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Evaluation Criteria for Frameworks in E-Health Domain

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ABSTRACT

Framework articles are commonly used to synthesise research literature on a topic area, and provide a thorough description and evaluation of the work done, setting directions for future research. There is a need for criteria that can both guide authors to develop comprehensive frameworks, and for reviewers to evaluate these articles, especially in complex areas such as E-Health. By assessing a representative sample of journals and databases most likely to publish E-Health framework articles, we present a set of criteria for the evaluation of framework articles and identify the most salient features for this type of publications. Our findings suggest that a “good” framework article should aid researchers in understanding the research area, have clearly defined boundary, consist of a parsimonious set of elements and have clear guidelines on what to expect for a problem within that framework. We also found that framework articles in the E-Health domain can be characterised according to their objective, comprehensiveness, relationship with the boundary of the research stream, temporal nature, elements examined and substantive output. This paper describes how we arrive at the criteria for evaluating E-Health frameworks, and illustrates how we can apply them on a specific framework.

Keywords

Evaluation, Criteria, Framework, Healthcare, E-Health

1. INTRODUCTION

Healthcare, which spans across all ages, genders, races, culture and geographical boundaries, is an area of concern to all population. Countries are plagued with critical healthcare issues (e.g. chronic, infectious and pandemic diseases) and a lack of basic healthcare programmes and facilities (WHO, 2006; Watts et al. 2005). Poor healthcare directly affects mortality levels, obstructs prosperity and business profitability, and does not help reduce poverty (Li et al. 2008b). E-Health is an application of information and communication technologies (ICT) across the whole range of functions that affect health (Silber, 2003). It promises to address some of the aforementioned healthcare issues by providing evidence-based healthcare (Overhage et al. 2001) and increasing medical practice efficiency (Ammenwerth et al. 2004).

Although interest in E-Health is generally high, E-Health system implementations pose considerable problems in terms of unfavourable implementation environments (e.g. ICT infrastructure, human related challenges, legal and financial challenges) (Li et al. 2008b). As a result, E-Health benefits may not be fully reaped (Li et al. 2008b).

In order to understand these problems and to achieve better healthcare outcomes, framework articles have been increasingly published to synthesise the vast amount of healthcare related articles appearing in multidisciplinary outlets. Frameworks provide a thorough description and evaluation of the work done in an area, setting directions for future research (Webster and Watson, 2003; Davis, 2003). Understanding framework articles is a challenge. This is because frameworks are the product of

analysing a substantial volume of literature which is often difficult to organise around specific themes (Schwarz et al., 2007). Each of the research cited in framework articles has been conducted in vastly different context and scope, which makes it difficult for researchers new in the area to understand, define and scope an area worth further investigation. New researchers usually begin by undertaking his/her own literature review. This challenge suggests the need for a set of criteria that can guide authors develop framework articles and reviewers to evaluate relevant articles. To identify and define the criteria, Schwarz et al. (2007) developed a clear understanding of what constitutes framework articles. However, their criteria are quite high-level and are not specific to the E-Health domain which is substantially more complex, spanning, across diverse disciplines. Specifically, their criteria did not include E-Health articles. Therefore, their criteria are not suitable for evaluating E-Health frameworks.

To address these limitations, this paper aims to develop a set of evaluation criteria for evaluating E-Health frameworks. We base and modify our procedure on prior work by Schwarz et al. (2007). This procedure is first described in Section 2. Then the purpose and characteristics of E-Health frameworks are summarised in Section 3 and 4 respectively. In Section 5, we describe a list of criteria for assessing E-Health framework articles. In Section 6, we apply it to one recently published framework article. In the final section, we conclude with a summary of our work, some tentative implications, current limitations and future work.

2. EXAMINING HEALTHCARE FRAMEWORK ARTICLES

This involves six steps, modified from Schwarz et al (2007). The first three steps facilitate the location and identification of relevant articles. The last three steps focus on analysing content. These steps are described below.

