

Enacting Eldertech in Senior Citizens' Communities of Japan: A Social Support Perspective

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Abstract—This work-in-progress research focuses on “the ICT enabled community-based support system” in Japan, which has done a great job on improving the quality of the seniors’ social life. The goal is to adopt a qualitative research approach with a multiple case design and the Social support theory to zoom in the research questions: 1) how do various communities use the deployed ICT to support the social life of the seniors? 2) How the general Critical Success Factors (CSF) acts during constructing and managing the ICT project? The originality of this research is that it takes multiple representative cases and reforms them into a generalized conceptual model for further research and application.

Keywords—ICT; social support; senior; community; CSF.

I. INTRODUCTION

In Japan, the need to explore practical ways to maintain senior citizens’ functional abilities and promote independent living is urgent [1]. The proportion of people aged 65+ years in the total population in Japan is more than 27% [2], which means that the Japanese population aging is still unprecedented in the world [1]. Meanwhile, other issues like the shrinking working population, the low birth rate, etc. will lead to the shortage of seniors supporting staff and the growth in social security costs [3]. The projections for 2050 show that considerable countries will face the similar population challenge soon [4].

Today, various assistive technologies have been adopted to help the seniors improving their living quality, such as general Information and Communication Technologies (ICTs), robotics, telemedicine, sensor technology, medication management applications, and video games [5]. On the other hand, how to use assistive technology fulfilling mental needs of the seniors is a significant research topic [6]. Loneliness and social isolation [6] is one of the most severe problems affecting the elder, which is expressed in little participation in social activities, dissatisfaction with social lives, or even no contact with other people at all.

The experiences of Japan suggested that one of the solutions to loneliness and social isolation is to rebuilding community-based support systems [1]. Close-knit community-based social networks enhanced provision and receipt of social support [1], which is fundamental to ease the critical issue—how to provide appropriate support to the

seniors who live alone [7]. Nevertheless, only a limited number of studies [8][9] in Japan have focused on this topic from a theoretical perspective.

To address the above research gaps, this research aims to select the representative cases of ICT enabled community-based support system in Japan, which have done a great job on improving the quality of the seniors’ social life. In order to choose a better angle to look into the research question of this research, the Social Support Theory (SST) [12] is considered to be a perfect fit for this study to zoom in the following questions: 1) how do various communities use the deployed ICT to support the social life of the seniors? 2) How the general CSF acts during constructing and managing the ICT project? In order to explore the above questions, the three key notions of SST might provide a comprehensive perspective. Using a qualitative method to analyze the multiple representative cases [13] can clearly and concisely tell the development of the appropriate designs which combine the various ICTs and the communities’ activities [14][15][16]. The originality of this research is that it takes multiple representative cases in Eldertech field for the first time and reforms them into a generalized conceptual model for further research and application.

The theoretical and practical contributions of this research are expected in the following. First, there is limited research that focuses on the ICT enabled community-based support systems and what they can do for the seniors. This study can address critical issues and contributes to the growing gerotechnology research. Second, this research might extend the adopted theory to form a new framework for explaining the similar phenomenon. Third, Japan’s successful experiences in developing and operating the ICT enabled community-based support systems might present examples for other countries, especially the Asian countries that will face the population issues soon. Finally, this research might offer other practitioners a specific agenda for developing the senior support system.

The outline of this paper is in the following. A literature review of the phenomenon and the theory lens will be explained In Section 2. Section 3 is about the methodology. Case description and expectable findings are in Section 4 and 5. Finally, there is the conclusion.

II. LITERATURE REVIEW

In this section, the background of the phenomenon and the social support theory will be introduced.

A. the Eldertech

There is an increasing number of studies focused on assistive technology for the seniors living with chronic illness in their own home within the medical health, nursing, and gerontology literature [5][17]. The issues related to material needs and the physical condition of the seniors population are usually adopted the telemedicine systems [3][5][11], mobile social alarming systems and online monitoring systems based on sensor technology [5][11], and other devices combined with the services offered by the emerging ubiquitous computing and intelligent home appliances [3][5]. According to the findings of Khosravi, et al. [6], within the studies on various technologies applied to alleviate social isolation, the commonly adopted technologies consist of the general ICT contained the computers and the internet, social network sites, robotics, telecare systems, etc. Most of these studies used experimental methods and survey to argue the relationship between social isolation and the new assistive technology. There was little research focused on how to use the assistive technologies—appropriate design—effectively to ease the loneliness and social isolation. It is not an issue that only matters to the person in need, but also to a healthy and sustainable society in the future.

