

Research Articles

## The Study of Information Behavior of the Thai Elderly During 2015-2019: Systematic Literature Review

การศึกษาพฤติกรรมสารสนเทศของผู้สูงอายุไทยระหว่าง พ.ศ. 2558-2562:

การทบทวนวรรณกรรมอย่างเป็นระบบ

จินดารัตน์ เบอร์พันธ์<sup>1\*</sup>, จิราพัชร ใจคำ<sup>2</sup>, จันทกานต์ หลานคำ<sup>2</sup>

Chindarat Berpan<sup>1\*</sup>, Jiraput Jaikam<sup>2</sup>, Janthakan Lankam<sup>2</sup>

<sup>1</sup> ภาควิชาบริการรักษศาสตร์ และ หน่วยปฏิบัติการวิจัยภูมิทัศน์สารสนเทศ คณะอักษรศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ประเทศไทย;

Department of Library Science and Information landscape Research Unit, Faculty of Arts, Chulalongkorn University, Thailand.

<sup>2</sup> หน่วยปฏิบัติการวิจัยภูมิทัศน์สารสนเทศ คณะอักษรศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ประเทศไทย;

Information landscape Research Unit, Faculty of Arts, Chulalongkorn University, Thailand.

\* Corresponding author email: chindarat.b@chula.ac.th

### Abstract

**Purpose:** The objective of this paper was to analyze the contents of research publications on the information behavior of the Thai elderly, in terms of the academic discipline of researchers, the scope of the Thai elderly under the study, their research approaches, and methods of data collection studied including studied issues and overall results.

**Methodology:** The research methodology of this systematic literature review on information behavior and the Thai elderly has three phases: planning, conducting, and reporting.

**Findings:** The findings showed that the research publications published during 2015-2019 were mostly conducted by researchers from Information Science, Communication Arts and Mass Communication. The participants of studies mainly were elderly aged over 60 years. Most of the research approaches used were survey studies and the data collection methods were questionnaires and interviews. The issues mostly focused on information behavior using new information technology, particularly in social media area.

**Applications of this study:** The findings of this study can be used to set guidelines and serve as the basis for future studies in order to improve Thai elderly information literacy skills, digital literacy skills, and continuing education. In addition, the study results can be used by the

relevant organizations to plan and provide services that complement the information behavior of the elderly.

**Keywords:** Information behavior, Thai elderly, Systematic literature review

### บทคัดย่อ

**วัตถุประสงค์:** เพื่อวิเคราะห์เนื้อหาด้านวิจัยด้านพฤติกรรมสารสนเทศของผู้สูงอายุไทยที่เผยแพร่ระหว่าง พ.ศ. 2558-2562 ในด้านสาขาวิชาที่นักวิจัยสังกัด ขอบเขตของผู้สูงอายุที่ศึกษา วิธีการวิจัยที่ใช้ในการศึกษา และวิธีการเก็บรวบรวมข้อมูล รวมทั้งประเด็นที่ศึกษาและผลการศึกษาโดยรวม

**วิธีการศึกษา:** การศึกษานี้เป็นการทบทวนวรรณกรรมด้านพฤติกรรมสารสนเทศของผู้สูงอายุไทย อย่างเป็นระบบ มีขั้นตอนการดำเนินงาน 3 ระยะ ได้แก่ การวางแผน การดำเนินการ และการนำเสนอ ผลการศึกษา

**ข้อค้นพบ:** งานวิจัยด้านพฤติกรรมสารสนเทศของผู้สูงอายุไทยที่เผยแพร่ระหว่าง พ.ศ. 2558 -2562 ส่วนใหญ่ ดำเนินการศึกษาโดยนักวิจัยที่สังกัดสาขาวิชาสารสนเทศศาสตร์ และนิเทศศาสตร์และสื่อสารมวลชน ดำเนินการศึกษากลุ่มผู้สูงวัยที่มีอายุ 60 ปีขึ้นไป ใช้วิธีการวิจัยเชิงสำรวจ ซึ่งเก็บรวบรวมข้อมูลโดยใช้ แบบสอบถามและการสัมภาษณ์ ประเด็นที่ศึกษาเน้นพฤติกรรมสารสนเทศที่ใช้เทคโนโลยีสารสนเทศใหม่ เป็นเครื่องมือ โดยเฉพาะการใช้สื่อสังคม

