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Knowledge management-enabled hospital performance – an empirical study of doctors' perceptions

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Abstract

Knowledge Management (KM) is considered as an organizational strategy for achieving sustainable competitive advantage. KM stimulates knowledge flow across the organization and increase accessibility of required knowledge to the employees. However, sustainability of KM is an emergent issue and can be improved when KM is linked with organizational performance measures. In this context, the paper explores the relationship between KM and organizational performance in hospitals which are considered as knowledge rich and relying on knowledge of healthcare professionals. The purpose of the paper is to ascertain the relationship between KM and hospital performance. This study was conducted in 4 multi-specialty hospitals at Chennai & Bangalore. Primary data was collected from clinical doctors through questionnaire survey. The findings of the study revealed that KM effectiveness of doctors has a significant effect on hospital performance. This study will enable hospital administrators to justify the need for effective implementation of KM in hospitals. This study is one of the first attempts in linking KM with hospital performance measures.

Key Words: *Doctors, Hospital Performance, Knowledge Management, Knowledge Management – enabled Hospital Performance.*

1. Introduction

Today, most of the organizations have realized the importance of recognizing knowledge as a strategic asset. Therefore, organizations need to focus on two aspects of Knowledge Management (KM) - (i) leverage existing knowledge (both internal and external knowledge) and (ii) create new knowledge, for enhancing the performance. Knowledge Management (KM) is defined as a conscious strategy of getting the right knowledge to the right people at the right time and helping people share and put information into action in ways that strive to improve organizational performance (O'Dell et al., 1998).

Hospital is considered as a Knowledge-intensive Organization as performance is based on the knowledge and skills of healthcare professionals. However, under-utilization of healthcare knowledge contributes to incorrect clinical decisions, medical errors, sub-optimal utilization of resources and high healthcare delivery costs. The key to successful clinical decision-making is the timely availability of correct and relevant knowledge with respect to the clinical context (Bolarinwa et al., 2012).

Hospitals are facing severe challenges for increasing the quality of care and reducing the cost. India ranks 145th among 195 countries in terms of quality and accessibility of healthcare (IBEF, 2018). As many as 5.2 million preventable medical errors and adverse drug reactions

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have been noted in India as per the study conducted by Harvard School of Public Health (Deccan Chronicle, 2018).

In hospitals, KM increases the learning and collaboration among healthcare professionals across specialty. The availability of required knowledge at the point of care improves the quality of clinical decision-making and minimizes the medical errors. These enable hospitals to increase the quality and reduce the cost. Therefore, hospitals should focus on KM practices for enhancing the performance. In order to justify the time and money spent on KM and to assess how well it is working, an organization needs to have a measurement oriented culture (Davenport & Glaser, 2002). However, there is a dearth of studies on linking both KM and hospital performance.

Organizations should emphasize both knowledge stock (availability of tacit and explicit knowledge) and KM capabilities for effective implementation of KM practices. Gold et al., (2001) studied KM as an organizational capabilities comprising of KM infrastructure (technology, structure and culture) and KM processes (acquisition, conversion, application, protection of knowledge) which positively influences organizational effectiveness. Subsequently, Lee and Choi (2003) developed an integrated KM framework where KM infrastructure (structure, culture, people, IT) influence KM process (knowledge creation); KM process influence organizational creativity (intermediate KM outcome); and organizational creativity influence organizational performance.

This paper explores the doctors' perception on two aspects (i) influence of KM on doctors' performance (KM effectiveness of doctors); and (ii) influence of KM effectiveness of doctors on hospital performance (KM-enabled hospital performance). The study considers KM effectiveness of doctors as KM intermediate outcome, antecedent to hospital performance. In order to measure organizational performance, primarily relying on financial accounting are becoming obsolete and emphasized the non-financial performance (learning & growth, internal process and customer perspectives) in addition to financial performance (Kaplan & Norton, 1996). Therefore, this paper adopts the balanced scorecard perspectives for measuring hospital performance.

1.1 Objectives of the study

Primary Objective:

To study the relationship between KM and hospital performance.

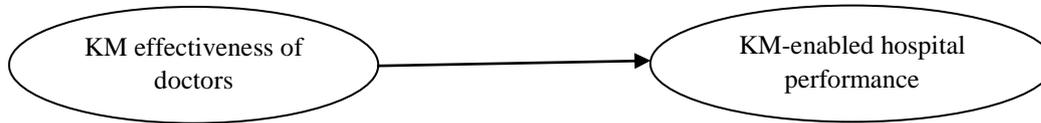
Secondary Objectives:

- To identify the elements of KM effectiveness of doctors.
- To identify the hospital performance measures.
- To explore the doctors' perception towards KM and hospital performance.
- To ascertain the effects of KM effectiveness of doctors on hospital performance.
- To suggest the measures for sustaining KM-enabled hospital performance.