With the proliferation and ubiquity of ICTs, in recent years, the usage of ICTs in rebuilding community-based support systems certainly brings more efficiency and variety. In Japan, under the promotion of the Japanese government, considerable regions have started various ICT enabled regional activation projects [18] which include many community-based support models for the senior citizens. Nevertheless, only a limited number of studies [8][9] in Japan have focused on this topic from a theoretical perspective, which usually adopted survey methods and concluded from the users' perspective. Also, similar research [3][10][11] in the western countries generally took the technical point of view.

B. Social Support Theory

The SST perspective is well-suited to address our research subjects. Some key concepts of this theory are constructive on knitting critical features of our research subjects together. Social support refers to the availability of interpersonal resources [19]. SST focuses on the ways individuals are embedded in a social network through social connections, and how these connections are used to request or offer support [19]. There are three key concepts in SST. First, **social embeddedness** focuses on the structure of the social network of individuals in terms of size or density and covers the actual connections among individuals in the social environment. Second, **perceived social support** focuses on an individual's beliefs about whether or not members of one's social network provide support and the positive as well as negative consequences of these beliefs and is used to explain the effects on those individuals confronted with

adverse events. Third, **enacted social support** focuses on network members who perform behavioral actions when assisting a specific individual in their networks and is used to explain behavioral actions and their consequences performed by others to provide social support. This concept evaluates an individual's actual behavior when providing support and the associated consequences.

III. METHODOLOGY

A qualitative research approach is adopted with a multiple case design to find answers to the "how" research questions [20][21]. This research will reveal the nature of the deployed ICT embedded in the applying and operating support system in each case, the relationship between the case background and the chosen ICT plan, the CSF, the effect of social support and the ICT. In the field of information systems, the CSF of the adopted information systems is well studied. The CSF usually refers to the factors that determine the success of a system to a great extent [23]. The CSF in this research means the design, task, management, and procedure, which are the most critical to the success of the system. Four representative cases will be studied mainly through in-depth interviews, observations, and related documents. The interview plan is constructed through the selected theory lens. The Social support theory provides three concepts which will enrich the dimensions of the research data—not only the subjective feelings of the end users as the previous research. For instance, social embeddedness focuses on the structure of the social network of individuals regarding size or density. It provides an objective measurement; perceived social support focuses on an individual's beliefs about whether or not members of one's social network provide support; enacted social support focuses on network members who perform behavioral actions when giving assistance to a specific individual in their networks, which reveals the efforts to achieve the ideal social integration. The observations consist of the use of the support systems, the management of the support systems, the routine and exceptional operations, the issues, etc. Finally, based on the Social integration measurement and the ICT measurement, four clear ICT usage patterns from four communities and the corresponding CSF will be concluded and form a conceptual model.

IV. CASE STUDIES

Four selected cases in Japan are analyzed in this research, which had been promoted as the successful ICT usage cases from the Japanese Ministry of Internal Affairs and Communications [22]. Table 1 shows the relevant information of the four cases. In case IRO, a leaf business is called 'Irodori'. Irodori business means cultivating, processing, and selling natural plants that are used as decorations for Japanese dishes. Less than 2000 people live in Kamikatsu, and young people take only 7.8 percent of the local population. It is the investment to the information network infrastructure (not advanced technology but the technology that can be used easily by the seniors) in 2000 that made Kamikatsu Town the No.1 of the leaf business. In

the OTS case, social media (e.g., facebook & twitter) combined the official website intends to draw citizens and travelers to engage in various events in Otsuki. Seniors in Otsuki can rent their farmland to visitors, manage it for them, and post the status of the plants regularly by the social media. In the TOK case, an easy-to-use application for a smartphone is developed for communicating regularly with the local seniors who live by themselves in order to ensure their safety; they can also communicate with others easily. In the KAT case, multiple information community centers with many IT/ICT devices are set up. The seniors can gather to the nearest community center to report their safety, to use various devices, and to communicate with each other.

