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A Survey of Managers' Access to Key Performance Indicators via HIS: The Case of Iranian Teaching Hospitals

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Abstract. Background: The challenges of using health information systems in developing countries are different from developed countries for various reasons such as infrastructure and data culture of organizations. Objective: The aim of this study is to assess managers' access to key performance indicators (KPI) via Hospital Information System (HIS) in teaching hospitals of Iran. Methods: All managers (Census method) of the four teaching hospitals affiliated to Hormozgan University of Medical Sciences (HUMS) were included in this study. KPIs which are linked to the strategic objectives of organizations were adopted from the strategic plan of HUMS. The questionnaire used in this study included three categories: Financial, Human Resources and clinical. One-sample t-test was used and the significant difference score was calculated for the acceptable level. Results: We found that HIS cannot facilitate access to KPIs for managers in the main categories, but it was effective in two subcategories of income (p=0.314) and salary (P=0.289)). Conclusion: A study of barriers to the use of managers of HIS in hospitals is suggested.

Keywords. Hospital Information Systems, Health Information Management, Hospital Administration, Iran.

1. Introduction

The benefits of the adopting HIS in health care organizations, have been confirmed in several studies [1-6]. The data which was generated and transformed to information and knowledge by these systems highlight the vital role of information systems in an organization, i.e. information alone is not “power”, but using it at the right time and right place shows “power” [7]. Facilitation and acceleration of access to Key Performance Indicators (KPIs) are the main requirements of any organization after the implementation of the systems in hospitals [8]. Meeting its strategic goals, an organization needs to define

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success and track its progress. KPI has an important role in determining the appropriateness of the main tools used to systematically monitor, evaluate, and continuously improve service performance in most advanced economies, in middle- and low-income countries [9].

Moreover, only information systems which potentially have the characteristics of accessibility, usability, reliability, adaptability and response time are capable of producing high quality data and information for a knowledge-based management in health care organizations [10]. Lammintakanen et al have categorized the barriers of information systems use into two groups:

- Barriers to use related to information content
- Barriers to use related to information systems [11]

However, the use of the information by managers has been reported to be the most important issue in organizations with a poor data culture. Focusing on the relationship between culture and use of information by the managers, Kevinen et al. recommended the application of different strategies to strengthen the use of information in organizations [12]. As a result, when evaluating and using the system, managers should take into consideration the usability of the information [10,13]. The purpose of usability evaluation is to determine the strengths and weaknesses of information systems and to provide guidelines for the improvement of their applications [10,14,15].

The past decade has witnessed the rapid adoption of HISs in many hospitals in Iran. Although extensive research has been carried out on the evaluation of HISs, no single study exists which adequately covers the use of the information generated by these information systems in different areas of hospital management. The aim of this study is to assess of managers' access to KPI via HIS in teaching hospitals.

2. Methods

This descriptive and analytical cross-sectional study was conducted in 2016. The study population included all strategic, tactical and operational managers in four teaching hospitals of Hormozgan University of Medical Sciences (HUMS). Due to limited research population, census method instead of sampling was used in this study.

Since KPIs are linked to the strategic objectives of organizations [9,16], KPIs of this study were extracted from the strategic plan of HUMS and the national health indicators published by Iran's Ministry of Health and Medical Education [17]. Considering the HIS adoption and implementation, the studied hospitals were at different stages. Hence, hospital managers answered questions regarding accessibility to KPIs by HIS according to the stage of HIS adoption. The questionnaire included three categories: Financial (27 items), Human Resources (19 items) and clinical (22 items).Questionnaires were distributed on the basis of organizational positions. They were asked to identify access to the information with three-choices of answers "yes" (one point) and "no" and "I have no idea" (zero points). To calculate the score of each item, the scores were added together and divided by the number of questions. Then, the score for each section was assigned between zero and one, and scores above 0.7 were considered to be acceptable. The significant difference score was calculated for the acceptable level and one-sample t-test was used. ($\mu \neq 0.7$vs.$\mu = 0.7$)

3. Results

A total of 126 questionnaires, completed by 106 managers, were collected. Some of the questionnaires were completed by the same managers in different areas for example the manager of financial office completed two more questionnaires in addition to the questionnaire directly related to his own area. The participants of the study consisted of 81.9% female and 18.1% male managers. In addition, 79% of the managers under the study had bachelor's degree with positions mostly at tactical and operational management level while strategic managers formed 4.8% of the total research population were general practitioners and specialists.

To assess of managers' access to KPIs via HIS, the areas under the study were divided into 6 subcategories including 37 indicators. According to the results (Table 1), managers' access to financial information via the HIS was significantly lower than the appropriate level (P=0.004). In this category, access to information related to income, was at an appropriate level (p=0.314) whereas the subcategory of access to the information related to costs was significantly lower than the appropriate level (p<0.001).