1.2. Research Model

Figure 1: Research Model



Perspectives	Measures
Learning & Growth	<ul style="list-style-type: none"> Evidence-based Care Innovative Care
Internal Process	<ul style="list-style-type: none"> Patients' Safety Quality Care
Customer	<ul style="list-style-type: none"> Patient-centred Care Value-based Care
Financial	<ul style="list-style-type: none"> Cost-effective Care Revenue Growth

Source: Author

1.3. Hypothesis

Ho. There is no significant effect of KM effectiveness of doctors on hospital performance.

Ha. There is a significant effect of KM effectiveness of doctors on hospital performance.

2. Literature Review

2.1 KM effectiveness of doctors - This study identified the following KM benefits that increase the effectiveness of doctors.

- To learn continuously and enlarge knowledge horizon** – KM practices enable employees to learn new things and innovate in organization. Individual learning leads to organizational learning wherein organization excels in acquiring, disseminating, storing and applying knowledge. Learning organization is the one which is good at organizational learning. Accordingly, the ultimate aim of KM is transform a healthcare organization into a learning organization which is able to generate new knowledge, create knowledge systems and base organizational actions on knowledge (Miner & Mezias, 1996).
- To minimize the medical error** – Medical error is defined as the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim (Institute of Medicine, 1999). The use of KM systems that support decision making in drug prescription and disease management protocols, would have a positive impact on health



care delivery since it allows (1) the decrease, if not elimination, of adverse drug effects and medical errors caused by human oversight and (2) the decrease of health care cost resulting from medical errors, giving a hand to health care financial resources management (Morr et al., 2010).

- **To make timely and informed clinical decision-making** - Clinical decisions have the inherent features of complexity, uncertainty, competing objectives and often critical time dependence. In medicine, decisions must be made, whether good or bad, and not delayed (James Stahl, 2015). Tacit knowledge sharing among doctors, such as the sharing of clinical experiences, skills, know-how or know-who, is known to have a significant impact on the quality of medical diagnosis and decisions (Kawamoto et al., 2005). Explicit knowledge combined with clinical experience essentially provided the basis for making clinical decisions to doctors (Boateng, 2010).
- **To ensure better collaboration across specialty** – Healthcare delivery is moving away from a physician-patient relationship to a customer-company relationship and at the same time the traditional single physician –patient relationship is moving towards a situation where the healthcare is delivered by a team of healthcare professionals wherein each specialize in a single aspect of healthcare (Bose, 2003). Doctors receive more clinical knowledge from colleagues than from journals or conferences (Gagliardi et al., 2008).
- **To capture and implement the best practices** - The business processes can be improved by reducing the processing time as the individuals can share their best practices. KM enable doctors to improve the efficiency of the clinical process by capturing and implementing the best practices.
- **To reduce the cost of care** – Knowledge sharing in health can provide treatment efficiently and hence it reduces medical cost. If medical errors are reduced, intuitively health cost reduces. Reduction of adverse drug effects also reduces medical cost (Mohajan, 2016).

2.2. KM-enabled hospital performance - The present study identified hospital performance measures under four perspectives of the balanced scorecard – (i) Learning & growth of employees is the foundation for creativity and innovation in the organization; (ii) Internal process - skilled and creative employees question the status quo and improve business processes; (iii) Customers - improved processes lead to improved products and services for customers; (iv) Financial - satisfied customers lead to increased financial results (Kaplan & Norton, 1996).

2.2.1. Learning and growth perspective:

- **Evidence-based care** - Evidence-based medical practices are essential to utilize research knowledge along with clinical expertise for effective clinical decision-making (Rosenberg et al., 1995). The scientific research is available in the form of explicit knowledge which is essential for the evidence based medical practices. The aim is to minimize the existing gap between research and practice. According to the research



conducted by Boateng (2010), doctors agreed that evidence-based care is the best route to ensure effective healthcare delivery and believed in the involvement of patients in clinical decision making.

- **Innovative care**–Innovation is implementing an idea for creating an impact (Dabholkar et al., 2013). Healthcare needs innovation, not only in clinical methods, diagnostics and pharmaceuticals but also in how services are organized, financed, produced, delivered and distributed (VK Singh & Paul Lillrank, 2015). Knowledge creation and application practices results organizational innovation (Demerest, 1997).