Step1: Selection of articles for review

The types of outlets most likely to publish E-Health frameworks are first identified by consulting healthcare researchers. The articles examined are based on the following criteria: (a) the words “framework” and “electronic health” (or “E-Health”) appearing in paper title, abstract or keyword list; or the words “evaluation”, “framework” and “electronic health” (“E-Health”) appearing in the title, abstract, keyword list, or paper body; and (b) E-Health framework papers are published in peer reviewed healthcare-related outlets. Based on these, we selected the articles from the following databases or journals: Web of Science, JAMIA, Medline, PubMed, CINAHL, PsychInfo, ERIC, ProQuest Science Journals, EMBASE and Evi.sagepub.com. (See Table 1 for sources of articles.)

Database (DB) or Journals (J)	Criterion (a)	Number of Selected Articles	Number of Filtered Articles
Web of Science (DB)	Framework and electronic health (E-Health)	20	6
	+Evaluation	134	13
JAMIA (J)	Framework and electronic health (E-Health)	2	0
	+Evaluation	16	4
Medline (DB)	Framework and electronic health (E-Health)	42	19
	+Evaluation	90	15
PubMed (DB)	Framework and electronic health (E-Health)	49	23
	+Evaluation	11	6
CINAHL (DB)	Framework and electronic health (E-Health)	9	4
	+Evaluation	18	6
PscInfo (DB)	Framework and electronic health (E-Health)	4	2
	+Evaluation	3	1
ERIC (DB)	Framework and electronic health (E-Health)	3	0
	+Evaluation	1	0
ProQuest Science Journals (DB)	Framework and electronic health (E-Health)	1	0
	+Evaluation	9	1
EMBASE (DB)	Framework and electronic health (E-Health)	24	14
	+Evaluation	61	14
Evi.sagepub.com (DB)	Framework and electronic health (E-Health)	/	/
	+Evaluation	52	3

Table 1. Sources of Selected Articles

Evaluation articles are separately selected, as their inclusion helps to increase the validity of the findings. Evaluation has been defined as an act of measuring or exploring properties of an IS (in planning, development, implementation, or operation phase), the result of which informs a decision to be made concerning that system in a specific context (Ammenwerth et al. 2004). Specifically, “evaluation” is a broad term for various methods and strategies for identifying the effects and assessing the value, feasibility, or other qualities of a technology, programme, or policy (Field, 1996). Increasingly, more evaluation articles have been published in the Web of Science.

Step 2: Filtering relevant articles

The criteria for filtering articles are:

- a. Articles which never mentioned or used the term “framework” in the entire text, title or abstract, but had framework papers listed in the reference section. These articles were ignored after a quick scan to see if the article included more than a casual citation to that reference.
- b. Articles that used the terms only when referring to another person’s work, or an entire literature, such as “Porter’s framework” or the “transaction cost framework”. In addition, a framework sometimes is simply used as an alternative term in place of “stream of research”, “this line of reasoning”, “concept”, “idea”, as in “legal framework”, “transaction cost framework” and so on. These articles were eliminated after confirming that they primarily elaborated on how they used these “frameworks”.

As a result, the framework articles for review are finally established. (Table 1: Number of Filtered Articles)

Step 3: Identification of content and structure

Abstracts and full text were scanned to identify the definition, usage and purpose of the articles. Relevant text was extracted or was re-typed verbatim. For example, one paper titled *Access and Authorisation in a Global e-Health Policy context*, provides guidance in four policy areas related to telehealth: organisational context, human resources, technology and equipment, and clinical standards and outcomes, to avoid potentially jeopardizing E-Health because decisions made in one jurisdiction might hamper, or even prevent an E-Health opportunity in another (Scott et al. 2004).