**การประยุกต์ใช้จากการศึกษานี้:** ผลการศึกษานี้สามารถนำไปใช้กำหนดแนวทางและประเด็นที่ควร มีการศึกษาด้านพฤติกรรมสารสนเทศของผู้สูงอายุไทยเพิ่มขึ้น นอกจากนั้นหน่วยงานที่เกี่ยวข้องอาจนำผลที่ได้ จากการศึกษาไปพิจารณากำหนดแนวทาง หรือวางแผนจัดบริการสารสนเทศที่สอดคล้องกับลักษณะพฤติกรรม สารสนเทศของผู้สูงอายุ

**คำสำคัญ:** พฤติกรรมสารสนเทศ ผู้สูงอายุไทย การทบทวนวรรณกรรมอย่างเป็นระบบ

## 1. Introduction

As a result of changes in population age structure over the past 3 - 4 decades, Thailand is entering a "Complete aged society" in 2022, and in about the next 20 years, Thailand's elderly rate is expected to increase from 18.1% in 2020 to 31.4% in 2040, meaning that the elderly population will be almost double from 12.0 million to 20.5 million (Foundation of Thai Gerontology Research and Development Institute (TGRI), 2021, p. 52). The figures mentioned indicate that Thailand will soon become a super-aged society. This continued rapid increase of elderly rate will affect the country's economic and social development, because the increase of dependent-age population and the decrease of working-age population may bring

about greater economic burdens with smaller operating budgets. To help relieve the burden on such conditions, it is important to improve self-reliance of dependent-age population. Therefore, a challenge which needs to be realized by all sectors is policy and strategy formulation for elderly empowerment, in order to support the elderly to have a good life and be able to help themselves as much as possible, with readiness to appropriately participate in social and economic activities. (Ministry of Social Development and Human Security, 2019).

Admittedly, a basic process for increasing the quality of citizens' lives to enable them to live a more efficient life is to improve their information literacy and digital literacy skills. At this moment in time, information has become a key element in all kinds of human activities, whether it be working, recreation, healthcare, or decision-making, with using digital technology as an important tool to increase efficiency and effectiveness. Therefore, it can be said that strengthening information literacy and digital technology skills is correlated with information behavior efficiency. As a result, the elderly can take care of their health, raise their income and live a greater quality of life in society.

“Information behavior” means actions and expressions of human beings interacting with information in various ways, such as needs, seeking, reception, use, dissemination and management of information in different contexts (Pettigrew, Fidel, and Bruce, 2001, p.44). However, in the era of information technology, especially digital technology has a great influence on human lives, it is inevitable that the scope of information behavior study is most often related to / connected with, or focused on the study of information technology used for the access / acquisition / dissemination of information in parallel. Sometimes the aim of studying the uses of many different types of information technology reflects or results in behaviors and guidelines for promoting efficiency in information behavior, for example, the study on factors influencing website accessibility of the elderly [5]<sup>1</sup> and the study on usage behavior and effect of LINE application on life and mind among the elderly of Ban Pan Rak Association [10]. Therefore, studying to understand the information behavior of the elderly in various aspects, including the behavior of using information technology, is an approach to help determine more appropriate ways to promote information literacy skills, continuous learning and digital literacy skills for the elderly, giving them opportunities to build up their confidence

<sup>1</sup> The numbers in square brackets are reference numbers of document specified in the list of Appendix: Research papers in the study.