2.2.2. Internal processes perspective:

- **Patients' safety** –Doctors believe that overwork, stress or fatigue and the failure of healthcare professionals to work together or communicate as a team, contribute to medical errors (Leonard et al., 2004). It is essential to create opportunities for healthcare professionals to exchange information to improve patient safety. Both tacit and explicit knowledge is used in the field of patient safety. The sharing of tacit knowledge among registered nurses enhanced by trust and mutual understanding contributed to patient safety by supporting problem-solving, knowledge acquisition and the detection of medical errors (Chang et al., 2012).
- **Quality care** - It is defined as a degree of correspondence between goals set and goals achieved in relation to patient care, without excessive use of financial resources (Frostick SP., 1993). Gronroos (1990) proposed a two-dimensional view that distinguishes between functional quality (speed and convenience of service) and technical quality (the end result of services). The quality of healthcare delivery is highly determined by the adoption of the right strategy of KM for informed clinical decision-making. The quality of interpersonal care is one of the most important constituent in patient satisfaction and their perception of service quality (Naidu, 2009).

2.2.3. Customer perspective:

- **Patient-centred care** - The six dimensions of quality in healthcare are safe, effective, timely, efficient, equitable and patient-centred. Patient-centred care is defined as providing care that is respectful of and responsive to individual patient preferences, needs and values and ensuring that patient values guide all clinical decisions (Institute of Medicine, 2001). Shared decision making improves patient-centred care by empowering patients as equal partners in care. It is defined as a process by which the patients and their significant others make a healthcare choice together with health care professionals (Charles et al., 1997). It improves patients' satisfaction, quality of care and health outcomes along with reducing costs and disparities.
- **Value-based care** - The aim of the 'value-based care' is to increase value. The value is created from health outcomes which matter to patients relative to the cost of achieving those outcomes (Putera, 2017). Value-based care is a process for helping patients to improve their health, reduce the effects and incidence of chronic disease and live



healthier lives in an evidence-based way. It emphasizes collaborative approach to patient care and sharing of patients' information so that care is coordinated and outcomes can be measured easily. It will reduce redundant care and related costs (NEJM Catalyst, 2017).

2.2.4. Financialperspective:

- **Cost effective care** - An organization employing 1000 knowledge workers wastes over \$5 million annually in unproductive search due to difficulty in finding information or lack of information availability (David Schubmehl & Dan Vesset, 2014). Telehealth services such as telemedicine, videoconferencing, electronic consults are increasingly viewed as a cost-effective method to deliver patient care and expand access (AHA, 2016).
- **Revenue generation** - Lean hospitals focus on reducing waste, not cutting costs. Reducing waste leads to lower costs and better performance across the board, but without causing side effects or dysfunction. One of the waste is defects which can be minimized due to application of right knowledge at the point of care (Mark Garban, 2012). KM practices reduce redundancy of knowledge and increases the economic efficiency and revenue in hospitals.

2.3. The impact ofKM on hospital performance

- **Ing-Long Wu and Ya-Ping Hu (2012)** explored KM-enabled performance for hospital professionals which includes three major components: (i) interaction between hospital knowledge assets (human capital, organization capital, information capital) and capabilities (acquisition, transfer, integration, application), (ii) hospital process capabilities (outside-in capability, inside-out capability, spanning capability) and (iii) hospital performance (financial performance, patient performance). The results found that the model of KM-enabled performance is well fitted with these components and hospital professionals are closely associated with KM-enabled performance in providing high-quality care.
- **Sumet Somsri et al., (2012)** studied whether KM model as a tool to improve the quality of service in a dialysis unit in Bangkok-based hospital. The study found that after implementing KM, staff job satisfaction and patient satisfaction with services increased significantly. The patient's quality of life – role limitations due to physical & emotional problems and vitality – at three and six months post – intervention applying KM to daily work had improved significantly.
- **Meenakshi Mongotra et al., (2014)** studied various KM practices followed by doctors at Government Medical College, Jammu. The study found that KM and organizational learning are significantly related. Further, organizational performance is a function of KM and organizational learning.
- **Hongmai Tang (2017)** explored the mediating role of KM on the relationship between leadership behavior and the organization innovation at primary hospitals in Shanghai.



The study found the positive relations between leadership behavior and KM, KM and organization innovation, leadership behavior and organization innovation.