The investigations will be conducted following the research plan (Figure 1). The research subjects of each case include the seniors, the control organization, the support agencies, and the relevant people from the society. The plans of interviews and observations for each research subject from three perspectives are listed.

TABLE I. THE SENIORS’S SOCIAL LIFE SUPPORTED BY THE ICT ENABLED COMMUNITIES

Geographic Location	ICT project	Start Date
Kamikatsu-cho, Tokushima Prefecture	IRODORI VILLAGE KAMIKATSU (IRO)	1999
Otsuki City, Yamanashi Prefecture	HALLO NATURES OTSUKI (OTS)	2012
Tokushima City, Tokushima Prefecture	TOKUTTER (TOK)	2010
Katsuragi City, Nara Prefecture	NEW ERA KATSURAGI CREATION PROMOTION PROJECT (KAT)	2013

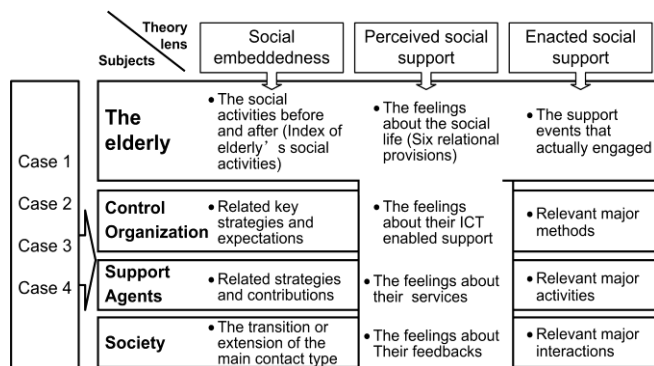


Figure 1. Investigation plan in detail.

V. EXPECTED FINDINGS

Based on the previous analysis of the secondary data of the four cases, this research intend to form a 2x2 matrix with Social integration and Social network platform dimensions

(Figure 2). Social integration is a sense of belonging to a group of people who share common interests and recreational activities. Public or private means whether the platform belongs to a third-party. The characteristics of each case’s findings will be discussed through the theoretical lens as well as the rational enablers. In detail, the research agenda in each case consists of the strategy and method of the control organization, the social situation and feelings of the elderly, the primary interactions with support agents and society, the CSF of the case, the distinguishing features of the design and outcomes. In the current state, the contents in Figure 2—the titles of the above research agenda—are the same; they will be specified during the investigation. For instance, the ‘strategy and method of control organization’ in four places of Figure 2 will be replaced by the research findings, such as ‘Designing, constructing, and operating the whole information system and hardware for the seniors’ in Case IRO, ‘Using the social media and office website for information distribution’ in Case OTS, etc.

From the current analysis, four success cases already show different features through the theory lens (Table II). Case IRO and Case TOK will be used as examples to explain the Table II. From the perspective of Social embeddedness, the seniors’ social lives are analyzed through the social activities before and after. In the Case IRO, the seniors are organized by the Irodori company to engage in product manufacturing, information processing, business managing, etc. They have to interact with the company, the customers, the visitors, etc. The changes in the social activities of seniors before and after are enormous. Hence, the cell of Social embeddedness in Case IRO in Table II is filled with ‘High’. In the Case TOK, each senior living alone is provided with a smartphone and the special application developed for them. The application is based on twitter and is designed for seniors to use it easily. Every day, the seniors will receive a message from support group inquiring about their status, and they should reply to this message for confirming their safety. Additionally, they can also tweet something else as well. Right now, they are connected with volunteers of the support group and the other seniors in the living area, which might bring them many opportunities to attend social events and make friends. However, comparing to the seniors in the first case, the support is valued as relatively ‘low’.

From the perspective of Perceived social support, the interviews for the seniors will be about their feelings regarding their current social lives, the ICT enabled support, the services, the feedback from the people of society that have interacted with them. The conjectural results are listed in Table II. The seniors in Case IRO might feel their social lives are more fulfilling than the seniors in Case TOK.