Step 4: Evaluation of content and structure

Once the content and structure were identified, evaluation was added to the database, including (a) what the article was trying to accomplish; (b) whether the article had any structure; (c) whether the objective of the article was to evaluate the status of the field or to suggest future research and; (d) whether the article was comprehensive or selective. A summary of the purpose, the structure, and the objective of each article were also included in the database and are summarised in Table 2. Importantly, the main evaluations of the article were the objective (purpose) and structure of the framework, and characteristics of a good framework, as espoused by Schwarz et al. (2007).

Step 5: Grouping of purposes

In this step, common themes centred on the purpose/objectives of framework articles were identified and grouped. All citations first used to establish the evaluated purpose of the article in Step 4 were noted. These citations and common themes were then used to group articles with similar objectives, structures, and characteristics. This step yields 42 statements related to the purpose/objectives of framework articles. Based on the perceived commonality of the themes, the purposes of the frameworks were grouped into eleven clusters. The resulting clusters represented another level of abstraction (Schwarz et al. 2007).

Step 6: Cluster analysis and validation

We used a validity procedure adopted by researchers to search for convergence among multiple sources of information and methods of data collection and analysis (Patton, 2002; Creswell and Miller, 2000). These purpose statements were analysed within, and across the clusters so as to ensure consistency and independence. The abstracted clusters were then given labels and reviewed once more for consistency. As a result, reassessment and re-labeling were performed for some articles. This step was repeated until a consensus was reached on the labels for abstracted categories of the purposes. In the final analysis,

articles were reassigned to appropriate clusters. This step ensured that there was consistency across and within the clusters.

3. PURPOSE OF FRAMEWORK ARTICLES

Applying the steps defined in Section 2, we propose 11 purposes associated with framework articles in the E-Health domain (See Table 2).

Most of the purposes (except 10 and 11) have been identified in Schwarz et al.'s study (2007). Although those purposes associated with framework articles are considered mutually exclusive, attention should also be paid to those articles which have more than a unique purpose. For instance, the framework article (Khoja et al. 2007) integrated previous research studies, and also proposed the legitimate boundaries for the E-Health area.

A close examination of the above 11 objectives of frameworks suggests that an overarching objective of a framework in E-Health is to find new opportunities for research and subsequently synthesise and integrate prior research, with a view to assisting major stakeholders (e.g. formulation and implementation of E-Health policies for practitioners and academics).

4. CHARACTERISING FRAMEWORK ARTICLES

The previous analysis suggests underlying dimensions to characterise framework articles in E-Health, based on Schwarz et al. (2007). These dimensions are: objective (Dimension1), comprehensiveness (Dimension2), relationship with the boundary of the research stream (Dimension3), temporal nature (Dimension4), elements examined (Dimension5) and substantive output (Dimension6). They provide a basis for integrating the preceding similarities and differences in the elicited purposes. A framework focuses on the integration of previous literature, but it only needs to examine that portion of the literature necessary to adequately unify the particular research streams being considered rather than being comprehensive. Extending the argument about the need for a framework to present a cohesive and comprehensive theoretical system, the framework subsequently gives a definition of what does (and does not) constitute the boundary of research stream. Furthermore, the framework is concerned with higher-level concepts and relationships among these concepts. It tends to have a prospective focus and thus can be used prescriptively for defining what lies ahead. Finally, the output of the framework (represented using models, tables, figures and/or descriptions of key variables) results from an attempt to conceptualise subject areas.

5. FRAMEWORK ARTICLES: DEFINITION AND CRITERIA FOR EVALUATION

Drawing from Schwarz et al. (2007), a framework in the E-Health area can be defined as an exposition of a set of concepts, values and practices that constitutes a way of understanding or studying the research issues related to E-Health within a body of knowledge. This exposition is intended to integrate or to summarise a research topic from a researcher's perspective (Schwarz et al. 2007).