Managers' access to human resources management indicators via the HIS was significantly lower than the appropriate level (P=0.003). Moreover, in the subcategories, access to information related to productivity was significantly lower than the appropriate level (P=0.001). However, the information related to salary was in the appropriate level (P=0.289). Managers' access to clinical information via HIS was significantly lower than the appropriate level (p<0.001) and in the subcategories, the average scores were significantly below the appropriate level (P <0.001). On the other hand, the rate of managers' access to KPIs through HIS in financial, human resources and clinical management were (56%), (48%) and (47%), respectively. These findings appeared to be lower than the appropriate level (Table 1).

4. Discussion

The main purpose of this study was to assess of managers' access to KPIs via HIS in HUMS hospitals. Although the findings of this study suggest that HIS in hospitals under the study did not facilitate managers' access to information in any of the main categories while in some subcategories (income and salary) they were favorable. Similarly, other studies in Iran, reported of inefficiency of HISs in meeting the information needs of managers too [14,18-21].

Table 1. Results of assess of managers' access to KPIs via HIS in HUMS

Categories	Subcategories	Mean scores	Standard deviation	t_0	95% Confidence Interval	P-value
Financial	Cost	0.37	0.23	-6.02	(0.26-0.49)	<0.001
	Income	0.75	0.18	1.06	(0.65-0.84)	0.314
	Total	0.56	0.28	-3.05	(0.46-0.65)	0.004
Human Resources Management	Productivity	0.36	0.24	-4.86	(0.21-0.51)	0.001
	Salary	0.59	0.36	-1.09	(0.37-0.81)	0.298
	Total	0.48	0.33	-3.36	(0.34-0.61)	0.003
Clinical	Structure/Process	0.54	0.26	-5.63	(0.48-0.59)	<0.001
	Outcome	0.41	0.24	-10.59	(0.35-0.46)	<0.001
	Total	0.47	0.26	-10.94	(0.43-0.51)	<0.001

According to research findings, managers' access to KPIs showed that the financial category appeared to be relatively more effective (56%) than other categories. These finding supports the findings of other Iranian researchers in universities of medical sciences in recent decades [14,18-21]. This finding places Iran in the early level of computerization on the basis of the categories of Medical Records Institute [8]. Moreover, most HIS projects in Iran are planned for automating financial processes in hospitals [18,21,22] therefore, it goes without saying that managers' access to financial information is more than other categories especially more than the main category of clinical information. Low level of access to subcategory of the information related to cost was an indirect issue that in which most of the information related to cost of the hospital were not recorded by the system. Often, other information systems which are not integrated with the HIS and are independent of the main system of the hospital provide the access to the information related to the cost for the managers. While an integrated HIS including human resources systems, data management, and financial systems and health care processes are more effective in increasing the use of information systems [12,23,24].

Research findings in the category of human resources show that HIS was not favorable in this category however the effect of HIS was desirable in the subcategory of information related to employees' salary. This subcategory is one of the administrative uses of HIS which has been stressed on its adoption in Iran [18,21,22,25]. It is worth mentioning that systems similar to this subcategory which are independent of HIS are extensively employed in hospitals but in most cases, they are not integrated with HIS.

Regarding managers' access to information in the clinical category, the finding of this study was not favorable and this is in line with the findings of other studies performed in Iran [14,18,19,21,22,25] and other developing countries [4,24,26,27]. This finding suggests that the effect of HIS on managers' access to information was reported as "unsatisfactory". There are two reasons which seem to be responsible for this. First, HIS is not function as a tool to produce the information required in the hospital [11]. In the development phase, weaknesses in various stages of development of information systems such as the analysis and design of the software caused by lack of needs assessment, engagement of mangers in adopting HIS due to problems in user-friendliness of systems, and imprecise and impractical reports on the functionality of systems [10,11,21,28] are some of the problems. In the startup phase, inadequate training of staff and users, the complexity of the system, lack of integration of information systems, lack of resources, inadequate understanding of information technology, poor support of the vendors to build a complete report development, absence of a long-term planning system, resistance to change are other reasons responsible for the weaknesses [10-12,18,21]. Second, information may be available in HIS but is not considered to support management for reasons such as lack of updated information in the system, non-valid information and information segregation in HIS, all of which may make the poor usability of information systems [11].

5. Conclusions

Due to the flaws of the system to meet the information needs of executives in different categories, a study of barriers to the use of information system managers in any organization is suggested. Moreover, at the time of purchase and procurement of information systems in the request for proposal, the information needs of clinical and

human resources categories should be identified, included and data integration policy should be followed up in HIS.

6. References

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