Developing a Conceptual Framework to Assessment of E-Health Status

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Abstract: Background and Objective: E-health is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. The aim of the present study suggests some factors that are directly influencing progress of e-health with factors were present in some manner that can be used to evaluate and assess e-health overall status in some specific organizations specifically in case of developing country. **Methods:** This study describes the components of the framework; this includes the conceptual model on the implementation, activities and contextual factors that may affect implementation, or the results it produces. Data was collected and based on literature review and qualitative approach like interviews, documents and participatory observations with informal discussions. Survey questionnaire was used to collect data from medical professionals and health care providers besides these interviews were also conducted with prominent administrative heads for expert opinion. **Results and conclusions:** On the basis of this study the factors which needs to considered and evaluated are accessible in categorized form; assets these components are interlinked and affecting other factors resulting effects on overall e-health in general. This conceptual framework presents an evaluation platform for e-health programs by addressing key elements that are crucial for success of a program. A complete picture of an organization can be drawn by applying this framework that organization has proper policies, appropriate infrastructure, human resource and funding before implementation of e-health programs.

1. INTRODUCTION

E-health is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology (Eysenbach, 2001).

E-health has become more focused area by health professionals due to the involvement of latest information and communication technology developments. The objective of e-health applications, as commonly understood, includes the promotion of the greater use of ICT in health-care systems in order to improve efficiency, access and accountability of health-care services (Fedorov, 2007). To ensure the maximum benefits and increasing e-health effectiveness and success, it is important to assess and evaluate the status and progress of e-health. The significance of evaluation in the area of e-health/telemedicine cannot be overemphasized: the field is in its infancy and while its promise is great, evaluation can ensure maximization of benefit (WHO,

2010). Without evaluation, we cannot make claims that e-Health has brought benefits. Evaluation needs to be part of inception and implementation of the program. Too often, evaluation is left to the end of a program, more of an after-thought (Pappas, 2008).

Evaluation is a systematic determination of a subject's merit, worth and significance, using criteria governed by a set of standards. It can assist an organization, program, project or any other intervention or initiative to assess any aim, realizable concept/proposal, or any alternative, to help in decision-making; or to ascertain the degree of achievement or value in regard to the aim and objectives and results of any such action that has been completed (ICAP, 2014). Evaluation can be considered as an essential part for any program to identify success, highlighting problems and weakness to be rectified. It can be an effective base to aid further development in existing status of programs.

2. METHODOLOGY

This study design was based on literature review along with gather information using qualitative method. Descriptive types of survey were conducted. As far as qualitative approach is concerned, mixed method approach with in-depth interviews and focused group discussions were done to collect the data from medical professionals and health care providers

besides these interviews were also conducted with prominent administrative heads with expert opinion. The method of data collection used was "Questionnaire", in which questions asked with the purpose to meet desired objectives.

3. RESULTS

On the basis of this study the factors which needs to considered and evaluated are accessible in categorized form; assets these components are interlinked and affecting other factors resulting effects on overall e-health in general. The framework presents three levels: initial, medium and fully implemented.

i.   Motivational factors

Findings of research which indicates the motivational factors a firm source for initiating any e-health project. Motivation is the crucial element in setting and attaining goals. Motivational factors are a base to drive attention of health professionals towards initiating e-health programs. In the designed framework first step is given to motivational factors and these are categorized as follows according to their nature of usability.

- Cost Effectiveness
- Time Saving
- Automation / Administration
- Quality Improvement

After successful implementation of e-health programs these factors turns into the benefits earned to specific organization /state and motivation for others.

ii. Policy & Planning

The development of coherent policies and comprehensive plan is crucial for the success of e-health projects. Obtaining maximum outcomes from a project is depending on how much time spent on policy formulation and planning. Next step has been given to policy and plans. Analysis is that at what stage policy making process; can determine the e-health status of organization. If organization has just proposed some objectives for e-health they are at initial stage, if some separate committee is working on specific plan of e-health organization is at medium phase and in case of having comprehensive policy and plan they are at final stage.

iii.   Financial issues

Through the literature review it was also find that one of the major problems of unsuccessful projects is lack of funding, whilst proper utilization of funds is another important issue. For implementation of e-health project, after devising a plan next considerable factor is proper allocation of funds. It can be evaluated as:

- If funds are allocated for improvement of IT Services and automation of administrative tasks for general work, it is staged as Initial.