and achieve self-empowerment, resulting in their life stability and happiness. However, our initial studies showed that in the past, information behavior researches concerning the Thai elderly were numerous and diverse, but there was still no research which analyzed and synthesized a structured overview of the study of this area, including study approach, academic authorship and studied issues. Examining the systematic synthesis of research in information behavior concerning the Thai elderly over the past five years would help to have greater understanding the current status of the study and show knowledge gaps concerning information behavior and the use of information technology of the elderly (Coto, Lizano, Mora & Fuentes, 2017), the authors were interested in analyzing the content of research papers about Information behavior of the Thai elderly, published during 2015-2019, in the aspects of academic disciplines of researchers, scope of the Thai elderly under study, research approaches and data collection methods, including the studied issues and overall results. The results of this study will be useful for interested persons and related agencies, such as research funding agencies, educational institutions and government agencies responsible for promoting and developing the potential of the elderly, to use as preliminary information to set a framework for supporting with more issues to study for the sake of appropriate promotion of information literacy skills, digital literacy skills, and continuous learning. It is also possible to use the findings to plan, organize and provide services that are consistent with the information behavioral characteristics of the elderly.

## 2. Literature reviews

The previous literature reviews on information behavior of the elderly including the use of new technologies to increase their behavioral efficiency, with the issues of interest similar to this study, were found as follows.

Brown & Sirichote (2015) analyzed the content of Khon Kaen University theses on the elderly, which had been published during 1989–2012, a total of 121 pieces, by using the research framework for urgent groups of the National Research Council 2012–2016, with the subject "Aging Society", comprising 4 areas, namely "The Elderly care products and services", "Expanding the opportunities / the social potentials of the elderly", "The role of local families and community in aging jobs", and "The Impact of free trade and ASEAN economic community". With regard to the parts related to "Information behavior" and "Digital

awareness”, It was found that there had been a secondary topic “Education: Lifelong learning and information technology” in the second area of the research framework (Expanding opportunities / social potentials of the elderly). Besides, the analysis results showed that the content contained in the largest number of theses (73 pieces) was the content about “Expanding the opportunities / the social potentials of the elderly”, as there had been up to 8 secondary topics related to the health, the good quality of life, and the potential development of the elderly. However, regarding the secondary topics in this area, it appeared that the first number one most studied were what related to “Health” (65 pieces), and only 2 pieces were related to “Education”. Therefore, it could be said that from 1989 to 2012, the studies about elderly people related to “Lifelong learning and information technology”, which would affect the increasing level of the right healthcare cognition, were not many. For the above reason, the review authors recommended studies about the information access / the information on health, including understanding the information technology usage for more capability to access the information on health.

Upatum (2016 b.) analyzed the content of 6 international research articles involving the studies of the online health information-seeking behavior of the elderly during 2010-2015. All of the articles could be searched from the Google Scholar database. The target population were the elderly aged 50-78 years in various countries, namely The United States (3 articles), the Netherlands, Australia and the Republic of Korea (1 each). The tools used in the research were interviews, questionnaires, and observation logs. In some research they used two types of tools. The study results showed that the key factors motivating the elderly to seek the information on health were awareness of changes in body condition and health problems arising, empowerment and quality of life to prevent diseases and illnesses, increase of confidence and effectiveness in treatment of diseases. To access information, most of the elderly used search engines such as Google and Yahoo, and social media platforms such as Facebook, Twitter, Blogs, etc. Problems experienced by the elderly in pursuit of information were internet capabilities, health information literacy levels, computer literacy skills, ability to choose appropriate search terms that match document representation, and expensiveness of internet service fee. Thus, the relevant authorities should arrange for promoting more lifelong learning for the elderly by preparing a reliable online health information source, which is easy to access and has been developing to meet the needs of the elderly in each area. Besides, in

website design, limitations in functional ability of the elderly should be also taken into account.

