Identification of Trust Factor in Digital Health Information from the Internet among Clinic Attendees

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Abstract—**Quality and authenticity of the digital information have always been major concerns for health and information professionals. Specifically, digital health information offered directly to the users much more exceptional concerns, in which users are prone to use faulty health information within non-healthy environment (the internet) without professionals help and guidance. This study seeks to find out what are the trusted characteristics of good digital health information which is important for the users and the providers, and what are the factors that people consider in trusting and distrusting digital health information over the Internet. The paper starts with a brief review of related studies and in the following we described the survey that has been conducted. We then present the data collected and our analysis. Finally, we conclude with a list of information elements that health websites must provide in order to gain the trust of users on digital health information**

Keywords-**health information, trust, information and content elements, security elements, privacy elements, health websites**

I. INTRODUCTION

The environment in which patients consume medical and health information has changed dramatically during the past decade. Rapid diffusion of internet technology within the public has placed a considerable amount of health information within reach of general consumer (Neuhaunser et al., 2003) .Traditionally, physicians have served a central gate keeping role in providing healthcare information and services to their patients (Arora, 2003). With detailed technical information on prevention and treatment options online, the communication dynamics between healthcare professionals and patients may be changing, and resulting in more shared decision making (Smith, 1997). Although the Malaysian government has allocated a considerable amount of budget in RMK10 for healthcare in terms of medical technologies and infrastructure (Utusan Malaysia, 2010), this is an overlooked area that needs to be explored. Thus, the current initiative that should be emphasized is, in what ways effective health information are disseminate through the Internet in order to improve the quality of healthcare.

It is also unclear how healthcare professionals and public health advocates instill initial trust among the Internet users. As up to date, there is no specific guideline that has been created to guide the Internet users on how to evaluate and establish trust on digital health information. Thus, the main objective of this study is to investigate the key factors that enable local society to trust the internet as an important source of health information. This study will be using a quantitative component as an approach. The quantitative component will be a set of a questionnaire to be administered to patients in government health clinics, using multistage random sampling.

This research is expected to produce a trust model in digital health information for healthcare professionals and a specific guideline for the mass population. These guidelines may be used by the Ministry of Health and other healthcare professionals in delivering digital health information both locally and internationally for the purpose of primary, secondary and tertiary prevention. It is hoped that this noble initiative will enable the government to enhance the health of the general population by providing a more effective and trustworthy health information through the internet in the near future.

II. BACKGROUND OF THE STUDY

Using Information Communication and Technology (ICT) for healthcare development has been initiated by Malaysian government through the Telehealth Flagship Application is among the agendas of the Multimedia Super Corridor Initiative (MSC) which started in 1996. Jai Mohan and Raja Razali (2004) mentioned that The Telehealth Flagship Application in MSC agenda consists of four sub applications, namely the Lifetime Health Plan (LHP), Mass Customized and Personal Health Information and Education (MCPHIE), Continuing Medical Education (CME) and Tele-consultation Application (TCA). The use of digital health information from the Internet has increased the awareness of public about certain diseases and indirectly developed health education and promoting self care (Kaplan and Brennan, 2001; Brennan, 1999). Furthermore, leveraging digital health information from the Internet also reduces the Internet users

fear and provide necessary knowledge to overcome their health problems.

As in similar study conducted, about 40% of 52 million American said that online health information affected their health care decision (Benedict, 2000). It is believed that in Malaysia the usage of Internet as sources of health care information also will be increased since the Internet user in Malaysia increased exponentially as many as 16,902,600 Internet users as of June, 2009, which is about 65.7% of the population (Malaysia Communication Multimedia Commission, 2009). Although the usage of digital health information will be increased but the users have never been educated to use the right information through the proper guidelines.

On the other part, the quality and authenticity of the digital information have always been major concerns for health and information professionals. Specifically, digital health information offered directly to the users much more exceptional concerns, in which users are prone to use faulty health information within non-healthy environment (the internet) without professionals help and guidance. Huntington et. al. (2004), in his study recognizes that the digital environment is giving a difficulty to the users to make trust and reliability judgments because of its dynamic nature and those fast-changing environments that allow many parties associated with the production of digital information services. At the same time, he also mentioned that this circumstance has giving the internet users a rich source of health information to be use and possibility of cross-comparisons to check authenticity, reliability etc. of the data provided. But somehow, due to this richness and dynamic nature of the digital environment, building a trust towards available health information within the net is terrifically difficult.