3. Research Methodology

This research design is descriptive study. The data collection was carried out in 4 multi-speciality hospitals (more than 500 beds capacity) in Bangalore & Chennai during August & September 2018. The respondents are 60 doctors from clinical specialties. The sampling design is non-probability judgemental cum convenient sampling. The primary data was collected through structured questionnaire which was designed with three parts. The first part is the demographic details of the respondent. The second part comprised of 6 items under the construct - KM effectiveness of doctors. The third part comprised of 8 items under the construct -KM enabled hospital performance. The questionnaire was designed with a 5-point Likert Scale (strongly disagree-1; disagree-2, neither agree nor disagree-3; agree-4; strongly agree-5). The details of variables and the items are shown in Table. 1. The secondary data was collected from various research papers. The SPSS tool was used for statistical analysis.

Table 1.Items for variable

Variable	Items
KM effectiveness of doctors	
Learning	KM enable me to learn continuously and enlarge knowledge horizon in clinical areas.
Medical errors	KM enable me to minimize the medical error in clinical areas.
Decision making	KM enables me to take prompt and right decision in clinical areas.
Collaboration	KM enables me to interact and collaborate more with other doctors across specialty.
Best practices	KM enables me to capture and implement best practices in clinical areas.
Cost reduction	KM enables me to reduce the cost of care by reusing available knowledge.
KM – enabled hospital performance	
Evidence-based care	My hospital has process for utilizing knowledge-based evidences in patient's care.
Innovative care	My hospital is innovative in clinical practices.
Patients' safety	My hospital achieves high standard of patients' safety in clinical practices.
Quality care	My hospital delivers high quality of care to the patients.
Patient-centred care	My hospital adopts personalized decision-making for enhancing patients' experience of care.
Value-based care	My hospital treats patients with an emphasis on maintaining good health throughout their life.
Cost effective care	My hospital delivers cost-effective care by minimizing wastes and redundancies in clinical practices.
Revenue growth	My hospital improves revenue growth through efficient clinical practices.

Source: Author



4. Analysis and Interpretation

4.1. Demographic statistics

It is inferred from table 2 that majority respondents were male (65%) and possesses Master's Degree (85%). 58% of the respondents were in the age group of less than 30 years. 75% of the respondents' has clinical experience of less than 10 years.

Table 2. Demographic information of the respondents

Demographic Variable		No.	%
Gender	Male	39	65
	Female	21	35
Age	30 years & below	35	58.3
	31 to 40 years	13	21.7
	41 to 50 years	6	10
	51 to 60 years	3	5
	61 years & above	3	5
Qualification	Bachelor' Degree	2	3.3
	Master's Degree	51	85
	Super Speciality Degree	7	11.7
Clinical Experience	10 years & below	45	75
	11 to 20 years	9	15
	21 to 30 years	3	5
	31 years & above	3	5

Source: primary data

4.2. Descriptive Statistics, Reliability and validity:

Kaiser-Meyer-Olkin (KMO) measure the sampling adequacy for factor analysis and Bartlett's Test of Sphericity indicates further appropriateness of factor analysis. From Table 3, KMO and Bartlett's Test value is 0.884 at significant level of 0.000. The degree of common variance among the variables was high and therefore factor analysis could be conducted.

Table 3. Kaiser-Meyer-Olkin (KMO) and Bartlett's Test

KMO Measure of Sampling Adequacy		0.884
Bartlett's Test of Sphericity	Approx. Chi-Square	348.79
	df	28
	Sig.	0.000

Source: primary data



From Table 4, the highest mean value is 4.43 for medical errors followed by evidence based care (4.42). The lowest mean value is 4.03 for cost effective care followed by revenue growth (4.05). The small variation in mean score is 0.633 for quality care and the high variation in the mean score is 0.882 for cost-effective care.

Construct reliability was assessed to find out whether the scales are consistent or not. From Table 4, Cronbach Alpha values are more than 0.8 which are acceptable (Hair et al., 2006). The Exploratory factor analysis was applied on 14 items resulting into 2 factors. All factor loadings are higher than 0.7, ranging from 0.720 to 0.936. The resulting items and factors are shown in Table 4.

Table 4. Descriptive statistics, reliability and validity tests

Variable	Mean	Standard Deviation	Factor Loading	Cronbach's Alpha
KM effectiveness of doctors				
Learning	4.35	0.659	0.801	0.881
Medical errors	4.43	0.673	0.902	
Decision making	4.28	0.715	0.838	
Collaboration	4.17	0.763	0.779	
Best practices	4.37	0.637	0.795	
Cost reduction	4.10	0.877	0.936	
KM – enabled hospital performance				
Evidence-based care	4.42	0.720	0.806	0.923
Innovative care	4.22	0.761	0.778	
Patients safety	4.40	0.669	0.880	
Quality care	4.35	0.633	0.896	
Patient-centred care	4.17	0.717	0.787	
Value-based care	4.22	0.691	0.867	
Cost effective care	4.03	0.882	0.720	
Revenue growth	4.05	0.746	0.779	

Source: primary data

The higher values of reliability and validity imply that the items as shown in Table 4 are adequate and the outcome of this analysis will be reliable and valid.



