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**ENTERPRISE RESOURCE PLANNING  
IN HEALTHCARE SYSTEM**

Hospital information systems are usually heterogeneous and autonomous. However, to improve the efficiency of the hospital sector, it has been proposed that integrated management systems should be applied in the healthcare organizations. These integrated systems would help to improve hospitals' processes and reduce operating.

This article integrates the appropriate information in order to enhance the knowledge of attitude toward using ERP from the health care personnel's perspective. In a situation where theory is advanced, it is essential to involve the creation and validation of new measures, and such efforts are considered an important contribution to scientific practice in the healthcare field.

**Key words:** ERP, information technology, integrated management system, healthcare organization, healthcare sector, medical personnel, bureaucratic implementation process, techno stress, information.

During the last decades healthcare managers tried to maximize hospitals' efficiency, without reducing the quality of healthcare services provided to the patients. This imperative has been reinforced in recent years as a consequence of the lack of available public resources for meeting the ever-increasing demand for healthcare services.

Hospital information systems are usually heterogeneous and autonomous. However, to improve the efficiency of the hospital sector, it has been proposed that integrated management systems should be applied in these healthcare organizations. These integrated systems would help to improve hospitals' processes and reduce operating. The behavior of healthcare personnel in relation to the management of information is directly related to their status as

primarily clinical rather than administrative personnel. The clinical personnel constitute a power group that, informally, exerts considerable influence in the management decisions taken within the hospital. As a consequence of the power structure existing in hospitals, information is usually fragmented between clinical and non-clinical topics or areas, which can make the use of integrated management systems difficult or impossible.

The control of information is sometimes used to legitimize and maintain the structures of power existing in. To prevent this phenomenon, information systems can be employed to redistribute power among the different members of the organization. The implementation of new information systems in a hospital represents a possible vehicle for the transformation of a “de facto” power structure into a different, more formal kind of power structure, by involving all the personnel, clinical and non-clinical, in the functions of management and supervision of the diverse activities of the hospital. However, it must be recognized that the introduction of new information systems in a hospital has a direct impact on the behavior of the clinical personnel in relation to the acceptance of information. Considering that personnel reject these integration systems, as they are normally reluctant to change their work routines, and feel that closer supervision might be problematical. Organizational routines that reflect institutionalized practices are slow to change and such changes often face resistance. Argument is that this approach to implementing ERPs is not valid for hospitals. Conversely, management considers this integration approach to be efficient, and that its cost is offset by its benefits.

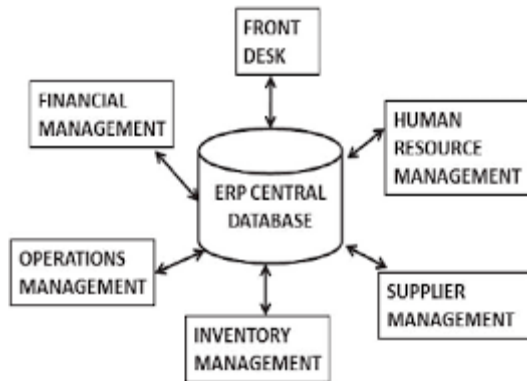
The current trend in the healthcare sector is to implement management strategies focused on improving efficiency in hospitals. It has been argued that ERP is the most suitable type of information system for supporting the management of organizations like hospitals [1-4; 17].

Initially, processes of “partial integration” are being carried out, using the administrative and financial modules of ERP, and keeping specific applications for other areas. As a general rule, ERPs have been employed to facilitate integration among all functional areas within an organization. In the case of hospitals, they are being used to achieve, as a minimum, the integration of planning within the financial area. ERPs have been developed in response to the need to manage across global businesses, a difficult task made more so in organizations such as hospitals, where each unit business is using different systems and technologies. It is not easy to deal with this integration process in hospitals because of their organizational issues.

*The main objective of the article* is to analyze the impact on the attitude toward using ERP systems in public hospitals identifying influencing factors. Cultural factors that have been included in this paper refer to organizational culture. Understanding these factors provides the opportunity to explore which actions might be carried out to boost adoption by potential users.

*The Enterprise Resource Planning (ERP) system* is a process-based Information Technology infrastructure. It is a process by which a company (often a manufacturer) manages and integrates the important parts of its business. An ERP management information system integrates areas such as planning, purchasing, inventory, sales, marketing, finance and human resources (fig. 1). When implemented in an organization such as health care brings with it changes on how users work. An ERP system cuts across the different functional units of an organization [8].

*Organizational culture* can be defined as the general pattern of mindsets, beliefs and values which members of the organization share in common, and which shape the behaviors, practices and other artifacts of the organization which are easily observable [11].



**Figure 1. Schematic presentation of ERP system**

*Implementation of ERP system.* ERP systems emerge as management systems that allow the administration of an organization’s resources in an integrated manner.

