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Identifying The Criteria For Selection Of Healthcare Chatbot In Thailand Using A Multi-Criteria Decision Making Approach

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Abstract

Today , Healthcare chatbot market is expected to grow rapidly. Chatbot for the healthcare industry is used for many purposes such as share information for the recommend health-related product, schedule appointment, check symptoms and refer to a doctor, provide supplemental mental –health services and attract new patient or customer. This research gives an attempt to determine the factors that have led to the success chatbot in healthcare. The purpose of this research is to prepare a model for the selection of healthcare chatbot in Thailand by using an analytical hierarchy process (AHP) which is a tool of multi-criteria decision making (MCDM) methodology. It helps healthcare to improve the reliability of the decision. The factors affecting the selection of chatbot are collected from literature review and opinion of experts. The obtained factors are analyzed by using the concept of IOC. Then the remain factor are categorized and structured based on the concept of AHP.A questionnaires are constructed and distributed to 9 experts. Five main selection factors were identified. The result shows that the most significant success criterion is Security and privacy with 56.40% . The second and the third significant go to User satisfaction (18.10%) and Purpose of use (10.50%) respectively. The fourth significant is Efficiency (9.9%) and the last significant criteria is Technology with 5.10 %

Keywords : Heathcare chatbot, Analytic hierarchy process (AHP), Success factor, Thailand

Introduction

At the present, There is using Medical technology in the global such as Surgery robot, Smart watch, Teleconference. Especially, during Corona virus pandemic, Technology is used for convenience and reduce risks that may occur. The health care service industry fully holds the welfares of information systems for its personnel and patients.(Muhammet,2019) Chatbot is the one of technology for communication via text or speech that is well known in the global. In Thailand, Medical chatbot is used for several purposes such as give information, make an appointment ,

medical recording. In Thailand, Information and Communication Technology needs to be taken into account when it comes to healthcare(Kttisak,2019).While chatbots have enormous success in areas such as product and service sales, marketing,entertainment and public administration(T.Makasi,A.Nili, K.C.Desouza and M.Tate,2021). However , they are still not widerspread in the field clinical domain because of the critical nature of the element on which it is necessary to make in depth assessment: the responsibility for health and the risks.(Vita Santa Barletta,2022).Therefore, chatbot in the healthcare domain sector can play an important role in optimizing resources only if their quality is demonstrated and measured.(J.E.Bibault,B,2019) Healthcare should consider criteria for making decision to select chatbot is suitable with organization and meet customer satisfaction. The purpose of this research is to identify criteria for selection healthcare chatbot in Thailand. These criteria will be guidelines to make a decision support system to select healthcare chatbot in the future.

Literature Review

Many chatbots have been developed for healthcare chatbot .(Zeineb,2020) There are several factors that have the potential to further propel of healthcare chatbots. These include applications of chatbots fot social media,chatbots for reducing healthcare costs,and the use of chatvots to help provide quality primary care and meet the customer satisfaction. This article is aimed to identify the criteria for selection of healthcare chatbot in Thailand by using a multi criteria decision making approach. In this literature is consisted of the concept of chatbot and Analytic hierarchy process (AHP)

2.1 Chatbot

Chatbots are software applications that use artificial intelligence and natural language processing to understand what a human wants, and guides them to their desired outcome with as little work for the end user as possible. Like a virtual assistant for your customer experience touchpoints. This system has been designed to address a plethora of domains.(Abdullah,2020)

An AI Chatbot can understand language outside of a set of pre-programmed commands and continue learning based on the inputs it receives. They can also make changes based on patterns and become smarter over time as they experience new situations. This type of chatbot can be applied to a range of uses – from sentiment analysis to making predictions about what a visitor is looking for on your website.