4.3. Testing of Hypotheses

Regression analysis was used to explore the effects of KM effectiveness of doctors on hospital performance. The results of regression analysis are as follows:

Table 5. Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.729 ^a	0.532	0.524	0.42709
a. Predictors: (constant), KM effectiveness of doctors			
b. Dependent Variable: hospital performance			

As table 5 shows, the correlation coefficient (R) is 0.729 which indicates a high degree of positive relationship between KM effectiveness of doctors and hospital performance. The R² value (coefficient of determination) shows that 53.2% of the modifications of dependent variable (hospital performance) is due to the discussed independent variable (KM effectiveness of doctors) in the present study. This confirms the effect of KM effectiveness of doctors on hospital performance. The remaining changes (46.8%) are due to other independent variables which are not discussed in the present study.

Table 6. ANOVA

ANOVA ^a					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	12.020	1	12.020	65.897	0.000 ^b
Residual	10.580	58	0.182		
Total	22.600	59			

- a. Dependent Variable: hospital performance
- b. Predictors: (constant), KM effectiveness of doctors

As shown in Table 8, the results of ANOVA for the model obtained from regression analysis are statistically significant ($p=0.000$ is less than 0.05)

Table 7. Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
	B	Std. Error	Beta		
(Constant)	0.955	0.416		2.296	0.025
KM effectiveness of doctors	0.771	0.095	0.729	8.118	0.000

- a. Dependent Variable: hospital performance



Table 7 illustrates coefficient of proposed model. The independent variable was expressed in terms of standardized factor scores (beta coefficients). It is observed that KM effectiveness of doctors has high significant effect on hospital performance ($\beta=0.729$, $t=8.118$, $p<0.05$). The beta values also show positive relationship. It is observed that one-unit increase in KM effectiveness of doctors would lead to a 0.771 unit increase in hospital performance. From Table 7, p-value is less than 0.05. It shows that there is a significant effect of KM effectiveness of doctors on hospital performance. Therefore, null hypothesis is rejected.

5. Findings

The study found that KM enhances organizational performance through an intermediate outcome (KM effectiveness of employees) which was in line with the findings of Lee & Choi (2003). In the present study, the intermediate KM outcome is KM effectiveness of doctors and the final KM outcome is enhanced hospital performance. Therefore, it confirms that there is a relationship between KM and hospital performance. The following are inferred:

- KM implementation in hospitals enable doctors to improve their KM effectiveness.
- Minimizing medical errors and capturing & implementing the best practices are most significant benefits of KM to the doctors.
- KM effectiveness of doctors leads to improved performance of the hospital.
- Evidence-based care and patients' safety are most significant hospital performance measures.

6. Suggestions

The study focused on measuring KM performance and organizational performance. Though sustaining KM is challenging, hospitals can focus on the following aspects for sustaining KM-enabled hospital performance:

- To increase knowledge stock in hospital–
 - Tacit Knowledge (intangible knowledge) -
 - To identify and bridge knowledge gap (existing gap between what hospital knows and what hospital should know).
 - To attract, motivate and retain doctors through HR practices.
 - To develop talent through various KM practices such as sponsorship for higher education courses; conducting various knowledge sharing programs such as Continuous Medical Education programs, seminars, workshops on various healthcare topics.
 - Explicit Knowledge (tangible knowledge) -
 - To develop cost-effective KM tools for storing, retrieving and reusing explicit knowledge.
 - To ensure that KM tools are easy to use and accessible to all doctors.
 - To ensure that the stored knowledge is updated on regular basis.
- To increase knowledge flow across hospital -
 - To encourage team building and collaboration among doctors.
 - To motivate doctors to share knowledge through rewards & recognition.
 - To encourage doctors to share experience through mentoring and clinical rotations.
 - To measure knowledge contribution of doctors through performance appraisal.



7. Conclusion

Due to the increasing competition, hospitals also should develop an appropriate strategy for improving and measuring the performance. As a strategy, KM cannot be implemented in hospitals without involvement of doctors. Accordingly, this study aimed at creating an awareness about KM performance among doctors and moving their mind-set from 'knowledge is power' to 'knowledge sharing is power' for gaining individual and organizational benefits of KM. The study also contributed to the KM research by ascertaining the positive relationship between KM effectiveness of doctors and hospital performance. The findings of the study are basis for both academicians and hospital administrators to establish and further strengthen KM-enabled hospital measures.

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