In simple understanding, digital health information users when wrongly diagnosed ailments caused by the poor information provisions could face the serious consequences. But still, people will go to the internet when they need to get medical and health information as it was a fastest way for self diagnosis. This in fact was reported in the Pew Internet and American Life Project (2000) saying that 55% of adults in the US with Internet access use it for retrieving medical and health information. Among them, 70% reported that Internet information really affected their health decisions. This indicate that, digital health information really has the potential for improving individual health, but somehow it also assumed that although the usage of digital health information are increasing but the users have never been educated to use the right information through the proper guidelines.

Therefore, it is important to find out what are the trusted characteristics of good digital health information which is important for the users and the providers, and what are the factors that people consider in trusting and distrusting digital health information over the Internet.

III. RESEARCH OBJECTIVES AND QUESTIONS

This research is conducted to investigate the trust factor of Malaysian Internet users in getting digital health information. Specifically, this study embarks on the following objectives:

- To describe the trusted characteristics of digital health information of users and providers.

  -It is very important to examine and understand factors that contribute towards the Internet user's trust in digital health information.

- To examine the factors for people to trust digital health information.

  -The second objective is to examine the factors that create and promote trust among Internet users. Understanding what creates trust in digital health information will lead to the development of an informational element guideline for trusted in digital health information provisioning in the websites. These factors will be based on 3 elements as part of research questions.

RQ1: Does Authorship Elements in health-based website influence trust of its consumer?
RQ2: Does Information Content elements in health-based website influence trust of its consumer?
RQ3: Does Policy elements in health-based website influence trust of its consumer?

IV. LITERATURE REVIEW

Trust is defined as "the willingness of a party to be vulnerable to the action of another party based on the expectation that the other will perform a particular action important to the trustee, irrespective of the agility to monitor or control that other party" (Mayer et al., 1995). In addition, trust is also a concept that has received attention in several different areas of social science, literature, psychology, sociology, political science, economic, anthology, history and sociobiology (Lewicki and Bunnker, 1996). However, trust is very hard to develop in online interaction because the Internet is open system architecture (Anil and Joobin, 1998). With recent development of the Internet technology, with the use of Web 2.0, any party can share their information as well as to provide any comment or advice online to other Internet users, which include information related to health. Eventhough many discussions of trust in digital environment focus on issues like security, technical reliability, or e-commerce, but just few address the problem of trust in the health information obtained from the Internet (Kelton et al., 2007)

Previous research has been conducted and discovered that health information retrieved from the Internet as the most trusted health information sources. Peterson and Fretz (2003), revealed that from 136 lung cancer patients 16% using the Internet for health information but the entire respondents rated quality of the information from the Internet as equivalent to the information they gained from the physician. About 60% of respondents intend to use it for reference in the future and most of them are young patients.

Huntington et al., (2004) in their study which involved sample of 1322 respondents in United Kingdom about consumer trust in health information on the web provided more detail fact on why people refused to trust

medical information gained from the Internet. From the findings, more than 80% claimed the reason they do not trust medical information from the Internet because sources of information unqualified and the origin of sources is not mentioned in the website. Besides that, it is also reported that the respondent found that the information presented contradicted with the information that was discovered from the website that they have previously visited. About 63% claimed some information given contradicted with their real experience and 29% said it contradicts with the doctor advice.

A review on Web 2.0 web information by Sai et al. (2008) about trust evaluation in health information on the World Wide Web, highlighted that the author and the information itself presented is crucial to be considered in evaluating health information from the web. The expertise of the author involved including level and area of the education, profession and experience is vital. Furthermore, the evaluation also must cover the author contribution history and his/ her social interaction within the community of practice in the particular health issues. Other researchers have argued that content factors such as source credibility appear to be more predictive of trust and selection. In fact, Sillence et al. (2004) noted that health consumers were more likely to trust sites that presented a balanced overview of the health topic. Sites which convey expertise through the inclusion of authors' credentials and references were viewed in a positive light.

