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## CHANGE MANAGEMENT OF HOSPITAL INFORMATION SYSTEMS IN CONTEXT OF HEALTH PROFESSIONALS TRAINING

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**Abstract:** Hospitals make changes by using information technologies to improve their services. For desired results applying “Change Management” is important as it consists of a set of ideas, processes and skills. This study investigates the processes (raising awareness, desire, knowledge, skill building and development), the tools (communication, participation, motivation, education, leadership, promotion), the factors (demographic, technological, economic, political, legal, competitive), the states (past, present, future) and the strategies (leading, expert, open to discussion, educative, proactive) of change management in hospital information systems. It shows the cultural, resistance, perception and behavior problems incurring when the change process starts and when it continues as well. Hospitals, which have a hierarchical structure, excessive discipline, solid job descriptions, seniority based on the power and authority principle, absence of communication channels, lack of sharing of information, experiences and top management commitment, not paying attention to employees' ideas, weak leadership and motivation, absence of flexibility and an effective learning system will eventually encounter resistance and fail to apply change management successfully.

**Keywords:** Change Management, Technology, Resistance, Hospital Information Systems, Innovation.

## SAĞLIK PROFESYONELLERİ EĞİTİMİ BAĞLAMINDA HASTANE BİLGİ SİSTEMLERİNİN DEĞİŞİM YÖNETİMİ

**Öz:** Hastaneler, hizmetlerini iyileştirmek için bilgi teknolojilerini kullanarak değişiklikler yapmaktadırlar. “Değişim Yönetimi” istenen sonuçlar için bir dizi fikir, süreç ve beceriden oluştuğu için önemlidir. Bu çalışma süreçleri (farkındalığı artırma, istek, bilgi, beceri geliştirme ve geliştirme), araçları (iletişim, katılım, motivasyon, eğitim, liderlik, terfi), faktörleri (demografik, teknolojik, ekonomik, politik, yasal, rekabetçi), durumlar (geçmiş, şimdiki zaman, geleceği) ve hastane bilgi sistemlerinde değişim yönetiminin stratejileri (lider, uzman, tartışmaya açık, eğitici, proaktif) inceler. Değişim yönetimi, değişim süreci başladığında ve devam ettiği zaman ortaya çıkan kültür, direnç, algı ve davranış sorunlarını irdeler. Hiyerarşik bir yapıya sahip olan hastaneler, aşırı disiplin, katı iş tanımları ve yetki prensibine dayanan kıdem, iletişim kanallarının yokluğu, bilgi paylaşımının olmaması, deneyimlerin ve üst yönetim taahhüdünün olmaması, çalışanların fikirlerine önem verilmemesi, zayıf liderlik, motivasyon eksikliği, esneklik olmaması ve etkili bir öğrenme sisteminin olmaması direnişe sebep olarak değişim yönetimini başarılı bir şekilde uygulanmaması anlamına gelmektedir.

**Anahtar Kelimeler:** Değişim Yönetimi, Teknoloji, Direnç, Hastane Bilgi Sistemleri, Yenilik.

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## **INTRODUCTION**

Change in technology affects the daily life of people and the workflow of institutions and corporations. Information technologies play a crucial role in human life and shape our world step by step. Information technologies are frequently used in education, banking, e-commerce, logistics, automotive, space and health sectors. Societies demand quality in health services, a comfortable life, effective and fast medical treatment as their level of education, sociocultural status and conscience increase. Health services and their quality are affected by improvements in IT. By means of the interaction between health and technology, sharing of medical information between patients, doctors and medical institutions has improved. To improve the quality of health services, to ensure a safe and quick integration between doctors, patients, employees and health institutions, Hospital Information Systems (HIS) change in time gradually and the management of this change is strictly required.

Changes in IT affect societies and they may tend to resist these changes. We can observe changes on some people as a progressive attitude is developed upon the change but sometimes resistance can be raised by people against the change. Resistance in this context means preserving the status-quo against any change. (Gravenhorst, 2003, p.3) It is important for people that face the change to consider the participants' perceptions and exceptions. Their resistance is based on several factors such as economical area, sociological area, and psychological area. "Change Management" concept is an art of fitting institutional cultures and behaviors to provide a solution to the change management problem in the era of change and eventually gains more importance every day.

