ハクビーン　ジャワド　アハマド

氏　　　　　名　　　**HAQBEEN JAWAD AHMAD**

学 位 の 種 類　　　博士（工学）

学 位 記 番 号　　　博第1250号

学位授与の日付　　　2022年3月31日

学位授与の条件　　　学位規則第４条第１項該当　課程博士

学 位 論 文 題 目　　　A Study on Conversational AI Platform for Participatory Democracy
（参加型民主主義のための会話型AIプラットフォームに関する研究）.

論 文 審 査 委 員　　　主　査　　　教授　　　加藤　昇平
　　　　　　　　　　　　　　　　教授　　　白松　俊
　　　　　　　　　　　　　　　　准教授　　武藤　敦子
　　　　　　　　　　　　　　　　教授　　　伊藤　孝行
　　　　　　　　　　　　　　　　（京都大学）

# 論文内容の要旨

　　Consultation, discussion and reaching consensus is a vital aspect of sustainable planning and the implementation of services, and participatory democracy is its key part. Participatory democracy, which must include its citizenry in societal activities and processes, is a critical component in the successful implementation of any plan. However, if large numbers of citizens and stakeholders interact with each other and too many opinions are presented it can be very difficult to reach agreement. This can be even more challenging in war-ravaged countries such as Afghanistan, where the scale of participation stimulates an atmosphere of confrontation, causing another problem for decision-making. Furthermore, collaborative technologies such as social media can only disseminate opinions but have no analytical power by themselves to aggregate various views and help reach consensus. Therefore, it is critical to find approaches that not only revolutionize information- centric participation in sustainable planning but also provide support among stakeholders to reach consensus.

　　In the previous works, a discussion support platform is developed and employed in a developed and stable country like Japan, so in this dissertation, I challenged the use of the same method for decision-making and consensus building in complex and crisis communities like Afghanistan.

In the **present work**, the results of the conducted research is to extend real- world application of proposed method to improve "Participatory Democracy" in war-ravaged and least developing country like Afghanistan are summarized and reported in chapters 2 to 8.

**CHAPTER 1**, focus on online forums for participatory democracy and introduce the terms used in thesis in general framework. The chapter also give brief information about the overall thesis in general framework. Additionally, the chapter lays out the major justifications and objective that was set out to achieve in this study.

In **CHAPTER 2**, the necessary information regarding the research method and the experimental apparatus setup is described. Based on our general proposed framework, the participatory process encouraged by open call through Kabul city, and discussion process were promoted through AI-based facilitation.

Two new techniques (1) and (2) are introduced for promoting participatory democracy.

(1)     A novel approach "reframing participatory process using AI" method is proposed for participatory democracy in participation process of Kabul city.

(2)     A novel method "developed and developing world" partnership is officially established and employed which enables us to conduct large-scale real-world experiment on behave of Kabul city local government for participatory democracy using conversational AI platform.

In **CHAPTER 3**, conversational AI are introduced for facilitating online participatory planning process in Kabul city. The analysis is supported by a real-world large-scale case example of AI for Sustainable Development Goals "AI for SDGs Good" project conducted in partnership with Kabul city municipality (KM). This chapter is devoted to the analysis on the discussion structure that is accomplished considering conversational AI as the developing factor. Considering the conversational AI that has the highest probability of leading the discussion, the discourse analysis is performed in terms of identification of discussion elements. The online discussion is conducted with and without conversational AI using online forum and it is output has been investigated to find the efficiently of conversational AI. The findings of the online discussion process based on conversational agent facilitation are reported. First, discussion with and without conversational agent as facilitators are investigated and reported.

Next, from the measurement of discussion elements results with moderation of AI,

the solutions for problems are more clearly collected with discussion with AI-based facilitation. In addition, discussion without agent, are clearly centered on raising issues and were observed.

In **CHAPTER 4**, by using the mentioned method, a cross-class of areas measurement of participatory process has been conducted. In this study, an experimental and analytical studies have been conducted to obtain the information needed for a deep understanding of the differences between people participation from "formal settlements areas" and "informal settlement areas" in the Kabul city planning process. A difference between a participation in formal areas and informal areas has been discovered in this study. People in informal areas were keener to participate and discuss in planning process compared to people in formal areas. Using this finding, it is possible to suggest, that conversational AI platform is more successful for communities in crisis than stable communities.

**CHAPTER 5**, present a detailed case study regarding the COVID-19 discussion and role of online discussion support system for promoting collective intelligence on COVID-19 related issues and ideas in Afghanistan. The application of conversational AI is experimentally extended to identify cross-people participation in online discussion. An experimental study has been conducted between two class of people: (1) health workers as expert on COVID-19 discussion and (2) private citizens as social paradigm to obtain the information needed for a deep understanding of the relation between "participants with prior knowledge on discussion topic" and " participants without prior knowledge on theme" using conversational AI. The findings suggested that conversational agent as facilitators is more successful to moderate discussion with groups of individuals with prior knowledge on discussion theme compared to groups of people without prior knowledge on discussion theme. The discussions elements are investigated and reported.