Literature suggests that several factors are important in determining the extent to which a consumer will trust a health website and act upon the advice presented. Regardless of its content, the design of the site in terms of its usability and visual appeal and the content of the site in terms of source credibility and perceived expertise are all important. Attractiveness and professional design found to be primary factors that bounded to consumer's trust (Fogg et al., 2003, Kim and Moon, 1998). In fact, Briggs et al. (2000) suggest that design factors and visual appearance are actually a predictor of early rejection and mistrust of a site in the context of online advice.

Quality information and inaccuracy or untrustworthy information is an issue that consumers must know and able to recognize (Peterson et al., 2003). Seals of approval or trust marks have been suggested as a strategy to help consumers in identifying high quality information. Most seals act as proxy indicators of quality by requiring websites to have.

V. THE RESEARCH FRAMEWORK

Based on the literature review, it can be surmised that four major factors are closely related to trust factor in digital health information**. Figure 1** depicts the proposed conceptual framework that will be used in the study. Upon completing the study, the model is expected to be refined and finalized prior to conducting the survey. In the nutshell, the model is developed based on the typical input-process-output model. Three groups of determinants namely Authorships Elements, Information Elements, and Policy Elements are conceptualized as factors to be significantly correlated to leads towards trust factors in digital health information amongst Internet users.
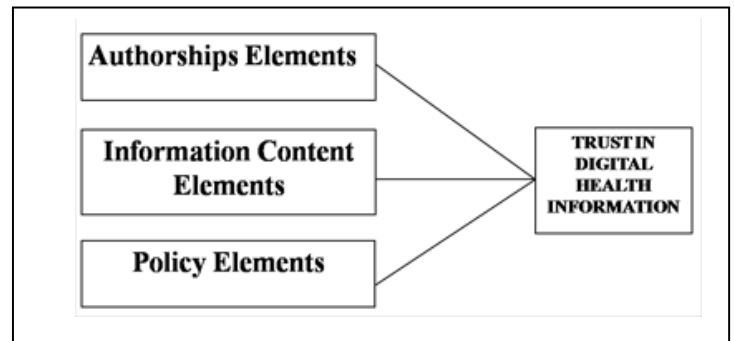

Figure 1: The Research Framework

The three (3) factors shown in **Figure 1** were identified from the matrix analysis of factors that influence trust in digital health information. These factors are the main points of understanding, taken from the previous articles, research, and dissertations of several authors. The next section will explain how these factors relate to trust in digital health information.

VI. THE STUDY

A questionnaire was designed and distributed to all 130 clinic attendees in the state of Kuala Lumpur, Malaysia. Respondents were asked detailed questions about the most significant factors relating to their trust on digital health information. The survey gathered information in the following categories:

- Profile of the respondents.

- The Internet usage.

- Authorship elements as factor for trust in internet health information

- Informational contents elements as factor for trust in internet health information

- Policy elements as factor for trust in internet health information

The factors researched are as follows:

- Profile (2 questions) - The first part of the survey includes the demographic characteristics of the respondents. The respondents were categorized into two segments; gender, and age.

- The internet usage (4 questions) - This section was designed to find information on the usage of the Internet by the respondents.

- Authorship elements as factors (4 questions) - This section provided respondents insight regarding authorship elements that build trust on digital health information.

- Information content elements as factor (12 questions) - This section was applied by the researcher to examine the elements of information content contributing as a trust factor in health websites.

- Policy elements as factor (4 questions) – This section explored the opinion of the respondents on elements of policy as a trust factor on digital health information.

VII.   THE ANALYSIS

A numerical index, known as correlation coefficient, expressed the degree or magnitude of the relation. The numerical index +1.00 is the highest possible value that the correlation coefficient can assume and indicates a perfect relationship between variables (Burn, 2000). **Table 1** shows a guide to the degree of relationship indicated by the size of the coefficients.