## **LITERATURE**

Health information systems are defined as assisting medical services via computers, automatic information transfers in electronic form, registering medical, financial and monetary operations of the hospital to electronic storages and gaining insights from this data. (Köksal and Esatoğlu, 2005, p.54)

Change is moving from one level to another or the act of moving from the current state of individual skills to a new state. (Taşlıyan and Karayılan 2011, p.254) Management comes from the word "Manus" in Latin and it has been used from industrial revolution and has been gained huge importance thereafter.

An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method or a new organizational method in business practices, workplace organization or external relations. (OECD 1997 Oslo Manual, 1997) Namely, in the state of innovation, the organization is constantly reviewing and analyzing to ensure the awareness of any need for change. It is about managing the changes which are parts or consequences of a particular organization's context and the type of change required. (Parlakkılıç, 2013,p.55).

Change management is a set of tools, processes, skills and principles which manages human side of changing. (Prosci, 2015) It is an art of harmonizing institutional culture and behaviors with changing world. (Şahin 2011, p.308)

Project Management on the other hand, applying knowledge, skill, tools and technique into project activity in order to take care of project requirements. (Prosci, 2015)

Usually “Change Management” and “Project Management” are confused with each other. Project management mostly covers technical side of project while Change Management covers the human side of a project. (Prosci, 2015) Project Management includes requirement analysis, concept design, preliminary design, detailed design, architecture, integration, testing, production, maintenance and operation but Change Management covers phases like raising awareness and ambition among employees, informing and making them more creative. Change management focuses on human. Its targets are resistance, culture, perception, manners and behaviors.

Health Information Systems “Change Management” phases includes mechanisms like raising awareness among the employees about necessity of a new system, drawing their attention to that “raising awareness”, expressing needs “raising desire”, including how to implement changing “transparent inform”, bringing manners and behaviors “earning creativity”, making the change permanent “strengthening”.

“Change Management” tools are communication which clarifies the emotions and thoughts of employees; attending, which contributes to the brainstorming and participation to activities; motivation; education which ensures the necessity of information, thinking, interrogating, developing a talent, learning; leadership which unites the employees under the purpose and management; senior management undertaking which claims responsibility of changing activities.

“Change Management” factors are demographic, technological, economic, political, legal and competitive elements like treatment techniques being used in medical field, constant update of products and services, reduced lives of the products, rapid changes in technologies, high expectations of innovation among consumers, strengthening international strategic collaborations.

Organizational changing process is first studied by Kurt Lewin. Lewin examined the change in management by separating it into three different phases. These phases are Behavior Analysis which includes ice braking, launch, letting the already lived moment go. Shift Phase which includes change time of old styles and applications, starting and continuation. Refreeze Phase which includes making the change new and solid, freezing it. (Kozak and Güçlü, 2003, p.3).

Understanding and management of change model is developed by John P. Kotter. (Kotter 1996). This change model includes eight steps as creating an emotion and coalition about necessity of change, clearing the vision, having a healthy connection, removing obstacles, focusing on short term earns, having a decisive and persistent behavior and ensuring that the change is permanent. Furthermore McKinsey's 7s, Burke-Litwin and Weisbord's 6 box models are existing.

When initiating and continuing change management process, several problems are faced which includes solving, awareness and management of perception, manner and behavior and they are strictly important. The management of change when switching from current health information system to a new one is

often difficult because of the uncertain nature of change (Tidd, 2005, p.78). Because of uncertainty, it cannot be known that whether the provided technology can cover the specific needs of itself. Uncertain fields are usually organizational uncertainties (Cohen, March and Olsen, 1972) as technical specs, righteousness, and technical uncertainties about sufficiency, reaction that organization employees will show to change, lack of knowledge on manner and resistance.

Following current trends in information technologies, informing users about the vision, the mission and the goals, deciding roles of each stakeholder, improving communication channels, changing intuitional cultures are important factors of a change for success. Some business cultures are open to innovation and creativity however excessive control and strict hierarchy damage this open spirit.

Recognition of an advance by using communication channels among members of a social system is considered important for management of the change. Upon recognizing the advances, members of a social system begin to inform each other and this accelerates the amount of shared information and removes ambiguities of the advances. Recognition of a development is built upon four items: development, a social system, a communication channel and time (Rogers, 1995, p.5).

