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## E-Health readiness assessment tools for healthcare organizations in developing Countries: The case of Saudi Arabia

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### Abstract

E-health readiness is described as the healthcare institutions/communities preparedness for the expected changes resulting from Information and Communications Technology (ICT) programs. In this paper, the assessment tools of e-health readiness that has been created for healthcare institutions are presented in the context of developing countries. The study primarily aimed to assess the e-health readiness of the ICT potential users in a number of medical and paramedical disciplines in the public health sector located in Western Saudi Arabia. The study also identified the potential users' personal characteristics that may have had a hand in impacting such readiness. Accordingly, the study developed tools through participatory action research to highlight the opinions of partners, review current tools, and develop and propose a conceptual framework, built on extant literature regarding the access to e-health determining constructs. The proposed conceptual framework was examined along with the validity and reliability of the tools, the result of which is addressed in separate papers following the collection of data. In sum, the study presented assessment tools for e-health readiness for healthcare providers and managers in healthcare organizations, in developing countries, particularly Saudi Arabia.

**Keywords:** Information and Communications Technology (ICT), E-health, Western Saudi Arabia

### 1. Introduction

In healthcare organizations and institutions, healthcare providers have been in constant pressure to make use of evidence-based data in their medical practice for enhanced quality of health services. In this regard, information and communication technologies (ICT) have been a great addition as an innovative method implemented in healthcare institutions to enhance healthcare services in terms of their effectiveness and efficiency<sup>[1]</sup>. Such ICT applications leveraged by the healthcare sector are referred to as e-health<sup>[2]</sup>, and they come in different forms and functions to achieve multiple objectives, ranging from the delivery of healthcare services to fulfilling administrative work.

Generally speaking, e-health contributes to enhancing healthcare quality and safety, limit costs, manage information, and provide continuous services and access to the services provided in healthcare institutions<sup>[3]</sup>. Despite the advantages, e-health provides, however, the rate of its progress throughout developing nations is still lagging, with costly outcomes because of the poor infrastructure and lack of trained workers<sup>[4]</sup>. This is evident from the struggle that health professionals face when dealing with health records computerization, particularly when they have to deal with newly introduced technologies. To compound the matter further, e-health expansion and adoption rate among healthcare professionals remain rife with issues despite the fact that its application has been deemed to bring on revolutionary modifications in the practices of healthcare professionals and healthcare organizations<sup>[5]</sup>.

Hence, considering the high rate of failure<sup>[6]</sup>, it is evident that e-health initiatives need informed planning to increase the chances of success and in relation to this, readiness for change in health organizations needs to be measured<sup>[7, 8]</sup>. Basically, organizational readiness for change refers to the level to which members of the organization are behaviorally and psychologically prepared to bring about the change and to adapt to it<sup>[9]</sup>. In related studies, organizational readiness is a pre-requisite for innovation adoption success<sup>[9-11]</sup>.

Moreover, the organizational and human aspects have been scrutinized as the failure behind ICT application adoption<sup>[12]</sup>, and the findings indicated that organizations who provided management and training for their health professionals in the pre-application of e-health

technologies, really made a difference in promoting positive perceptions among them towards the technologies [13].

As a consequence, health professionals' characteristics and readiness towards e-health prior to its adoption have to be determined and recognized. Various case studies stressed on the importance of the characteristics of users, with mainstream cases revealing the issue of e-health application adoption to be related to oversight of technical and social aspects [14-16].

In the same line of study, end-users interactivity with technology has been largely ignored in literature and technologies expansion and application are often developed based on other criteria rather than requirements of users. Thus, the main issues in adoption of new innovation appear to stem from human factors and social aspects as highlighted in literature [17-18]; for instance, user's experience (human factor) in using technology and his/her age, have a key role in his/her acceptance and use of e-health [19-20], and have been underlined as one of the top reasons behind failed ICT application attempts [12, 21, 22]. There is therefore a need to determine and confirm the end-users' characteristics and their influence on e-health application success.

## 2. Literature Review

On the basis of reviewed literature, there are complex changes that are currently happening in our daily lives and thus, such changes need to be addressed in a suitable and timely fashion [14-16]. Change management studies have generally indicated that employee readiness is the topmost factor that brings about successful and effective organizational change implementation. Because employees possess various characteristics, motivational approaches, knowledge, values and behaviors, their different responses are dependent on their personal attitudes, beliefs as well as intentions [23-24].

It is interesting to note that employee readiness is built on the proximal perception of the employees and it varies based on their experiences, internal and external environment, knowledge and their future expectations. Literature dedicated to employee readiness factors has been categorized into individual factors and workplace factors [25], with the former related to personal, psychological and social aspects of the individual. These influence the employee's level of doubt concerning the change initiatives. For the latter factors, studies showed that employee's expectation and assumption stem from the environment they are surrounded with in the workplace [26-29]. Studies in this caliber highlighted organizational environment, culture and factors in the workplace facilities [27, 29, 30-34]. These factors, individually and in combination, were evidenced to have a significant effect on change programs implementation.