Degree of Correlation Coefficient		
Absolute Value of Correlation Coefficient	*Remarks on Correlation (rho)*	*Nature of Relationship*
0.90 – 1.00	Very High Correlation	Very Strong Relationship
0.70 – 0.90	High Correlation	Marked Relationship
0.40 – 0.70	Moderate Correlation	Substantial Relationship
0.20 – 0.40	Low Correlation	Weak Relationship
Less than 0.20	Slight Correlation	Relationship so Small as to be negligible

Table 1: Remarks on the degree of Correlation Coefficient

A.   Demography:

Tables 2 and 3 report the results relating to the background of the participants in this study. Table 4.2 reveals that 65 respondents, attendees of government clinics in Klang Valley, participated in the study. The response rate by the females participating in this study exceeded the males. This study found that the majority of respondents (53.8 percent) were female, whilst the remainders (46.2 percent) were male.

Demography		
Gender	*Frequency*	*Percentage*
Male	30	46.2
Female	35	53.8
TOTAL	65	100

Table 2: Profile of Respondent's Gender

Table 3 shows the age range of the respondents participating in this research. The respondents' ages ranged from 20 to 30 years old, representing a majority equivalent to 33 or 50.7 percent, respectively. A small number of respondents were 41 – 50 years old, which was only about 12.3 percent. The remainders (18.5 percent) were below 20 years old and those that ranged from 31 – 40 years old.

Range of Respondent Age		
Age	*Frequency*	*Percentage*
Below 20	12	18.5
21 - 30	33	50.7
31 - 40	12	18.5

Range of Respondent Age		
Age	*Frequency*	*Percentage*
41 - 50	8	12.3
TOTAL	65	100

Table 3: Profile of Respondent's Age

B.   Authorship Elements as Factor:

Table 4 depicts most of the respondents' answers to questions in Section B of the survey. The analysis of Table 5 was conducted with the intention of finding an answer to research question number one, which is:

RQ1: Does Authorship Elements in health-based website influence trust of its consumer?

Five (5) elements of authorship as factor were included in the questionnaire. Using a scale of one (Strongly Disagree), two (Disagree), three (Not Sure), four (Agree) and five (Strongly Agree) the overall data was summarized in Table 5. The ranking is performed by comparing means with other variables. The highest mean is ranked as one, and so on.

Authorship Elements as Factor					
Elements	**Strongly Disagree**	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**
The expertise/credential of the author who wrote about health information on the web is important	-	-	12.3	46.2	41.5
The contribution history of the author is important to match with the subject he/she published on the web	1.5	1.5	20.0	46.2	30.8
The author social interaction with the community of practices on the discussion of particular health issues is important	-	4.6	20.0	44.6	30.8
The education background of the author must match with the health subjects he/she published on the web	-	-	7.6	46.2	46.2
The working experiences of the author on particular health domain is important element to be referred			16.9	40.0	43.1

Table 4: Authorship Elements influencing Trust in Digital Health Information Frequency

From **Table 4**, we can see that a majority of the respondents agreed the education background of the author is the significant factor that develops trust on the information provided in the health website. Background of the author must match with the health subjects he/she published on the web.

This was proven by the 92.4 percent of the respondents who strongly agreed and agreed in total.

It is important also to note that the expertise/credential of the author who wrote about the health subject ranked as second. The analysis shows that 87.7 percent of the respondent strongly agreed and agreed on this factor to make have a faith on consuming health information in the websites. About 83.1 percent of the respondent agreed that the working experiences of the author on particular health domain are important element to be referred as. The respondent also highlighted that the contribution history of the author are also important to match with the subject he/she published on the web. 77 percent of the respondents agreed that contribution history of the author could boost trust factor on digital health information as well. Finally, the author social interaction with the community of practices on the discussion of particular health issues are also highlighted by the respondent when it brought 75.4 percent of the respondent to agreed to it. The overall data was summarized in **Table 5** below.

Authorship Influencing Trust			
Elements	**Mean**	**Std. Deviation**	**Rank**
The education background of the author must match with the health subjects he/she published on the web is important to me to trust	4.3846	.73478	**1**
The expertise/credential of the author who wrote about health information on the web is important for me to trust the information published	4.2923	.67830	**2**
The working experiences of the author on a particular health domain is important element for me to trust the information	4.2615	.83838	**3**
The contribution history of the author is important to matched with the subject he/she published on the web for me to trust	4.0308	.84722	**4**
The author social interaction with the community of practices on the discussion of particular health issues is important for me to trust the information	4.0154	.83838	**5**

Table 5: Authorship Influencing Trust on Digital Health Analysis

C. Information Content Element ass Factor:

Twelve (12) elements of authorship as factor were included in the questionnaire. Using a scale of one (Strongly Disagree), two (Disagree), three (Not Sure), four (Agree) and five (Strongly Agree) the overall data was summarized in Table 7. The ranking is performed by comparing means with other variables. The highest mean is ranked as one, and so on.