In addition, Upatum (2016 a.) also reviewed international research during 2010-2015, involving the studies on information behavior of the elderly and learning activities empowering the elderly. The study results revealed that the elderly needed information to meet 3 basic needs, namely 1) physical needs focused on information about healthcare, housing and clothing, 2) psychological and security needs such as information about government welfare, laws and social engagement, and 3) intellectual needs such as new learning information. As for activities promoting and developing the potentials of the elderly, they may be lifelong learning focused on improving physical health, mental health and training in the use of information and communication technologies to seek information for self-care, and social and economic activity participation.

Coto, et al. (2017) analyzed the content of 36 research articles involving the elderly and online social media study, published during 2005-2016. The analysis results showed that most of the research articles analyzed had been published in journals, and most of the researchers were in Europe, followed by the Americas and Asia, respectively, while the largest number of them lived in the United States. Regarding the academic disciplines of the researchers, most of them were affiliated with the Department of Computer Science, followed by Health, Computational Design, and Art & Design, respectively. In addition, there were some researchers coming from different disciplines such as Journalism, Economics, Education, Management and Human Resources. The scope of these studies could be classified into three major categories, which were issues related to the elderly, issues related to technologies, software design & development, and issues related to the quality of life. When considering the issues studied, they could be classified into 2 parts: 1) The issues focused on the elderly, consisting of the influence and impact of online social media on the elderly, the use of online social media technologies to facilitate interactions between the elderly and other people, and the characteristics of the elderly who used or tended to be able to use social media devices. 2) The issues focused on social media from technological points of view, consisting of the issues about designing and evaluating online social media technologies. As for the participants in the studies, there was a wide variety of age criteria on who is considered elderly ranging from 40, 45, 50, 55, 60, 65, 70, and 80 years old. However, many research articles did not define the

age of target population. Besides, other characteristics had been also determined in a number of research articles, such as genders, education levels, etc. With regard to research approaches, there were user-centered participatory approach, case studies, exploratory studies, ethnographic studies, grounded theory approach, literature reviews and trainings. However, literature reviews were the most popular, such as a review of research on the elderly with common health problems and isolation, and a review of research on the use of social media by the elderly and social / economic contexts. The second most popular approach was exploratory research. Besides, for data collection methods, there were observations, focus group, interviews, and questionnaires. Some studies used multiple data collection methods, while some studies did not clearly indicate at all what methods were used. The review results showed that there had not been any specific standard research approach for studying the elderly with social media. This may be because the research on the field of social media with the elderly have just started recently. For this reason, literature review may be one appropriate way to illustrate what have been already studied and what needs more research.

Dodd, Athauda, & Adam (2017) analyzed the content of 30 pieces of research to examine the challenges and the solutions of the aging users' experience with the user interface. The study results showed that there were 3 challenge factors that the elderly had experienced in interacting with computer systems through high-level user interfaces, namely physical condition, computer experience, and cognition. Physical condition was the most prominent issue, indicated by 17 pieces of research, comprising abnormal eyesight, decrease in touch perception and hearing ability. In terms of computer experience, it was indicated by 15 pieces of research that elderly individuals' lack of experience resulted in a poorer understanding of information system processes and caused them to feel unfamiliar with the interfaces and controls of the application. Regarding cognitive issues, the problems, identified in 13 pieces of research as results of physical limitations of the elderly, comprised 1) selective attention which caused interconnected action tracking problems arising from interactions with the user interface, 2) decrease in the ability to use information stored in memory, and 3) decrease in the ability to remember consecutive actions in a task (long-term memories) caused by less interactions with user interfaces (long-term memories). The ways to improve user interfaces to solve the problems of such challenges were mostly focused on mobile phone development, which could be classified into 4 areas: interface and control design (17 pieces

of research), input controls (15 pieces of research), use of natural language (12 pieces of research) and cognitive evaluation by usability testing (6 pieces of research). The review authors noted that only a few solutions addressing cognitive issues in the domain of mobile user interfaces had been proposed, and many studies had encouraged input through touch based applications, because they were considered to be more intuitive and natural interface.

Based on the above 5 literature reviews, the issues to be used as this research framework could be summarized and classified into 4 areas, as follows.