To guide E-Health researchers/reviewers in the development of frameworks and the assessment of the quality of these frameworks, a set of criteria is suggested in Table 3. Criteria 1 to 17 were adapted from the desirable qualities of a framework (Schwarz et al., 2007). The final criterion was identified with the new findings documented in Section 3. As a whole, these criteria reflect multiple approaches to understanding the structure of E-Health frameworks, such as eleven associated purposes and six underlying characteristic dimensions. A note of caution is warranted here – these criteria should not be used by authors and reviewers as a *checklist* to assess the relative goodness of a given framework; rather, the list of criteria suggests desirable qualities for framework articles in the E-Health domain.

Abstracted Purpose	Evaluated Purpose
1.To integrate previous research studies	<ul style="list-style-type: none"> To organise/structure/relate large body of findings (Ammenwerth et al. 2003; Philips et al. 2004) To locate different research efforts into the big picture (Bell et al. 2004; Dansky et al. 2006) To integrate across standard organisational perspectives (Chute et al. 1998) To integrate across theoretical perspectives (Connell et al. 2007; Jennett et al. 2003; 2004; 2005 ; Khoja et al. 2007) To integrate across disciplines (González et al. 2006; Gregory et al. 1995; Hypponen et al. 2007) To encourage dialog across perspectives (Philips et al. 2004)
2.To theorise about a phenomenon	<ul style="list-style-type: none"> To categorise data to understand research background (Ali et al. 2007; Orfanidis et al. 2004) To study support environment and thus facilitate the development, evaluation, or clinical practice of E-Health applications (Ammenwerth et al. 2003; Bell et al. 2004; Hanrahan et al. 2006; Olabarriaga et al. 2007) To accommodate a specific E-Health workflow model (Grammatikou et al. 2000)
3.To aid the data collection	<ul style="list-style-type: none"> To differentiate between methodologies (Kwahk et al. 2002) To introduce an exploratory methodology to conduct evaluation (Moehr et al. 2006)
4.To aid the interpretation of data	<ul style="list-style-type: none"> To do a systematic collection, organisation and analysis of data (Barber et al. 2007; Miscione, 2007; Sellitto et al. 2005) To assess situation in a particular case (Dorr et al. 2007) To understand cases (secondary data) (Orfanidis et al. 2006)
5.To provide a new focus within a research stream	<ul style="list-style-type: none"> To assess goals, methods and hopes of future study (Blobel, 2007) To raise researchers' awareness of the potential of different perspectives (Blobel, 2007; Oliver et al. 2005; Winkelman et al. 2005) Suggesting avenues for future research (Gunasekaran et al. 2006; King et al. 2005; Philips et al. 2004; Winkelman et al. 2004) To systematically bring new research areas into focus (Han et al. 2001) To accumulate research findings (Sharma et al. 2005)
6.To aid the understanding of the relationships between theoretical concepts	<ul style="list-style-type: none"> To understand relationships (or explain 'why' or 'how' or 'process') (Hoyo-Barbolla et al. 2006; Ammenwerth et al. 2003; Baynon et al. 1998) To serve as a theoretical justification (literature review section, typically) of hypotheses by defining linkages (Doran et al. 2007; González et al. 2006) To describe relationships among elements at a different level than theory (further theory development will expand/deepen these relationships and/or develop hypotheses) (Ruelland et al. 2003)
