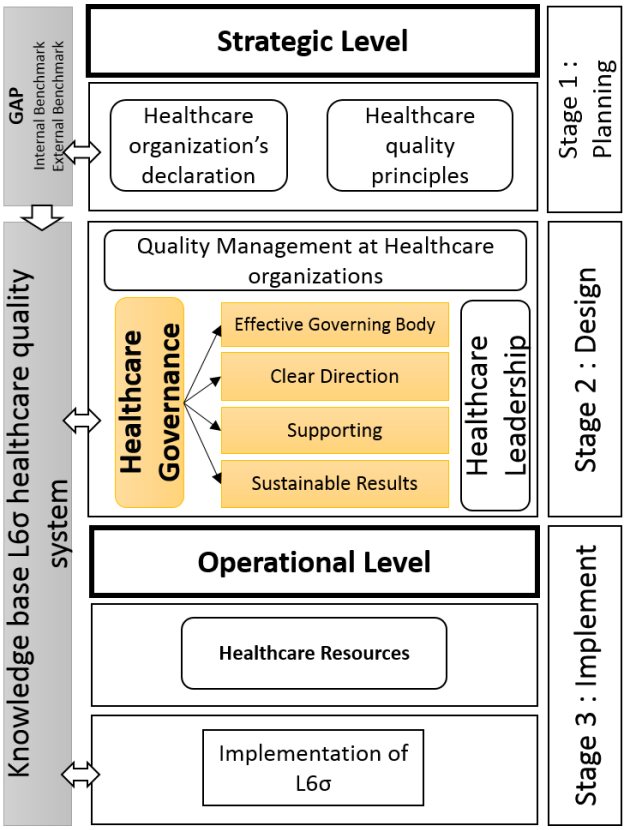

Figure 1 KB-QMHE model

In order to formulate the L6σ for QMHE in a rule-based system, KPIs are recognized at each stage to create the suitable model shown in Figure 1. The mentioned KPIs will be used later to generate the KB rules for different variables of L6σ in healthcare based on different levels of decision making at each organizational hierarchy.

Thereafter, all the KB rules will be saved in the KB database and simplified by mixing with the GAP analysis method to accomplish best analysis and calculation outcomes of the decision making course. The project model is established to evaluate the healthcare institutional abilities in different angles, starting from a wide strategic level and tightening down to the most operational level.

Actually, each KPI in this module is also connected to the information base as the data acquisition platform and benchmarked with the existing knowledge of best practices. Finally, the user feedback must be reviewed and verified at the end of the process. The following examples show the KB rules of *effective governing body sub-module:*

IF *The governing body operates according to defined responsibilities* (**Yes**: GP; **No**: BP-**PC-1**)

AND *the governing body has the appropriate membership to fulfill its roles* (**Yes**: GP; **No**: BP-**PC-1**)

AND *the governing body has a defined process for decision making* (**Yes**: GP; **No**: BP-**PC-2**)

THEN *the healthcare organization's governing body is effective*

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OR	*the organization's governing body statues is poor in respect to effectivity.*
IF	*The organization's governance structure is identified in an organizational chart.* (**Yes**: GP; **No**: BP-**PC-1**)
AND	*the governing body has written documentation that identifies its responsibilities.* (**Yes**: GP; **No**: BP-**PC-1**)
AND	*the governing body has processes in place to oversee the function of human resources management* (**Yes**: GP; **No**: BP-**PC-2**)
THEN	*the healthcare organization's governing body is effective*
OR	*the organization's governing body statues is poor in respect to effectivity.*

The above rules are representing *effective governing body sub-module* KPIs. As it can be seen each rule is consisting of IF-THEN equation. Knowledge acquisition is a demanding process in which a knowledge engineer cooperates with the expert to transform expertise into coded program by elicit information from the expert, interpreting the information and build rules that represent the expert's solutions. As a pre-requisites for acquisition, knowledge engineer must take in consideration the problem domain, selecting the right expert and preparing well for the knowledge acquisition. Each question is assessed by Good Point (GP) and Bad Point (BP). If the user will answer Yes, it will be GP and if the answer is No, it will be BP. This BP is weighted according to its Problem Category (PC)

IV. Conclusion

This paper has presented a KB methodology for evaluating Governance body as part of QMHE system using a hybrid integration (KB and GAP) approach. The KB-QMHE model is designed to assess the healthcare organization's capabilities through four Levels of different strategic and operational perspectives with a view to enhancing the Quality Management in Healthcare Environment. Future research will take in consideration the implementation of this proposed method in real hospitals to get a validated results and improve the system accordingly.

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