Another important concept related to spreading the development is their approval. There is a timeline of approval. The process of change starts with reaching awareness and continuation (Damanpour, 1991, p.13). Thus the speed of approval is important for management of change. It is affected by relative advantages, suitability, complexity, openness to trial and measurability (Rogers, 1995, p.207).

The speed of approving a change might be different depending on demographic, individual, cultural properties of societies and their willingness towards accepting the change. Some changes get approved right after they happen, but some requires usage and trial by significant portion of the society. Members of the society are separated to five categories depending on their eagerness towards a change: innovators, early adopters, early majority, late majority, and laggards (Rogers, 1995, p.261). The speed of approving a change is also considered highly important for change management.

Businesses which have complete framework, value the differences, believe in skills of their employees, encourage team work, develop efficient learning system, share their experiences, learn their lessons from not only their success but also their mistakes, embrace new ideas, continuously inspect and analyze are considered to be more successful (Tidd, 2005, p.561).

The perception of e- readiness is also important for change acceptance in medicine. Parlakkılıç pointed out that technological skills readiness; online learning style readiness; equipment /infrastructure readiness; attitude readiness; human resource readiness; environmental readiness; cultural readiness; and financial readiness dimensions should be evaluated before any change management starts (Parlakkılıç, 2015, p.60).

## **METHODOLOGY**

The patients come to hospital when they have health problems and they are discharged after their problems are treated. During this process they encounter

many states which use information systems which are getting more important nowadays. Managing human part of the health information systems which means managing culture, behavior and treat is the most important step for a change to implement into routine successfully.

The main aims of this work are pointing out individual and cultural problems of usage of health information systems and suggesting related solutions. The long term aims of this work are improving consciousness of change management at the times that health information systems are to be changed, minimizing problems that might arise during the change, and maximize its benefits. Pointing out “change” concept is a manageable entity raising awareness of individual and cultural resistances, behaviors and perceptions. Obtained results can be helpful to remove resistances towards changes, raising consciousness to change behaviors, to minimize problems and to maximize benefits.

Quantitative methods are used in this work as the research progresses. Managers, professors, medical doctors, interns, nurses, assistants and employees are asked to participate into a survey, and its results are documented in this paper. To be able to learn participants’ opinions Likert Behavior Measurement is applied including tools, phases, software, hardware, security/legal/privacy/ethics sections and 48 questions which is based on quantitative data.

In the analysis of the data, SPSS program is used cooperating with descriptive statistical analyzes, Kruskal Wallis, Mann-Whitney U, Wilcoxon W, Kikare and Spearman's rho.

The Mann-Whitney U-Test is applied to test whether the scores obtained for two independent groups differ significantly from each other. The Kruskal-Wallis test is used to determine whether there is a significant difference between the mean of two dependent groups of two or more independent variables.

The questionnaire is adapted to a group that is working in the hospital and its validity and reliability is tested. The Cronbach Alpha coefficient was measured as 0.836.

Change management is chosen dependent variable whereas change management tools, change management states, software, hardware, security/legal/privacy/ethics are chosen as independent variables.

Hypotheses of this research:

1) User perception and behavior relies heavily on human capital in “change management” process.

2) User perception and behavior are reasonably related to change management tools such as leadership, participation, information, motivation, education, promotion.

3) User perception and behavior are reasonably related to change management states such as awareness, readiness, perception, eagerness, knowledge, and ability.

4) The performance of software and hardware are reasonably related to satisfaction of users, technicians, and managers.

5) The performance of health information systems are reasonably related to security, legal, ethical, privacy issues.

## RESULTS

This research was conducted at a state hospital in Ankara, 2015. Polyclinic, clinic, pharmacy, board of health, dean and institutions of the hospital were included to research scope. 167 employees from managers, professors, medical doctors, medical interns, nurses, laboratory assistants, and employees participated into a survey.

SPSS (22.0) was used to analyze the data obtained through the survey, as well as definitive statistical methods and the one-way ANOVA test. Confidence of the survey results obtained as 0.93 Cronbach Alpha coefficient which is between 95% confidence interval and  $p < 0.05$ , which is the reason why it's highly reliable.

### 1.1. Results and Discussion of Change Perception

We see differences in user behavior based on human capital, and prove that our first hypothesis is true. Results of change information and skill points can be seen in Table 1.