Medical chatbots are AI-powered conversational solutions that help patients, insurance companies, and healthcare providers easily connect with each other. These bots can also play a critical role in making relevant healthcare information accessible to the right stakeholders, at the right time. (https://www.senseforth.ai/conversational-ai/medical-chatbots/,2011)

Some related research of chatbot

(Parkam,2022) From the research found that Chatbots' scalability,wide accessibility,ease of use, and fast information dissemination provide complementary functionality that augments public

Health worker in public health response activities,addressing capacity constraints,social distancing requriements, and misinformation.Additional use cases, more spphisticated chatbot designs and opportunities for synergies in chatbot development should be explored.

(Tom,2019) Most internet user would be receptive to using health chatbots,although hesistancy regarding this technology is likely to compromise engagement. Intervention designers focusing on AI-led health chtabots need to employ user-centred and theory-based approached addressing patients concerns and optimizing user experience in order to achieve the best uptake and utillisation.

(Richki,2020) Security framework on chatbot using MAC Address Authentication to customer service quality is an effort to increase security in using chatbots. MAC Address authentication is the first stage of security that

will be checked by the system before proceeding to the next security stage.

(Jeetu Kuma,2019) The most demanding sector of chatbot is in the business sector where the customer service plays an important role,as they can do the continuous work,and handles the client by 24/7 support.Chatbot virtual assistance gives genuine feedback support to client.

2.2 Analytic hierarchy process (AHP)

Analytic hierarchy process (AHP) is a structured techniques for organizing and analyzing complex decisions, based on mathematics and psychology. It was developed by Thomas Satty .(T.L.Satty and K.Peniwati, Group Decision Making: Drawing Out and Reconciling Differences, RWS Pub,Pittsburgh,PA,2008) The AHP divides the decision problem into the following steps

1. Identifying the problems and developing the Hierarchy process

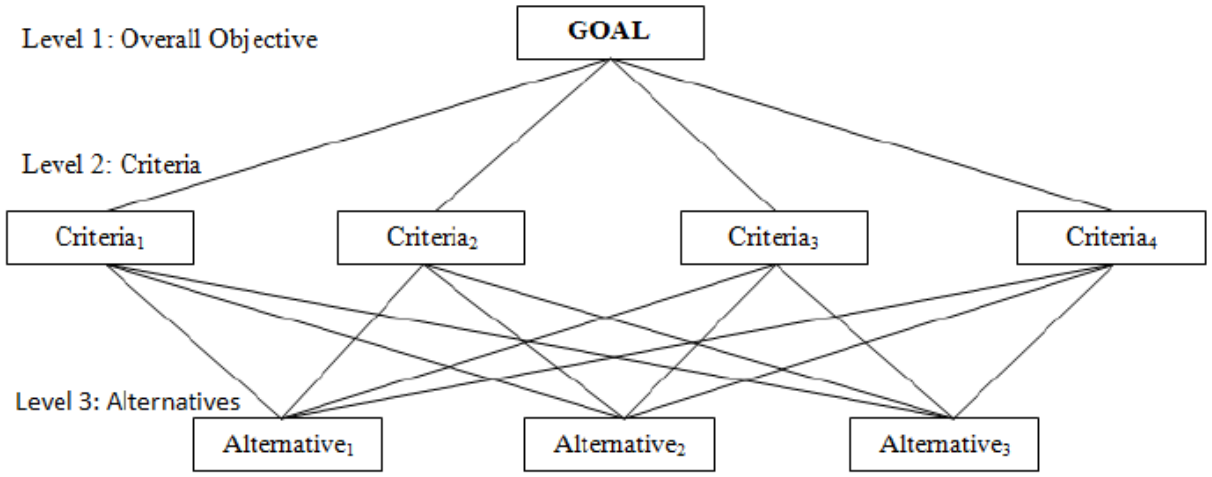

Figure1 : AHP Structue(https://www.researchgate.net/figure/General-hierarchy-structure-of-AHP_fig2_264436283,2022)

2. Comparing pairs of structure elements, Determine significance of the different elements at each level. The scale used in the comparison with corresponding numeric values in the range of 1 to 9

Table1: AHP Scale (Satty,1980)

Numerical rate	Judgment
1	Equally important
3	Moderately important
5	Strongly important
7	Very strongly important
9	Extremely important
2,4,6,8	Intermediate values between the two adjacent judgement

3. Synthesis the Overall Priorities

The assessment of the significant from each level of the hierarchical structure. The overall priorities of the criteria are synthesized.