Aligned with the above studies, published relevant works in developed nations revealed that organizational culture, environment and employee behavioral approaches differ from their developing counterparts, like Saudi Arabia. To the best knowledge of the researcher, studies carried out in Saudi Arabia that examined the four domains, namely individual factors, contextual factors, perceptions of structural empowerment and work opportunities, and organizational factors. Individual factors influence the readiness of health professionals for changes in the healthcare sector and so do contextual factors, which focuses on the health professional's practice environment

and their perceptions of structural empowerment and work opportunities. Lastly, organizational factors focus on emotional climate within the organization through the individual's emotional level and thus, studies need to focus on these factors.

Therefore, the main objective of this study is to examine the attitudes and behaviors of health professionals towards organizational change in the public health sector of Saudi Arabia. This study is justified by the Saudi government's introduction of reforms in the public health sector in accordance with Vision 2030 – with one of those reforms being the e-health implementation. Such implementation is geared towards enhancing healthcare services quality and cost saving, as well as to increase healthcare services access and the information provided to the inquiring patients.

## 3. Methodology

### 3.1 Study Design

The study adopted a descriptive exploratory cross-sectional design, with an online questionnaire distributed using social media websites and applications. A link for the questionnaire was forwarded to the participants accounts through WhatsApp groups and Twitter. Each questionnaire included the title of the study, the purpose behind it and the approximate time of completion. Following the participants' provided consent, they can click 'start the survey' and proceed to answer the questions within it.

### 3.2 Study Procedure

The study used opted for online data collection method because of the current curfew imposed by the Saudi authorities, and accordingly, the study used Google forms for this purpose. The study ensured that data was kept confidential and gathered following the go-ahead from the authorities. The study population comprised of ICT potential users from different medical and para-medical disciplines in the public health sector of Western Saudi Arabia. Such population consists of physicians, physiotherapists, psychologists, occupational therapists – from the clinical staff, secretary and archivist from the non-clinical staff, and directors and program managers from the management staff. Respondents were selected based on their access to computers and smartphones and their access to the institution's email address. The size of the sample was calculated using Krejcie and Morgan's (1970) table [35].

### 3.3 Instrument for Data Collection

The constructs convergent and discriminant validity were ensured by selecting their measurement items from prior relevant studies.

#### 3.3.1 First Tool

The first part of the questionnaire contained items measuring individual factors that influence the readiness of healthcare professionals for organizational change. This part is divided into two, with the first one dedicated to obtaining respondents' demographic characteristics including age, marital status, educational qualification, place of work, years of experience in healthcare, and years of experience in the unit/department. As for the second part, it contained items concerning the readiness of the healthcare professionals and their resistance or organizational change adopted from [36 - 37]. This part covered 19 items, with the items responses gauged by a scale ranging from 1 (strongly

disagree) to 5 (strongly agree).

### 3.3.2 Second Tool: Healthcare Professionals' Work Index

The second tool is the Healthcare Professional's Work Index developed by [38], after which [39] conducted its revision. The tool measures contextual factors affecting healthcare professionals' readiness for organizational change and their practice environment, through 15 items. The main scales have the following sub-scales and measurement items; autonomy was measured by three items, control over healthcare professionals' practice was measured by six items, educational opportunities was measured by three items, and health professionals' relationship was measured by three items. The responses to the items were measured on a 5-point Likert scale that ranged from 1 (strongly disagree) to 5 (strongly agree).

### 3.3.3 Third Tool: Conditions of Work Effectiveness-II Questionnaire

The third tool, which is Conditions of Work Effectiveness-II was adopted from [40], and it addresses the perceptions of healthcare professionals of structural empowerment and work opportunities through 13 items with four sub-scales for perceived access to organizational factors. The sub-scales are as follows, opportunities measured by three items, information measured by three items, support measured by four items and resources measured by three items. The responses to the items were gauged through a 5-point Likert scale that ranged from 1 (strongly disagree) to 5 (strongly agree).

### 3.3.4 Fourth Tool: Geneva Emotion Wheel

The fourth tool was developed by and adopted from [41 - 42] to measure organizational factors affecting healthcare professionals' readiness for organizational change, focusing on emotional climate within the organization through the aggregate measures of the emotions of the individual. The responses were gauged through a checklist, requiring a tick mark on one of the emotions selected, which best represents the overall emotional tone of the healthcare system organization. The responses were also gauged using a 4-point Likert scale ranging from 1 (low intensity) to 4 (high intensity). There were four categories of emotions, 1) positive high control emotional climate that covered pride, elation, joy and satisfaction, 2) positive low control emotional climate that covered relief, hope and interest, 3) negative high control emotional climate that covered envy, disgust and anger, and lastly, 4) negative low control emotional climate that covered sadness, fear, shame and guilt.

## 4. Conclusion

The study of e-health readiness paves the way for progressive changes in the organization with the involvement of staff, from resistance to acceptance of new ideas and change preparedness. Such study could serve several advantages, among which are to avert money losses and to save time and effort, prevent delays and avoid staff frustrations and those of service users and planners.

In other words, organizational readiness assessment, particularly of healthcare organizations is the right step to take for successful e-health implementation. In this study, different perceptions of users' of e-health at the individual,

organizational and technological levels were obtained and examined. This study recommends that decision-makers focus on the influence of personal factors (age, position/duties) and perceived workload in the organization among healthcare workers when planning and implementing technological health initiatives. In this regard, ICT implementation calls for a tailor-made approach to the organization and to the employees working within it. Successful e-health technologies implementation calls for more studies to examine the topic of organizational readiness and validate tools such as e-health readiness and the implementation strategies effectiveness within the organization.

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