Researchers' academic disciplines: 1 review paper. (Coto, et al., 2017) Most researchers belonged to the Department of Computer Science. However, there were also some researchers coming from other disciplines such as Health, Journalism, Education, Administration, and Human Resources.

Scopes of the target elderly: 2 review papers. (Upatum, 2016 b., and Coto, et al., 2017) In the review by Upatum (2016 b.), it was found that ages of the target elderly had been determined in the range of 50 to 78 years old, living in many countries, but the largest number of them had been in the United States. However, the review by Coto, et al. (2017) indicated that ages of the target elderly have been determined differently from 40 to 80 years, while some papers did not define the age of the population. Besides, in a number of research articles other characteristics had been also determined, such as genders and education levels,

Research approaches and data collection methods: 2 review papers. (Upatum, 2016 b., and Coto, et al., 2017). Upatum (2016 b.) found that data collection methods used were interviews, questionnaires, and observation logs. In some researches more than one type of tools were used, while Coto, et al. (2017) indicated that some of the study approaches used in research on the elderly and social media were user-centered participatory approach, case studies, exploratory studies, ethnographic studies, grounded theory approach, literature reviews, and trainings. As for data collection methods, observation, focus group, questionnaires, interviews including multiple methods were used.

Studied issues and study results: The issues and results of the studies were different according to their topics specified, namely “the content study in accordance with the aging social research framework of National Research Council 2012 – 2016” (Brown & Sirichote, 2015), “the study of online health Information seeking behavior” (Upatum, 2016 b.), “the study of information behavior and learning activities” (Upatum, 2016 a.), “the study of online

social media software design and development in relation to quality of life" (Coto, et al., 2017) and "the study of user experience with user interfaces" (Dodd, Athauda, & Adam, 2017)

### 3. Research questions

The questions defined in this study consisted of 4 following items.

- 1) Which academic disciplines were the researchers who studied the information behavior of the Thai elderly during the period of 5 years (2015-2019) affiliated with?
- 2) What were the criteria determining the scopes of the study on the Thai elderly information behavior during the period of 5 years (2015-2019)? (e.g., age, area, etc.)
- 3) What were the research approaches and data collection methods conducted for the studies on the information behavior of the Thai elderly during the period of 5 years (2015-2019)?
- 4) What were the study issues and overall results of the research conducted on the information behavior of the Thai elderly during the period of 5 years (2015-2019)?

### 4. Research methodology

The research methodology consisted of 3 phases. Each phase had the following stages. (Table 1)

**Table 1** Research Procedures

1. Planning	1.1 Define the scope of the study	1.2 Define the research questions	1.3 Define the selection criteria	
2. Conducting	2.1 Search the literature from databases and reference lists of searchable literature	2.2 Select the literature according to the criteria defined	2.3 Reading and analyzing the essence	2.4 Coding 2.5 Reviewing to check the validity
3. Reporting	<ul style="list-style-type: none"> <li>• Researchers' academic disciplines</li> <li>• Characteristics of the elderly studied</li> <li>• Research approaches</li> <li>• Issues on information behavior studied</li> </ul>			

## 5. Literature selection criteria

The requirements of research to be selected as the information sources of this literature review were determined as follows.

- 1) The research published in the forms of research articles, research reports, dissertations, or independent study that can be accessed to the full text.
- 2) The research published in Thai or English, from 2015 to 2019 (5 years). The reason for determining this period is that the authors started collecting data in 2020; with a retrospective study of 5 years.
- 3) The research that was aimed at studying the information behavior of the Thai elderly.
- 4) The research that was not aimed directly at studying the information behavior, but its procedures or findings were considered to be partly related to or reflect the information behavior of the Thai elderly.
- 5) The research that collected data from the elderly to reflect their information behavior and / or the characteristics of media used by the elderly, which affected their information behavior.