Table 6 depicts most of the respondents' answers to questions in Section C of the survey. The analysis of Table 6 was

conducted with the intention of finding an answer to research question number one, which is:

RQ2: Does Information Content elements in health-based website influence trust of its consumer?

From Table 6, we can see the opinions of respondents about elements of information content in internet health websites that positively affect people's trust in health information usage. More than 98 percent of the respondents strongly agreed and agreed that including the sources of information on health website content was able to promote trust in digital health information. The respondent also believed that frequent information updates on the health website was also significant as 89.2 percent of total respondent strongly agreed and agreed on this matter. The respondent also highlighted that having a sufficient related citation and references were very much important as nearly 91 percent of the respondent were agreed on it. Information on the health website should not also contradict with the real experiences. 80 percent of the respondent strongly agreed and agreed on this matter. The respondents then were asked on the social and interaction aspect of the website and nearly 85 percent of the respondent believed that the health website must provide spaces for the consumer to communicate, and give feedback. Having a relevant animation is ranked last with less significant values with only 53.9 percent of the respondent agreed to it. The overall data of this section is summarized in Table 7. The ranking is performed by comparing means with other variables. The highest mean is ranked as one, and so on.

Information Content Element as Factor					
Elements	**Strongly Disagree**	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**
The health websites should have sufficient related citations and references	1.5	1.5	6.2	56.9	33.8
The health websites should have frequent information update	-	1.5	9.2	47.7	41.5
The health websites should provide a proper search facility	-	3.1	10.8	69.2	16.9
The health websites should include sources of information on its content	-	-	1.5	63.1	35.4
The health websites should have information that not contradict with real experience	-	-	20.0	49.2	30.8
The health website must be free of advertising/commercial value	3.1	7.7	27.7	44.6	16.9

The health website must have less navigation pages for fast loading of information	-	1.5	26.2	49.2	23.1
The health website must provide relevant animation	6.2	6.2	33.8	38.5	15.4
The health website must provide relevant pictures	4.6	-	23.1	47.7	24.6
The health website must provide presentable text	1.5	3.1	21.5	50.8	23.1
The health website must provide relevant hyperlinks	1.5	6.2	16.9	49.2	26.2
The health website must provide spaces for the consumer to communicate, and give feedback	1.5	1.5	12.3	55.4	29.2

Table 6: Information Content Elements Influencing Trust on Digital Health Information Frequency

Information Content Influencing Trust			
Elements	**Mean**	**Std. Deviation**	**Rank**
The health websites should include sources of information on its content	4.3385	.50858	**1**
The health websites should have frequent information update	4.2923	.70096	**2**
The health websites should have sufficient related citations and references	4.2000	.75416	**3**
The health websites should have information that not contradict with real experience	4.1077	.70982	**4**
The health website must provide spaces for the consumer to communicate, and give feedback	4.0923	.63738	**5**
The health websites should provide a proper search facility	4.0000	.63738	**6**
The health website must have less navigation pages for fast loading of information	3.9385	.74743	**7**
The health website must provide relevant hyperlinks	3.9231	.90671	**8**

Information Content Influencing Trust			
Elements	**Mean**	**Std. Deviation**	**Rank**
The health website must provide presentable text	3.9077	.84267	**9**
The health website must provide relevant pictures	3.8769	.94386	**10**
The health website must be free of advertising/commercial value	3.6462	.95902	**11**
The health website must provide relevant animation	3.5077	1.03264	**12**

Table 7: Information Content Elements Influencing Trust on Digital Health Information Analysis

D. Policy Element ass Factor:

Three (3) elements of authorship as factor were included in the questionnaire. Using a scale of one (Strongly Disagree), two (Disagree), three (Not Sure), four (Agree) and five (Strongly Agree) the overall data was summarized in Table 9. The ranking is performed by comparing means with other variables. The highest mean is ranked as one, and so on.