7.To synthesize previous research in an actionable way for practitioners	<ul style="list-style-type: none"> To help evaluators or decision makers recognise evaluation issues which have not received sufficient attention (Autti-Ramo et al. 2007; Booth, 2004; King et al. 2005) To provide evaluators/ implementers with a methodology to address issues concerning the E-Health applications (Bell et al. 2004; Oliver et al. 2005; Wickramasinghe et al. 2005; Winkelman et al. 2004) To orient organisational (or IT functional) activities around the central theme (Connell et al. 2007; González et al. 2006; Saranummi et al. 2007) For managers to decide whether a variable is worth spending time/money on (Dixon et al. 1999) To guide healthcare practitioners to improve healthcare outcome (Doran et al. 2007; von Krogh et al. 2005) To help decision makers/managers focus on critical success factors (Demiris et al. 2004; Green et al. 2006; Oliver et al. 2004; Sittig et al. 2005; Wickramasinghe et al. 2005) To help decision makers/implementers deliver E-Health applications (Hanrahan et al. 2006) To educate evaluators/implementers/decision makers by providing underlying structure (Karras et al. 2006) To provide evaluators and decision makers with evaluation methodologies throughout system development (Kaufman et al. 2006) To provide healthcare organisations/ decision makers with a methodology to address E-Health issues (Maldonado et al. 2007; Scott et al. 2004; Tulu et al. 2005; von Krogh et al. 2005) To provide decision tool to aid decision makers/managers in picking E-Health applications, based on outcome (Demiris et al. 2004; Oliver et al. 2004; Wickramasinghe et al. 2005) To make practice and research more systematic (Winkelman et al. 2004)
8.To propose the legitimate boundaries for a research area	<ul style="list-style-type: none"> To understand the scope of evaluation issues (Autti-Ramo et al. 2007; BeuscartZephir et al. 1997; Jennett et al. 2003; 2004; 2005 ; Khoja et al. 2007) To understand the scope of E-Health issues (Campbell et al. 2001; Kluge, 2000)
9.To help organise the specific concepts already studied in a research stream	<ul style="list-style-type: none"> To assess and organise important variables (Gregory et al. 1995; Hypponen et al. 2007; Keppell et al. 2001; Wickramasinghe et al. 2005)
10.To propose solutions to practical issues not yet studied in a research stream	<ul style="list-style-type: none"> To provide E-Health evaluation framework by redefining the scope, developing a methodology etc (Barber et al. 2007; Campbell et al. 2001; Jennett et al. 2003; 2004; 2005; Khoja et al. 2007; Winkelman et al. 2005) To provide framework to solve practical problems in E-Health (Blobel et al. 2007; Jian et al. 2007; Kluge, 2000; Orfanidis et al. 2004) To propose a framework to solve practical issues in healthcare (Floca et al. 2007; Sharma et al. 2005)
11.To facilitate future research	<ul style="list-style-type: none"> To facilitate future evaluation research (Ammenwerth et al. 2003; Barber et al. 2007; Brennan, 1995; Keppell et al. 2001; Sellitto et al. 2005) To facilitate the design, implementation, and evaluation of future projects (Clamp et al. 2003; Kalra et al. 2005; Karras et al. 2006; Miscione, 2007)