## 6. Literature search methods

The Thai literature search process was carried out in February 2020, starting with a search from the Union Catalog of Thai Academic Libraries (UCTAL). After obtaining the information on relevant articles, the authors considered through which library database the full text of each article can be accessed, and then further searched those library databases. A total of 9 library databases were searched. For English research papers, the search process was carried out in April 2020 from 9 databases. The names of all databases and search terms used are shown in Table 2.

**Table 2.** Databases and search terms used for literature searching

Databases (Thai Language)	Search Terms
1. Union Catalog of Thai Academic Libraries (UCTAL).	Information Elderly
2. BU Research (Bangkok University)	สารสนเทศ ผู้สูงอายุ
3. CUIR (Chulalongkorn University)	The Elderly (subject heading) ผู้สูงอายุ (หัวเรื่อง)
4. Thammasat University Library (One Search)	

5. Kasetsart University Library (One Search)	The elderly AND Information
6. Khon Kaen University Library (One Search)	ผู้สูงอายุ AND สารสนเทศ
7. Maejo University Library (Single Search)	
8. Library and Information Center NIDA (Single Search)	
9. Chiang Mai University Library (PULINET)	
<b>Databases</b>	
<b>(English Language)</b>	
10. Google	research Thai elderly information
	research Thai elderly information
	behavior
11. Google Scholar	Thai elderly AND information
	Thai elderly "information behavior"
	information behavior of Thai elderly
12. Research Gate	Thai elderly AND information behavior
13. ThaiLIS	Thai elderly
14. Semantic Scholar	Thai elderly AND information behavior
15. IEEE Xplore	Thai elderly
16. CU Reference Databases	Thai elderly
17. Thammasat University Library (One Search)	Thai elderly AND information behavior
Search results were limited to academic journals and magazines.	
18. Office of Academic Resources, Chulalongkorn University (Library Search)	Thai elderly AND information behavior
Search results were limited to academic journals and magazines.	

By searching the literature from the above databases and using some reference lists of searchable literature for further searches from <https://www.google.co.th/>, a total of 61 relevant Thai research papers and 10 relevant English research papers were found. After being studied in detail, 45 pieces of them (37 Thai research, 8 English research) were considered to be in line with the criteria defined.

The above 45 research papers were classified as research articles (30 pieces), research reports (3 pieces), theses, and independent studies (12 pieces). It appeared that the year with the most publication was 2018. (12 items). (Table 4.)

## 7. Results and discussion

Having studied 45 research papers, according the research questions defined, the results were as follows.

**Academic disciplines:** The researchers who studied the information behavior of the Thai elderly during 2015-2019 were mainly affiliated with 2 academic disciplines, namely 1) Information Science such as Information Studies, Library Science and Information Science, Information Management, Information Technology, and 2) Communication Arts / Mass Communication such as Communication, Advertising and Public Relations. Besides, a number of the researchers were affiliated with Business Administration and Management, Educational Administration and Management, Educational Psychology, Social and Human Development, Demography and Public Health.

The reason that the researchers who studied the information behavior of the Thai elderly were mainly affiliated with Information Science and Communication Arts / Mass Communication, might probably be the two academic fields are interrelated with each other. In other words, both of them are aimed to build understanding of "information" interacting with humans. Information Science is focused on the study of "information" as an important medium informing knowledge that is essential to be managed, collected, and stored effectively to facilitate retrieval, access, and dissemination, so this will result in optimal use of information. While Communication Arts / Mass Communication is focused on the study of "information" as an element of communication considered to be an important process of human life. For the above reason, some universities organize the curriculums of both academic fields by combining them to be taught and learned in the same department, such as Department of Communication Arts and Information Science, Faculty of Humanities (Kasetsart University), Department of Library Science, Information Science and Communication Arts, Faculty of Humanities (Thaksin University), etc.

In addition, regarding the issue of multidisciplinary in research teams, the results of this study appeared to be similar to those of Coto, et al (2017), showing that the studies about elderly people, either in the aspect of information behavior or social media behavior, are related to many academic disciplines, such as Computer Science, Information Technology, Public Health and Health, Journalism (Communication, Advertising, and Public Relations), Education, Administration, Human Resource Development. Besides, it is also possible that

information-related behaviors cover a wide range of all dimensions and all fields of study. In addition, the important role of social media in today's people's life including information behavior, and the awareness of aging society in Thailand cause researchers of all disciplines to turn their attention to study these relevant issues.