Table 8 depicts most of the respondents' answers to questions in Section B of the survey. The analysis of Table 8 was conducted with the intention of finding an answer to research question number one, which is:

RQ3: Does Policy elements in health-based website influence trust of its consumer?

The respondents were asked about the elements of website policies on the privacy policy, security, trust seal and editorial policy. About 81.6 percent of the respondent agreed that a health website must have a security policy to gain trust of the consumer. The respondent also agreed that privacy is one of the factors that are significant to build a trust on health websites. Nearly 89 percent of the respondent agreed that strong privacy policy is a must on health websites. The respondent then believed that having a trust seal could also promote trust to health websites whereby 75.4 percent of total respondent agreed upon it. Having a trust seal is ranked last with less significant values of 61.5 percent respondent strongly agreed and agreed. The overall data of this section is summarized in Table 9.

Policy Element as Factor				
Elements	**Strongly Disagree**	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**
The health website must entail a privacy policy	1.5	-	9.2	41.5	47.7
The health website has to be a secure site	-	1.5	12.3	36.9	49.2

The health website must visually shows a trust seal	-	3.1	21.5	44.6	30.8
The health website must have a good editorial policy	-	4.6	33.8	44.6	16.9

Table 8: Policy Elements Influencing Trust on Digital Health Information Frequency

Policy Influencing Trust			
Elements	**Mean**	**Std. Deviation**	**Rank**
The health website has to be a secure site	4.3385	.75575	**1**
The health website must entail a privacy policy	4.3385	.77615	**2**
The health website must visually shows a trust seal	4.0308	.80950	**4**
The health website must have a good editorial policy	3.7385	.79602	**3**

Table 9: Policy Elements Influencing Trust on Digital Health Information Analysis

VIII.   DISCUSSION & CONCLUSION

In this study, we have examined the perception of internet health information users. We tried to extract as much information as possible on the factors of the health websites that will build trust and confidence users. Our findings can be used by health information providers and also those professionals who work on cyberspaces to improve their websites. In conclusion, this study has identified the three factors that can influence trust building within the studied area. These factors are; authorship elements, information content elements and policy elements. From the selection of criteria for authorship elements, the respondent emphasized that background of the author is more important and most preferred by the users when accessing and using health information on the websites. Based on analysis, it indicates that the expertise of the author involving the level and area of the education, profession and experience were factors that significantly contributed to trust factors of the digital health information use by the respondents. The rest of the choices pointed to the vigorous contribution of health information and materials that is evidence of the author as subject matter expert in the health subject. The respondents feel that social interaction with the community of practices on the discussion of particular health issues is important also required to build the trust.

From the selection of criteria for website information content, the respondents emphasized that the sources of information on website informational content is the topmost requirement to gain trust. In fact having a most update information on particular website was also important to ensure the subject were relevant and not out to date. Citations and related references also stand on the topmost requirement for the health information to be trusted. This indicates that internet user has become literate and aware of the need of evaluating credible internet information to be used and trusted. The next important factor in the list of informational content elements of a website is the provision of the availability of a communication channel for the users to communicate and give feedbacks. This communicative element is reassuring and could lead to the trust building as well. Presenting information elements on the website is very important because poor presentation will drive customers away to a competitor's website. A good website with proper information presentation will encourage them to come back and also recommend the website to others. This is evident when, the respondents have cited 'less navigation pages for fast loading of information' as important elements as well. Apart from that, presentable text with the use of simple sentences is most preferred. Even though pictures and video features are nice to have, respondents feel that they are less important because not everyone has fast Internet access. Graphics, audio and video content will slowdown information download. Poor rate of information download will only frustrate potential customers and drive them away to another website. This is evident when these aspects were all given low priorities by the respondents.

On the privacy aspect, our respondents have indicated that health websites should provide a 'logon password' facility to shows how secure the site is. This will make customers feel that the websites are governed by a professional people. A clearly stated 'privacy policy', 'providing a trust seal' and the 'a good editorial policy' is next on the list.

IX.   ACKNOWLEDGMENT

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