Table 1. Distribution of change points based on change perception

	N	Average	Standard Deviation
Innovators	56	12,2143	3,54049
Early Adopters	38	10,5789	2,90043
Early Majority	55	10,7636	3,43707
Late Majority	20	9,6500	2,85205
Laggards	7	10,2857	4,78589
Total	176	11,0398	3,43322

The results of ANOVA presented in Table 2 show us that change perception affects change information and skill points, that's why we can state that there are reasonable differences ( $f= 2,926$ ,  $p<.05$ ) among change information and skill points of the groups.

Table 2. ANOVA results of change information and skill points based on change perception

Variance Source	Square Sum	sd	Square Average	F	P.	Difference
Intergroup	132,124	4	33,031	2,926	,023	1-2, 1-3, 1-4,
Intragroup	1930,598	171	11,290			
Total	2062,722	175				

To determine between which groups the differences are belonging to, groups were compared each other. According to LSD test data; between innovators (x=12,21) and early adopters (x= 10,58) innovators is advantageously different, between innovators (x=12,21) and early adopters (x= 10,76) adopters is advantageously different, between adopters (x=12,21) and late adopters (x= 9,65) adopters is advantageously different. These results show that knowledge and skills of innovators are high.

### 1.2. Results and Discussion of Change Management Tools

We found a relation among change management tools such as leadership, participation, information, motivation, education, promotion, and this proves that our second hypothesis is true. Results are presented in Table 3.

We see through our survey that the most prominent obstacle against a change is habits, and when employees are not aware of the change but are forced to adapt to the change only because of managerial pressure, their resistance increases. There should be a consensus on the problem sources and the need to find solutions among employees. Necessity and contents of the change should be told clearly to them as well. In change management, it is very important to inform employees and get their feedback on every process.

Table 3. Relations between change management tools

N 176	I was informed on every part during deployment of HIS <b>Information</b>	I was asked about my opinions of HIS <b>Participation</b>	I've got enough training about HIS <b>Education</b>	I'm more motivated and professional with HIS. <b>Motivation</b>	Upper management fully supported HIS. <b>Leadership</b>	Upper management during deployment of HIS. <b>Upper Management</b>
I was informed on every part during deployment of HIS <b>Information</b>	1	,664(**)	,599(**)	,484(**)	,481(**)	,429(**)
		,000	,000	,000	,000	,000
I was asked about my opinions of HIS <b>Participation</b>	,664(**)	1	,460(**)	,461(**)	,447(**)	,447(**)
		,000	,000	,000	,000	,000
I've got enough training about HIS <b>Education</b>	,599(**)	,460(**)	1	,444(**)	,411(**)	,605(**)
		,000	,000	,000	,000	,000
I'm more motivated and professional with HIS. <b>Motivation</b>	,484(**)	,461(**)	,444(**)	1	,525(**)	,538(**)
		,000	,000	,000	,000	,000

Upper management fully supported HIS. <b>Leadership</b>	,481(**)	,447(**)	,411(**)	<b>,525(**)</b>	<b>1</b>	,456(**)
	,000	,000	,000	,000		,000
Upper management during deployment of HIS. <b>Upper Management</b>	,429(**)	,447(**)	<b>,605(**)</b>	<b>,538(**)</b>	,456(**)	<b>1</b>
	,000	,000	,000	,000	,000	

When employees support a change initiative, participate as soon as possible and contribute with their ideas and opinions to the change process, adaptation to the change gets easier. To decrease their resistance, one should support employees' participation to change process, and raise their motivation. Strong communication practices are known to affect employees' motivation. (Pugh, 2007, s.85)

Leadership is very important for the continuity of a change in terms of promotion, support, determination and participation. Using effective communication to manage the change, informing employees about every stage of the change, always letting communication channels to be open, listening others opinions, trying to understand the problems and creating sincere communication atmosphere to lead are making the management of change more successful.

Table 4. Relations between change management phases.