Finally, from the perspective of Enacted social support, the interviews for the seniors will be about the activities and events they experienced and the assistance they received. From the current data, in Case IRO, the seniors have engaged in learning the leaf business, learning how to use the information system and hardware to do business, information and equipment upgrade, interaction with visitors, training new trainee, etc. On the other hand, the introduction of

smartphone and the application is the main support activities for the seniors in Case TOK. Hence, 'High' is for Case IRO and 'Low' is for Case TOK. Similarly, the other two cases are evaluated currently through the same process.

The ongoing investigations will provide more detail information to refine the conceptual model and to enrich the qualitative analysis. Information during constructing and managing the ICT project of each case will be analyzed for locating the CSF as well as for generating survey for the system managers. General CSF for this kind of support system can be expected.

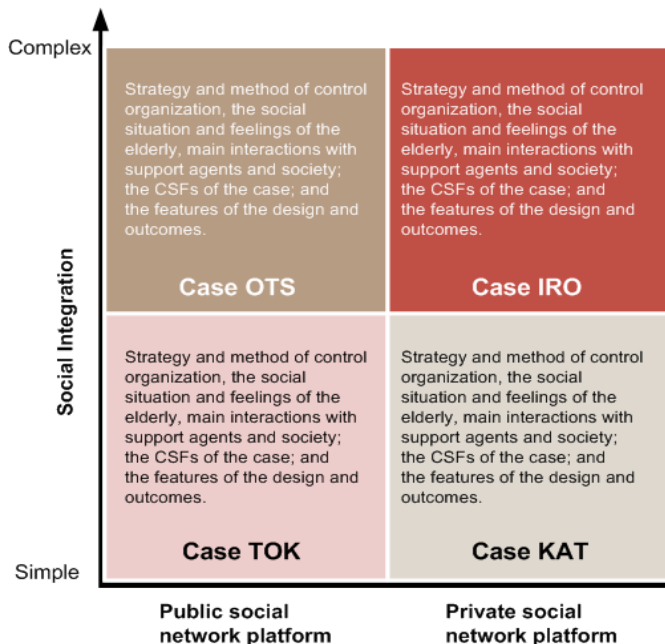


Figure 2. Different Approaches Revealed within Current Case Analyses

TABLE II. THE EXPETABLE SENIORS'S SOCIAL LIFE SUPPORTED BY THE ICT ENABLED COMMUNITIES

	ICT	Social embeddedness	Perceived social support	Enacted social support
IRO	Private	High	High	High
OTS	Public	High	High	Low
TOK	Public	Low	Low	Low
KAT	Private	Low	Low	High

*The most complex Social Integration is presented with 'High' in all three notions; the simplest Social Integration is presented with 'Low' in all three notions.

The findings are highly expected to answer the research questions. From the primary analysis of secondary data, four success cases have already shown the distinguishing features on supporting the seniors with different approaches of deployed ICT. Although the current data have not covered

the identification of the CSF, the further investigations are expected to generate more valuable data on the projects' implementation and management details.

VI. CONCLUSIONS

This research focuses on "the ICT enabled community-based support system" in Japan, which has done a great job on improving the quality of the seniors' social life. There is limited research that focuses on the ICT enabled community-based support systems and what they can do for the seniors. The CSF of these success cases has not been studied well enough in the prior research as well. This study can address critical issues, such as the key issues and the CSF on ICT usage in a community, and contributes to the growing gerotechnology research. This research might extend the adopted theory to form a new framework for explaining the similar phenomenon. The previous research of ICT enabled community-based support systems usually adopted a survey method to evaluate the satisfaction of the seniors. In this research, the social support theory provides multiple perspectives not only from the seniors, but also from the control organization, the support agencies, and the society. Japan's successful experiences in developing and operating the ICT enabled community-based support systems might present examples for other countries, especially the Asian countries that will face the population issues soon. Comparing to other studies on the similar subject, the conceptual model proposed by this research will provide four success examples with specific CFS and the ICT usage patterns. Other communities can modify or refine their support systems by choosing one success example with similar background and ICT application. This research might offer other practitioners in Japan a specific agenda for developing and implementing the community-based support system and expand the research approaches on the similar phenomenon.

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