In **CHAPTER 6**, experimental idea contest studies have been conducted to obtain the information needed for a deep understanding of the relation between "quality opinion submission" and "discussion development in the real-world online idea contest project. A "relationship" between active competitor and discussion development and its impact as extrinsic motive on discussion development has been discovered in this study. This method can be applied to develop ideas for online idea contest.

**CHAPTER 7** presents a detailed case study regarding the policy-decision making and role of our proposed method. The application of the proposed method is extended to identify the issues occurring in the planning process in Kabul city, and its solutions to help policy makers. A comparison is made between private citizens collected insights and people-representative insights analysis.

This chapter finds its usefulness in selecting the real-insights based on the citizens inclusion in societal activities and processes, and found that is a critical component in the successful implementation of any plan in Kabul city. The study is achieved contradiction among citizens and their representative by comparing their collected insights regarding working and not working functions inside Kabul city. One of the main failures of implementation of plan in Kabul city were not include the citizens in societal activities and processes, and their voices were manipulated by their non-elected representee. One of the major real-world contributions of this study were to convince Kabul city local government to directly include its citizenry in societal activities and processes, and change the non-elected representee to direct elected-representees.

**CHAPTER 8** presents the comparisons results of conversational AI for online discussion among Japan and Afghanistan. The developed and least developed countries have been selected for this case study. A comparison has been made between threshold of $n$ people facilitation between groups of individuals of both countries.

The findings suggested that, people in least developed countries were keener to participate and discuss in in online discussion compared to people in least developed countries. Using this finding, it is possible to suggest, that conversational AI platform is more successful to moderate discussion in least developed countries than developed countries.

In **CHAPTER 9**, the conclusions are given. This chapter concludes the remark of the thesis. These include the accomplished targets, limitation of the study as well as unaccomplished but interesting tasks that are related to this thesis and have been listed for consideration as future research works.

# 論文審査結果の要旨

Consultation, discussion and reaching consensus is a vital aspect of sustainable planning and the implementation of services, and participatory democracy is its key part. Participatory democracy, which must include its citizenry in societal activities and processes, is a critical component in the successful implementation of any plan. However, if large numbers of citizens and stakeholders interact with each other and too many opinions are presented it can be very difficult to reach agreement. This can be even more challenging in war-ravaged countries such as Afghanistan, where the scale of participation stimulates an atmosphere of confrontation, causing another problem for decision-making. Furthermore, collaborative technologies such as social media can only disseminate opinions but have no analytical power by themselves to aggregate various views and help reach consensus. Therefore, it is critical to find approaches that not only revolutionize information- centric participation in sustainable planning but also provide support among stakeholders to reach consensus. In this study, the results of the conducted research are to extend real- world application of proposed method to improve "Participatory Democracy" in war-ravaged and least developing country like Afghanistan are summarized and reported in chapters 2 to 8.

**CHAPTER 1**, focus on online forums for participatory democracy and introduce the terms used in thesis in general framework. The chapter also give brief information about the overall thesis in general framework. Additionally, the chapter lays out the major justifications and objective that was set out to achieve in this study.

In **CHAPTER 2**, the necessary information regarding the research method and the experimental apparatus setup is described. Based on our general proposed framework, the participatory process encouraged by open call through Kabul city, and discussion process were promoted through AI-based facilitation.

In **CHAPTER 3**, conversational AI are introduced for facilitating online participatory planning process in Kabul city. The analysis is supported by a real-world large-scale case example of AI for Sustainable Development Goals "AI for SDGs Good" project conducted in partnership with Kabul city municipality (KM). This chapter is devoted to the analysis on the discussion structure that is accomplished considering conversational AI as the developing factor.

In **CHAPTER 4**, by using the mentioned method, a cross-class of areas measurement of participatory process has been conducted. In this study, an experimental and analytical studies have been conducted to obtain the information needed for a deep understanding of the differences between people participation from "formal settlements areas" and "informal settlement areas" in the Kabul city planning process.

**CHAPTER 5**, present a detailed case study regarding the COVID-19 discussion and role of online discussion support system for promoting collective intelligence on COVID-19 related issues and ideas in Afghanistan. The application of conversational AI is experimentally extended to identify cross-people participation in online discussion.

In **CHAPTER 6**, experimental idea contest studies have been conducted to obtain the information needed for a deep understanding of the relation between "quality opinion submission" and "discussion development in the real-world online idea contest project.

**CHAPTER 7** presents a detailed case study regarding the policy-decision making and role of our proposed method. The application of the proposed method is extended to identify the issues occurring in the planning process in Kabul city, and its solutions to help policy makers. A comparison is made between private citizens collected insights and people-representative insights analysis.

**CHAPTER 8** presents the comparisons results of conversational AI for online discussion among Japan and Afghanistan. The developed and least developed countries have been selected for this case study. A comparison has been made between threshold of $n$ people facilitation between groups of individuals of both countries.

In **CHAPTER 9**, the conclusions are given. This chapter concludes the remark of the thesis. These include the accomplished targets, limitation of the study as well as unaccomplished but interesting tasks that are related to this thesis and have been listed for consideration as future research works

These research results have been printed and published as three peer-reviewed international academic journals and ten peer-reviewed international conference papers. After reviewing this dissertation and answering questions on the public hearing, we have concluded that this dissertation is sufficiently appropriate for conferring a doctoral degree of engineering.