N 176	I'm aware of the benefits comes with HIS	I'm aware of the improvements comes with HIS.	HIS is important for the institution I work for.	HIS is important for my career.	I've got enough training about HIS	I know how HIS will be deployed.
I'm aware of the benefits comes with HIS	1	<b>,859(**)</b>	<b>,567(**)</b>	,458(**)	,382(**)	,459(**)
		,000	,000	,000	,000	,000
I'm aware of the improvements comes with HIS.	<b>,859(**)</b>	1	<b>,584(**)</b>	,485(**)	,454(**)	<b>,531(**)</b>
	,000		,000	,000	,000	,000
HIS	<b>,567(**)</b>	<b>,584(**)</b>	1	,478	,215	,338

is important for the institution I work for.	** )			(**)	(**)	(**)
	,000	,000		,000	,004	,000
HIS is important for my career.	,458(**) )	,485(**)	,478(**)	1	,492(**)	,460(**)
	,000	,000	,000		,000	,000
I've got enough training about HIS	,382(**) )	,454(**)	,215(**)	,492(**)	1	,724(**)
	,000	,000	,004	,000		,000
I know how HIS will be deployed.	,459(**) )	,531(**)	,338(**)	,460(**)	,724(**)	1
	,000	,000	,000	,000	,000	

1.3. Results and Discussion of Change Management States

We found a relation among change management states such as readiness, perception, eagerness, knowledge, ability, reinforcement and this proves that our third hypothesis is true. Results are presented in Table 4.

Employees' resistance and behavior against the change is found to be strongly related to change management states such as awareness, readiness, perception, and eagerness. Employees who are ready to embrace the change and got enough training can guess the effects and benefits of the change and are taught to increase their awareness of the change support and know how it will be happen. Employees who are aware of the change will understand its importance for their career and the business they work for.

Table 5. Relations between user satisfaction and health information systems

	Treatment processes on HIS are easy enough to perform my work.	I can reach the statistics that I need fast and precisely.	Laboratory, radiology and other services get faster with HIS.
<b>N 176</b>			
Treatment processes on HIS are easy enough to perform my work.	1	,616(**)	,568(**)
I can reach the statistics that I need fast and precisely.	,616(**)	1	,526(**)
Laboratory, radiology and other services get faster with HIS.	,568(**)	,526(**)	1

1.4. Results and Discussion of Health Information Systems, and User Satisfaction

Health information systems, their software, hardware and performance are found to be strongly related to user satisfaction, and this proves that our fourth hypothesis is true. Results are presented in Table 5. Advancements which come from the new information systems provide convenience in regards with reaching to the needed statistics fast and precisely, obtaining laboratory and radiological data correctly and rapidly. Hence, employees begin to work with these simplified data more efficiently.

1.5. Results and Discussion of Security, Legal, and Privacy Rules

Performance of health information systems is found to be strongly related to security, legal rules and privacy and this proves our fifth hypothesis. Results are presented in Table 6.

Table 6. Relationship between security, legal rules and privacy.

	Patients' records are kept more secure and privately with HIS.	Private and secret data stored by HIS are found to be suitable with the mandate of electronic health data privacy laws.	HIS is found to be suitable with patient communication and permission rules.	HIS is found to be suitable with patients' permit of intended use of their data.
<b>N 176</b>				
Patients' records are kept more secure with HIS.	1	,739(**)	,457(**)	,423(**)
		,000	,000	,000
Private and secret data by HIS are found to be suitable with the mandate of electronic data privacy laws.	,739(**)	1	,698(**)	,538(**)
	,000		,000	,000

HIS is found to be suitable with patient communication and permission rules.	,457(**)	,698(**)	1	,757(**)
	,000	,000		,000
HIS is found to be suitable with patients' permit of intended use of their data.	,423(**)	,538(**)	,757(**)	1
	,000	,000	,000	

Private and secret data stored by new information systems are found to be suitable with the mandate of electronic health data privacy laws. Moreover, patients' permit of the use of their data in accordance to privacy rules of hospitals is found to be suitable with patient communication and permission rules.

## CONCLUSIONS

Hospitals are complex organizations in terms of structural processes, technologies, standards, and manpower. Health information systems are affected by technological advancements, international regulations, health politics, quality assurances, integration to other health systems. They are, therefore, bound to change continuously.

When employees support a change initiative, participate as soon as possible and contribute to the change process with their ideas and opinions, adaptation to the change gets easier. Employees, who gets enough training, ready to change and aware of it, understand its importance for their career and the business they work for.

Success of change management lies on human side of the change rather than setting up modern technical systems. Change must be in the management cultures and be embraced by all employees. Success can only be achieved by education, transparency, communication, elasticity and developing innovation and change cultures among employees. Successful change management contributes highly in regards with quick problem resolutions, increased motivation of employees, effective use of the sources and increased quality of service in institutions.

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