4. Consistency test

Each comparison contains numerous decision elements for the consistency index(CI) and the consistency ration (CR) which measure the consistency judgment for each comparison. The judgment consistency can be checked , the CR is acceptable if it does not exceed 0.10 .(Satty ,1990)

Research Methodology

The aims of this research is to develop conceptual framework for identifying the criteria and set priority for the selection healthcare chatbot in Thailand by using analytical hierarchy process (AHP).

For this study, data were collected from literature review and opinion of experts. The obtained factors are analyzed by using the concept of IOC. Then the remain factors are categorized and structured based on the concept of AHP. Five main criteria and seventeen sub criteria were identified. After that questionnaires are constructed and distributed to 9 experts . The small sample size (less than 10) is required if the data is collected from experts.(Satty, 2001) . The 9 experts for this research from academia and practitioners in healthcare industry were invited as the people grade the criteria for the selection in this research.The analysis on these criteria was done by using an analytic hierarchy process(AHP) which is the tool for multi criteria decision making (MCDM).

Research Result

It consist of two parts in AHP structure and result from interviews and significant weights of each criteria.

Part1 : AHP STRUCTURE

Table 2 show the data collection from literature review and related research. After that the obtained factors are analyzed by using the concept of IOC which agree with the opinion of experts who have experience in healthcare. Then, There is increasing of other criteria that are suitable with selection chatbot in healthcare. Finally, There are five main criteria of Purpose of use, Technology, Efficiency, User satisfaction and Security and Privacy.

Table2 : Criteria for selection chatbot in healthcare

Researcher and Year of Reserach	Criteria
Vyas (2017)	Speed of response time
Morrrissey and Kirakowaki (2015)	Dealing with unexpected question
Kulligowska (2015)	Accurate replies
Eeuwen (2017)	User friendly, Protect and respect privacy
Lin and Hsieh(2011)	Functionality, Enjoyment, Security and privacy, Assurance, Design, Convenience, Customisation

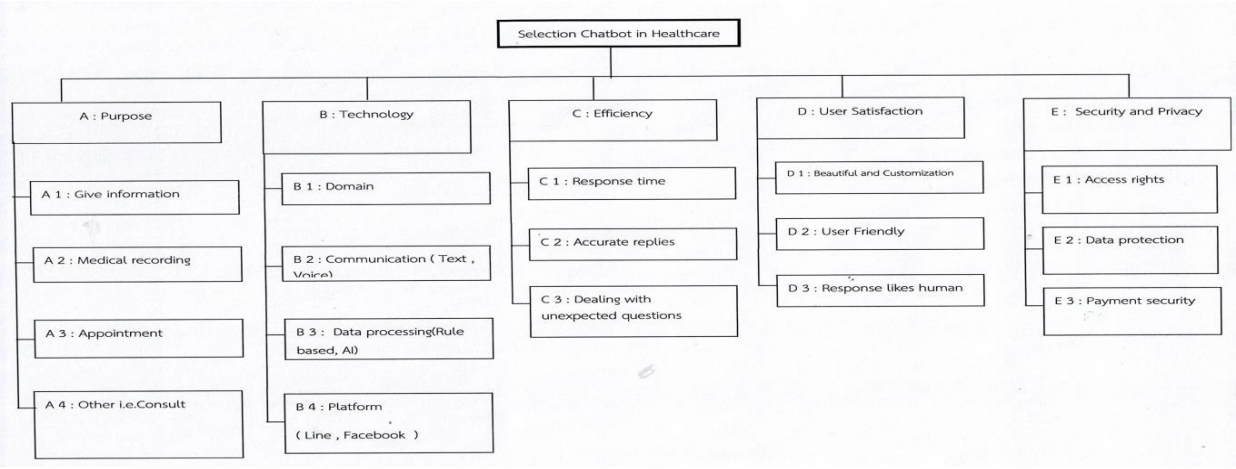

Figure2 : AHP Structue of selection chatbot in healthcare

In Figure2 show AHP structure of selection chatbot in healthcare and Table 3 show identified selection criteria. Five main criteria and seventeen sub criteria were identified.The factor affecting the selection from the literature review and opinion of experts.