Table 2. Purposes of Framework Articles in Healthcare Domain

Criteria	Explanation	Source (*)
1. Identifies areas for future research	This new focus can be theoretical, methodological, or philosophical, but the objective is to inform E-Health researchers of areas that should be focused upon as the research stream moves forward.	P5 and D4
2. Has high internal consistency	It aids in the understanding of the relationships between theoretical concepts and focus on explanations for why these relationships have occurred.	P6
3. Aids researchers in understanding the research area	It extends the argument about the need for a framework to present a cohesive and comprehensive theoretical system. A framework defined what does (and does not) constitute the boundary of the stream.	D3
4. Contains fundamental concepts that endure	It helps organise the specific concepts already studied in an E-Health area - to assess and organise important variables.	P9
5. Has only a few elements or dimensions	This is determined with only a portion of the literature necessary to adequately unify the particular research streams being considered rather than being comprehensive.	D2
6. Can be reflected in a simple graphic or table	The output of framework articles consists of models, tables and so forth, resulting from an attempt to conceptualise subject areas based on a portion of literature.	D6
7. Captures the critical aspects that are useful to describe a phenomenon	It assists researchers to theorise about a phenomenon, as an input to the development and testing theory in healthcare domain.	P2
8. Is clear	The logic of a framework requires clearness.	Writing skill
9. Is concise	The description of a framework needs to be concise.	Writing skill
10. Is useful (defined as how well it frames the body of knowledge)	A framework contributes to the body of knowledge in E-Health studies	The value of research
11. Provides a good fit with previously obtained results or offer and explanation of inconsistency in results		Requirement of literature review
12. Tells us clearly what is covered, and what is not covered by it	It proposes the legitimate boundaries for an E-Health area (i.e., what is and what is not appropriate for the area).	P8
13. Has clear guidelines on what to expect for a problem within that framework		D6
14. Is intellectually coherent	This can be achieved by integrating previous research studies. An output of this process is a cohesive model or table that unifies the separate research streams in E-Health domain based on previous studies.	P1
15. Contains mutually exclusive and collectively exhaustive categories	It contains high level concepts and relationships among these concepts are concerned in framework articles.	D5
16. Supports current theoretical understanding of the concepts and provides a tool for explaining observations from the environment	It synthesises academic literature in a meaningful way, offering guidelines and advice to E-Health practitioners including decision makers, evaluators and managers and so on.	P7
17. Identifies all the component concepts, articulates their characteristics, and provides some type of interaction expression between the concepts	The identification of concepts and articulation of their characteristics are accomplished by integrating previous research studies. In terms of interaction expression between the concepts, the framework needs to help organise the specific concepts and understand their relationships.	P1, P6 and P9
18. Facilitates future research in E-Health domain	The research involves E-Health evaluation, as well as design and implementation of E-Health research projects. The facilitation can be accomplished by aiding in the collection of data and in the interpretation of data.	P3, P4 and P11

* P: Purpose (see Section 3); D: Dimension (see Section 4).

Table 3. Criteria to assess the quality of framework articles in healthcare domain

6. APPLICATION OF FRAMEWORK EVALUATION CRITERIA (CASE STUDY)

The criteria in Table 3 are applied in this section to evaluate one framework article (EHRAF) (Li et al. 2008) published in AIS SIG GlobDev 1st annual workshop.

6.1. EHRAF with Six Dimensions

EHRAF can be characterized within the same six dimensions specified in Section 4.

- **Objectiveness and comprehensiveness:** We examined that portion of literature (e.g. Jennett et al. 2005; Khoja et al. 2007) necessary to adequately identify the E-Health readiness components from healthcare providers' and organisational perspectives and thus revealed E-Health readiness status in healthcare organisations.
- **Relationship with the boundary of the research stream and temporal nature:** We presented a cohesive and comprehensive theoretical framework by justifying the need for E-Health. Also, it gives a definition of what does (and does not) constitute the boundary of the stream. As discussed in Section 1 and 2 of the EHRAF, healthcare challenges exist in many countries. With the introduction of E-Health systems, the tension from those healthcare issues can be at least diffused. Although interest in E-Health is generally high, E-Health systems have not always succeeded in terms of adoption and/or acceptance. Accordingly, the importance of E-Health pre-implementation evaluation, especially for developing countries, is highlighted. E-Health readiness assessment as a part of E-Health pre-implementation evaluation is an essential requirement prior to implementation. Existing E-Health readiness frameworks however are observed to be inconsistent in coverage. Furthermore, readiness levels have not been clearly measured, which is problematic for readiness assessment. In order to address these problems, EHRAF constitutes the boundary of E-Health readiness assessment by integrating the components of each reviewed framework from healthcare providers' and organisational perspectives, with quantified constructs using a graph-based approach. Importantly, a more comprehensive framework has been suggested to incorporate other perspectives - patient, system and public - according to future evaluation needs.
- **Elements examined and substantive output:** the output (Figure 2-7 in the EHRAF (Li et al. 2008)) results from an attempt to conceptualise subject areas based on a portion of the literature. By integrating the components of reviewed frameworks, four readiness components (core, engagement, technological, and societal) were identified. As a result, EHRAF presents the output of the E-Health readiness assessment in a simple way.