There are two main approaches for integrating information in hospitals: (1) complete, and (2) partial. The complete approach is based on a single integrated module program encompassing clinical, administration, and financial data using different applications, such as patient sign-in and

discharge information, the locations of first aid kits, invoicing and pharmacy data. It is against this background that the efforts of software companies fit, seeking to present products that integrate all these information centers. There is a paucity of studies on user participation and the contribution of users towards the successful implementation of ERP systems.

More and more healthcare organizations move from functional to ERP systems. However, not all healthcare organizations have been successful in their ERP implementations. Implementing an ERP system suggest that a cautious, evolutionary, bureaucratic implementation process backed with careful change management, network relationships, and cultural readiness have a positive impact on several ERP implementations. Understanding such effects will enable managers to be more proactive and better prepared for ERP implementation. Partial integration involves using the ERP's administrative and financial modules and connecting them via a series of specific applications (radiology, laboratory, etc.).

To succeed in implementing an ERP system in hospitals, it is not sufficient to only get the system up and running within schedules. It is even more critical to enable the users to efficiently and effectively use this system.

The implementation of an ERP system requires the employees to learn a new system and also adapt to the newly re-engineered business processes. Knowledge about how to perform a given task forms the basis on executing one's job. As mentioned earlier, the changes in business processes could lead to confusion and demotivation to the existing employees. This may or may not increase the likelihood of user-adoption of the new system, and decrease the employee dissatisfaction and post implementation turnover rates.

One of the main mistakes and consequently problems with ERP implementations is attributed to the underestimation of the effect of social and cultural factors on ERP success.

Three main potential negative consequences from ERP implementations were reoccurring, namely:

- job stress;
- job satisfaction
- techno stress.

These consequences are believed to affect the system adoption and ERP success in many cases.

1. **User & Job Satisfaction.** One of the main goals of any organization is to keep their employees satisfied in their job. If the implementation of a new system is not managed carefully, this could result in a lower job satisfaction for some organizational members. Also, the employee's knowledge and

ability to use an ERP has been argued to have a strong influence on job satisfaction.

How the implementation of an ERP system in an organization affected job characteristics that again was believed to influence job satisfaction of the employees such as task significance, task identity, skill variety, autonomy and feedback. Task significance and identity have a strong positive relationship with job satisfaction. The nature of an ERP system is to implement workflows and systems that interconnect processes across the entire organization. The transition from having a workflow where employees largely make up the process itself to an organization where the processes are deeply integrated into the technical solution and the employees are only affecting the process in certain stages, the ability to make a difference and employee job impact on the organization may feel absent.

Some scholars argue that ERP implementations as such could lead to increased job satisfaction, if the implemented system is easy to use. Many ERP systems collect data about the logged in user and can provide feedback in regards to how many orders are processed and in what timeframe this is done. The employee can experience that the feedback given to them is less personal and more quantifiable, and this can lead to the employee feeling less satisfied in their job.

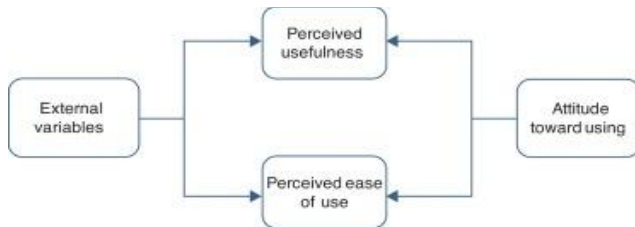
While employee behavior is known to be largely affected by job satisfaction, however, ERP implementation projects mainly follow a technical plan that does not necessarily take job-related transformations into attention. Configuring ERP-systems inexorably affects employees' jobs and tasks; hitherto the effect on these jobs is rarely taken into consideration during the configuration effort. An ERP system leads the employees to feel a great change in their job.

2. Techno stress and Job Stress. In general, any changes introduced to how employees work, could increase the likelihood of job stress. The implementation of an ERP system is tightly linked with business process re-engineering. Thus, this total interference of the tools and processes routinely used by employees on a daily basis has been shown to increase job stress among the employees in the organization. As the new business processes often affect job characteristics that lead to uncertainty in regards to job execution. And also poses changes to the job demands.

In a broader view, stress resulted from the inability to adapt to and cope with new computer technologies has also been referred to as techno stress. Job overload and role conflict amongst employees can also lead to an increase in techno stress degree, which might affect the ERP implementation success.

The necessity of learning new skills and technologies are also affecting the employee after the ERP system goes live and this may result in a heightened feeling of stress [12; 14].

Thus, training and support has been argued to moderate techno stress among system users. While job / techno stress could impose risks for system use and adoption by employees, however, they don't necessarily lead to system resistance in organizations.



**Figure 2. Techno stress appearance in the implementation process of ERP systems**

*Advantages.* ERP have significant advantages. All information is centralized in a single relational database accessible by all modules, eliminating the need for multiple entries of the same data. Therefore, ERPs could help to improve quality of service while increasing efficiency. Many patients' processes in hospitals differ substantially in their degree of variability and sophasticity. As a result the logistic processes supporting the patients' processes may differ to the same degree. However, ERP requires that processes be described very precisely. In hospitals, ERP systems are welcomed as long as they provided direct benefit to their work and eased their work practices [16].