- If allocation of funds depends on the nature of e-health project and on the availability of e-health projects are not on priority, then it is at Medium.

- If a separate fund is allocated for e-health projects and research and development, it is fully implemented.

iv.   Human Resource Development and capacity

Health professional and staff associated with e-health projects require appropriate skills to use the technology and tools. Assessment of Human resource capacity to work with technology can result in successful project implementation. HR development is placed on fourth step and categorized as under:

Initial – If HR has basic IT skills (PC operating, office automation, basics of networking).

Medium – If medical professionals (doctors, paramedics) are familiar with IT and capable to maintain computerized medical records along with the efficient usage of computers for research and development.

Fully Implemented – Personnel are dealing with developing specialized e-health services like HMIS, EHS, HIS.

v.   Infrastructure

Infrastructure is so much important considered as a backbone of e-health that's why it is step just before implementation. It includes equipment, installation, maintenance and ongoing support. Evaluation level for infrastructure categorized as below:

- PC is the basic unit for the infrastructure of IT and e-health applications; PCs also used for office automation, so availability of stand-alone PCs and Laptops, servers for Basic IT services like ISA, email, anti-virus servers will be staged as Initial.

- Establishment of separate department for IT to tackle the IT issues and development of e-health applications staged as Medium.

- Fully Implemented – Infrastructure has to be considered as fully implemented if following are established:
  - Fiber optic / wireless / wi-fi network connectivity,
  - Interconnection of different departments,
  - Specialized / customized e-health applications and centralized e-health servers.

vi.   Implementation

Lastly Implementation of e-health is categorized as:

Initial - Basic computer applications on stand-alone machines to maintain medical records and to compose and printouts of different reports.

Medium – specialized software's used by concerned on their specific, trail or pilot projects will also fall in medium phase. Wholly Implemented – if

organization has functional e-health system such as   HMIS, MIS.

Table 1. Tabular Description of Conceptual Framework

|	POLICY & PLANNING	FINANCE	HR DEVELOPMENT	INFRASTRUCTURE	APPLICATIONS/ IMPLEMENTATIONS
INITIAL	Just a proposal by any dept.	Funds allocated for improvement of IT services and office automation	Basic IT skills (PC operating, office automation, basics of networking)	Servers for Basic IT services(ISA, email, anti-virus servers) Establishment of separate IT department	Simple computer applications to maintain data and compose & printing
MEDIUM	Committee working on policy formulation	Funds allocated for e-health projects depends on availability/ no priority	• Medical professionals enable to use specific e-health applications. • Efficient usage of IT for R&D	Development/ deployment of e-health applications	• Specialized softwares used by concerned on their own, • Trail or pilot projects
FULLY IMPLEMENTED	Policy devised/ approved	• Separate fund allocation for e-healh projects • E-health R&D	Personnel dealing with/ developing specialized e-health services like HMIS, EHS, HIS	• Smart networks • Interconnection of different departments, • Specialized/customized e-health applications and centralized e-health servers.	Fully functional e-health system such as HMIS, MIS.
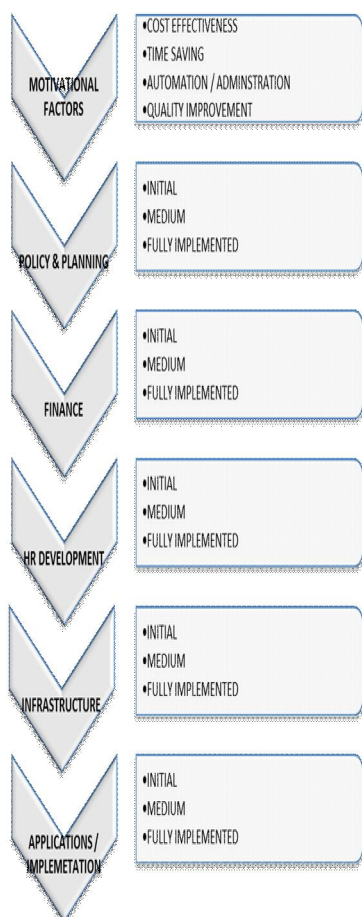
Figure 1. Conceptual Framework

4. DISCUSSION

As in case of developing country, e-health is in its infancy stage and very few projects have been initiated. But reports shows the failure of most projects because of many problems such as lack of policy and proper planning, lack of funding, lower human capacity to work with latest technology and tools. So most of the projects got fails during implementation phase while many of the projects are running separately by organizations. It is important to have some criteria to evaluate and monitor e-health projects during implementation. This study suggests some factors that are directly affecting progress of e-health. In this study these factors could presented in some manner that can be used to evaluate and assess e-health overall status in some specific organizations specifically in case of developing country.