6.2. Framework with Purposes

EHRAF serves multiple purposes. Firstly, it indicates future research areas in the E-Health domain. As discussed in Section 6.1, more components from different perspectives such as patient and public - can be included in E-Health readiness assessment according to future evaluation needs, raising awareness of different perspectives. Further, the readiness assessment framework can also be tailored to other E-Health systems (e.g. telemedicine and e-referral systems).

Secondly, EHRAF helps to organise and assess the specific concepts already studied in an E-Health area (four readiness assessment components). EHRAF provides guidelines in Section 4.2 and 4.3 to individually assess core readiness, engagement readiness, technological readiness and societal readiness. Subsequently, overall E-Health readiness can be revealed using the graph theory in a bottom-up approach.

Thirdly, the purpose of EHRAF is to propose legitimate boundaries for an E-Health area (i.e., what is and what is not appropriate for the area). E-Health readiness can be evaluated from multiple perspectives. However, only the components from healthcare providers' and organisational perspectives were studied in this case. Therefore, EHRAF helps to understand the scope of E-Health readiness assessment.

Lastly, EHRAF integrates previous literature in an actionable way, offering guidelines to E-Health evaluators. It synthesises the components of reviewed frameworks and uses a graph-based bottom-up approach, providing evaluators with a method to determine the status of E-Health readiness.

6.3. Results of EHRAF Evaluation with Criteria

EHRAF not only matches up with all six characteristic dimensions of frameworks in general, it also serves multiple purposes in the healthcare domain. Furthermore, the framework presents other legitimate features required by the framework evaluation criteria:

- The logic from the need to the outcome is clear, as discussed in Section 6.1.
- The description of EHRAF turns out to be concise and it also provides clear guidelines about what to expect for a problem. Four components were initially identified to assess E-Health readiness from healthcare providers' and organisational perspectives. For each component, it offers instructions to quantify the construct with the graph theory using a bottom-up approach.

- EHRAF contributes to the body of knowledge in E-Health. The contribution can be reflected by suggesting areas of future research, organising the specific concepts already studied and proposing the legitimate boundaries for an E-Health area, which are the first three purposes discussed in Section 6.2.

7. CONCLUSIONS

E-Health has taken an indispensable role in improving healthcare. The success of E-Health diffusion provides possibilities to achieve business profitability and thus poverty reduction. However, E-Health implementations pose noticeable problems in terms of unfavourable implementation environments and technical issues. In order to address these problems, framework articles help to synthesise existing publications and develop clear guidelines on what to expect for a problem. Understanding framework articles is a challenge, as they are the product of analysing a substantial volume of literature which is often difficult to organise around specific themes. This paper describes how we arrive at a set of 18 criteria that can guide authors to develop framework articles and reviews to evaluate these articles.

Our study shows that there are several important criteria for evaluating framework articles in healthcare contexts. We find specifically that a good framework article should possess these features: 1) extend the argument about the need for a framework to present a cohesive and comprehensive theoretical system; 2) integrate only a portion of previous research studies necessary to adequately unify the particular research streams, being considered rather than being comprehensive; 3) propose the legitimate boundaries for an E-Health area (i.e., what is and what is not appropriate for the area); 4) identify concepts and articulate their characteristics, which is accomplished by integrating previous research studies; 5) consist of a parsimonious set of elements; 6) have clear guidelines telling us what to expect for a problem within that framework; 7) inform E-Health researchers of areas that should be focused upon as the research stream moves forward; and 8) facilitate future research in E-Health domain. These criteria are offered as a guide for authors and reviewers to framework articles in healthcare contexts.

While we believe our study to be a reasonable effort, we do not yet see it as being complete. E-Health is a multidisciplinary area. Our overall results are based in part on framework articles published in IS and Medicine. In the future, framework articles from other disciplines (e.g. business) need to be included to determine the extent to which the new findings would be consistent with ours.

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