*Drawbacks.* A healthcare system failure can have serious consequences. The perception of possible risks related to ERP could affect users' attitude. Healthcare personnel make continuous efforts to reduce risks due to the serious repercussions involved. Legal and economic factors, as well as public trust in the healthcare system, have also been affected by these risks. Therefore, perceived risk could have a significant impact on the attitude toward using new technology.

The major problems arise in most ERP adoptions because of organizational rather than technical issues, for example social and cultural barriers, and user resistance. At the same time, hostile reactions toward the ERP system were

evident since it implied control mechanisms of their work and introduced new work tasks previously performed by others process. However, a deeper knowledge of factors related with attitude toward using ERP systems in hospitals is required. Often the formal information is not complete, and the implementers do not know where the different types of process knowledge reside in the organization. Therefore, healthcare personnel could think that implementing ERP would be risky because it would either lead to missing functions or to sub optimizing parts of the organization [15].

Hospitals are undergoing significant changes, mainly due to ITs within the healthcare process.

This article integrates the appropriate information in order to enhance the knowledge of attitude toward using ERP from the healthcare personnel's perspective. In a situation where theory is advanced, it is essential to involve the creation and validation of new measures, and such efforts are considered an important contribution to scientific practice in the healthcare field. These measures can be utilized to examine other emerging technologies within the healthcare context. Reducing the “resistance to be controlled”, the “resistance to change” and the “perceived risks” of using this technology by healthcare personnel is a central issue to get a better “attitude toward using” ERPs in public hospitals. These three factors should be managed during the implementation process to influence the attitude of users toward the use of ERP systems in the right way and, therefore, to increase the success probabilities.

Health care personnel's “resistance to change” may be a serious cause for concern in implementing ERPs in public hospitals because it affects the “perceived ease of use” and “perceived usefulness” of this IT. To reduce personnel's “resistance to change”, managers must be prepared to talk candidly about the needs for change, otherwise fear and uncertainty will remain a prevailing element that can damage morale and prevent successful implementation of the ERP at all levels of the organization.

These significant relationships are also notable for healthcare technology developers. If healthcare personnel perceive incompatibility between the tasks to be performed and the new system, they might find it difficult to use and/or might find it useless. On the other hand, training processes might not only explain system use but also illustrate the ability of the ERPs to enhance job performance. Training processes should also be focused to reduce the “resistance to be controlled” and the “perceived risks” by healthcare personnel.

The training process is one main vehicle for the dissemination of the organizational culture and should be directed toward reducing “resistance to change”, “resistance to be controlled”, and “perceived risks” in healthcare organizations. The training process should not only be focused to explain how the system works, but also to show the ability of information systems to facilitate daily operations, so that they are centered on spreading cultural factors in the organization. By using this strategy, the training process can be oriented to reduce resistance to be controlled and minimize the risks perceived to the use of these technologies.

Further the importance of influences such as individual differences, prior experience, level of education, and the role of technology in organizations in the context of ERP acceptance in public hospitals.

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## **ПЛАНУВАННЯ РЕСУРСІВ ПІДПРИЄМСТВА У СИСТЕМІ ОХОРОНИ ЗДОРОВ'Я**

Інформаційні системи в лікарнях, як правило, неоднорідні та автономні. З метою підвищення ефективності сектору охорони здоров'я було запропоновано застосовувати інтегровані системи управління в практиці медичних організацій. Ці інтегровані системи допоможуть поліпшити функціонування бізнес-процесів у лікарнях та підвисити ефективність їх діяльності.

Ця стаття розглядає ставлення персоналу медичних установ до використання ERP систем у практиці їх діяльності. На сьогодні теорія систем є достатньо

розвиненою, але важливо створити необхідне практичне підґрунтя для впровадження ERP систем у галузі охорони здоров'я.

**Ключові слова:** ERP, інформаційні технології, інтегрована система управління, медична установа, сектор охорони здоров'я, медичний персонал, бюрократичний процес впровадження, технострес, інформація.

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## **ПЛАНИРОВАНИЕ РЕСУРСОВ ПРЕДПРИЯТИЯ В СИСТЕМЕ ЗДРАВООХРАНЕНИЯ**

Информационные системы в больницах, как правило, не однородны и автономны. С целью повышения эффективности сектора здравоохранения было предложено применение интегрированных систем управления в практике медицинских организаций. Эти интегрированные системы помогут улучшить функционирование бизнес-процессов в больницах и повысить эффективность их деятельности.

Данная статья рассматривает отношение персонала медицинских учреждений к использованию ERP систем в практике их деятельности. На сегодня теория интегрированных систем является достаточно развитой, однако важным остается создание необходимой практической базы для внедрения ERP систем в отрасли здравоохранения.

**Ключевые слова:** ERP, информационные технологии, интегрированная система управление, медицинское учреждение, сектор здравоохранения, медицинский персонал, бюрократический процесс внедрения, технострес, информация.