Part 2 AHP Application to determine criteria of healthcare chatbot

Table 3: Identified selection criteria

Main criteria	Sub criteria
Purpose of use	Give information Medical recording Appointment Other i.e. Consult
Technology	Domain Communication Data processing Platform
Efficiency	Response time Accurate replies Dealing with unexpected question
User Satisfaction	Beautiful and Customization User friendly Response likes human
Security and privacy	Access rights Data protection Payment security

Table 4: AHP Result

Main criteria	Sub criteria	Scores
Security and privacy(56.40%)	Data protection Payment security Access Rights	35.80% 34.20% 30.00%
User Satisfaction (18.10%)	User friendly Response likes human Beautiful and customization	59.50% 29.10% 11.40%
Purpose of use(10.50%)	Medical recording Appointment Other i.e. Consult Give information	40.50% 34.50% 18.20% 6.8%
Efficiency(9.9%)	Accurate replies Dealing with unexpected questions Response time	74.00% 20.40% 5.60%
Technology(5.10%)	Data processing(Ruled based,AI) Communication(Text,Voice) Platform(Line,Facebook) Domain	50.50% 24.90% 14.30% 10.20%

From Table 4 ,after analyzing criteria ,the results of the study shows that the most significant success criterion is Security and privacy with 56.40% . The second and the third significant go to User satisfaction (18.10%) and Purpose of use (10.50%) respectively. The fourth significant is Efficiency (9.9%) and the last significant criteria is Technology with 5.10 %. In the security and privacy section, data protection gives the highest factor with 35.80% .In the user satisfaction section,user friendly gives the highest factor with 59.50%.In the purpose of use section, medical recording gives the highest factor with 40.50%.In the efficiency section, accurate replies gives the highest factor with 74.00%. and in the technology section,data processing gives the highest factor with 50.50 %

Table 5: Success sub criteria for descending orders

Sub criteria	Scores
Data protection	23.8%
Payment security	22.7%
Access rights	19.9%
User friendly	7.6%
For Medical recording	4.4%
Accurate replies	4.2%
For Appointment	3.8%
Response likes human	3.7%
Data processing(Rule based(AI)	2.2%
Other i.e For consult	2.0%
Beautiful and customization	1.5%
Dealing with unexpected questions	1.2%
Communication (Text, Voice)	1.1%
For Give information	0.7%
Platform (Line, Facebook)	0.6%
Domain	0.4%
Response time	0.3%

By multiplying the main factors with sub factors, the result show weight of sub factor. Table 5 shows individual weight of sub factor.It can see that the criteria that the key success for selection chatbot in healthcare in descending order.

Discussion and Conclusion

In Thailand, It is increasing of using chatbot in healthcare. There are many purposes of using chatbots such as giving information and patient appointment and the organization needs to find the suitable chatbot that have a standard , meet the customer satisfaction and developments technology in the future. Chatbot help organization to reduce cost and the patient can communicate with hospital easily. However, it is necessary that healthcare should know the criteria for selection chatbot in order to have the reliable decision. The research paper investigated and quantitatively model approach to select Healthcare chatbot in Thailand. The results of study showed that Security and privacy is the most significant criteria .The data in healthcare should keep privacy of patients and having computer security system (Richki,2020).Furthermore, healthcare should concern with user satisfaction(Eeu Wen,2017).AHP helps to analysis to provide information that use in the decision making process which can benefit to healthcare organization.

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