The main aim to develop this conceptual framework is to set a standard criteria for the evaluation of an e-health project and locate our position that where we are standing. It reports key elements for assessment of e-health for health care institutions in developing countries, along with some important planning issues such as influencing factors, implementation, assessment and evaluation. With the help of this framework willingness to adopt new program can be measured before implementation of e-health projects, as it covers many aspect from very initial stage. Implications of the projects can also be projected in the beginning by following these factors.

Motivational factors for adopting/implementing of e-health programs can be sought by the help of this framework, which lead to devise a policy, suitable for the desired results. Financial issues can also be

addressed in order to calculate the financial health of the project either funds are available only for automation or separate funds are allocated for e-health projects implementation and R&D in the field. Finally the implementation of the project as a whole can also be evaluated in this framework. With a simple survey of available resources a picture can be drawn, either the IT is being used as an office automation and database tool or it is working as HMIS and remote health-care facility.

Addressing the conditions of e-health projects running in health organizations in developing countries will help in reducing the digital divide; by considering these factors one can identify the weaknesses and can plan comprehensively. As this framework is based on the conditions of Pakistan and it is applicable to most developing countries of the world especially of this geographical region.

Center of any evaluation is to know the amount of change between the initial and current point and where we should be. Change between the two points means the present position of the institute. And "where we should be" means the goal set in the policy and designing of the program. If the gap between goal and current status is low the project is going in right direction and *vice-versa*

CONCLUSIONS

This conceptual framework presents an evaluation platform for e-health programs by addressing key elements that are crucial for success of a program. A complete picture of an organization can be drawn by applying this framework that organization has proper policies, appropriate infrastructure, human resource and funding before implementation of e-health programs.

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REFERENCE
1. Ahern, David K; Kreslake, Jennifer M; Phalen, Judith M; Bock, Beth. "What Is e-health (6): Perspectives on the Evolution of e-health Research". *Journal of Medical Internet Research* (Jmir.org) 8. Retrieved 15-04-2012.
2. Androuchko, V. and Malik, A.Z (2008). Pakistan – How To Speed Up the Introduction of E-health Services in Developing Countries.
3. Carlos A. Meier, Maria C. Fitzgerald, and Joseph M. Smith. July, 2013. E-health: Extending, Enhancing, and Evolving Health Care, *Annual Review of Biomedical Engineering*, West Health Institute, California. Vol. 15: 359-382.
4. D Silber, *The case for e-health*, paper presented at the European Commission's first high-level conference on e-health, May 22–23 2003, European Institute of Public Administration, 2003, viewed 28 February 2011,
5. Eysenbach, G. "What is e-health?". *Journal of Medical Internet Research* (Jmir.org) 3 (2): e20. Retrieved 15-04-2012.
6. Fedorov,G, 2007. E-health in asia and the pacific challenges and opportunities. *UNESCAP, Bangkok, October, 2008.*
7. Khoja, S. And Scott, R. (2008). Developing a Conceptual-Framework for E-Health Readiness Assessment Tools for Developing Countries.
8. Khoja, S. et al, 2008. E-health readiness assessment: promoting "hope" in the health-care institutions of Pakistan. *Journal of World hospitals and health services,* 44(1). pp 36-8.
9. Mishra, S. *et al.* 2008. The Current Status of e-health Initiatives in India, *making the e-health connection,* Bellagio Italy July 13 – August 08 2008.
10. Pappas. G. and Khoja. S. (2008) Prospects for improving health in Pakistan, using e-health: Lessons learned and a proposal. COMSATS series of publications on Science and Technology.
11. WHO, 2010. TELEMEDICINE opportunities and developments in member states. *Global Observatory for e-health series.* Volume: 2.
12. World Health Organization, 2011. Atlas e-health country profiles: based on the findings of the second global survey on e-health.
13. http://www.icap.org/policytools/toolkits/evaluationtoolkit/2whatisevaluation/tabid/441/default.aspx (retrieved on 10th December, 2014).

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