However, it is worth noting that among the researchers of the international research articles studies by Coto, et al (2017), none was affiliated with the field of Information Science. This may be because in the period of 2005-2016, the role of social media in information behavior was still not very prominent, so the researchers in the field of Information Science at that time were not interested in studying the aspects related to social media.

The results of this study also reflect the important role of "Information Science" as an academic source that produces research papers in this area. The findings bring benefits for creating the ideas and the ways of development for elderly to live in a learning society.

**Scope of the Thai elderly under the study:** The largest number of the research papers studied (23 pieces) defined their target population as the elderly aged 60 years and over. The second largest number of the research papers studied (16 items) did not determine their target ages, while some of them define their target population as the members of certain elderly institutions under study, such as the seniors in BanPanrak House Association, the Seniors Club @ Boromarajonani College of Nursing, the seniors in the ... Subdistrict Municipal Elderly School Project, the Seniors Club in...province, the seniors in the group "Digital-minded elderly" or use other criteria, such as Elderly Patients with non-communicable diseases, etc. Besides, there were 2 research papers determined the target ages as 50 years or older, while another 2 of them determined as 55 years or older. In addition, there was 1 research paper studying aging workers to support their retirement. The findings on this issue are similar to those of the literature review by Coto, et al (2017) and Upatum (2016 b.), showing the difference and variety of criteria for determining the target ages. This may be because the age determination for "the elderly" varies by world region and organization concerned, for example, the United Nations defines "the elderly" as those aged 60 year or over, while some organizations classify "the elderly" into 3 groups: 1) "young old" ranging from ages 60 to 75 years, 2) "old old" ranging from ages 75 to 85 years and 3) "very old" aged more than 85 years. Therefore, the researchers have used a wide range of age as criteria for defining the elderly from the age of 50, 55, 60, 65 and 70 years old (Coto, et al 2017).

Regarding the scope of geographic areas where the elderly were living, there was 1 research paper studying the elderly all over the country, and in a number of research papers, several provinces were selected to represent all regions of Thailand, such as Bangkok, Chiang Mai, Nakhon Ratchasima, and Songkhla while some research papers defined their target population as the elderly living in a particular province or a particular district differently in various regions of the country, such as Bangkok (14 pieces), Samut Prakan (3 pieces, only Bangphli district 1 pieces), Nakhon Ratchasima (3 pieces) Khon Kaen (2 pieces) Chiang Rai, Ubon Ratchathani, Nakhon Si Thammarat, Chonburi, etc., and no location was specified (7 pieces). However, it was found that a number of research papers determined the residential areas of the elderly correlated with the location of the agencies / institutions that the researchers were affiliated with. This may be probably because, unless the researchers were familiar with the areas, it was also convenient for them to collect data from the relevant sample groups and / or informants. In addition to collecting data from the elderly, some research also collected data from other parties involved in the research issues, such as the persons in charge of information distribution for the elderly, etc.

**Research approaches and data collection methods:** “Survey research” was the most used approach in the papers studied (30 pieces), some of which were identified by the researchers as “mixed research approach” (quantitative and qualitative research), collecting data by both questionnaires and interviews, however, they were put in the group of “survey research”, because their study results were considered to be descriptive, primarily focused on describing the nature of the phenomenon rather than to explaining for understanding the phenomenon in the environment or context studied. The second most used research approach were “correlation research”, “documentary research” and “case study research”. In addition, there was 1 survey research paper also using “research and development” as part of study. [38] (Table 3).

The reason that most of the papers studied were “quantitative research”, using survey approaches and correlational approaches may be because most information behavioral studies were aimed at explaining the nature of the phenomena occurring with reference to wide-scope population by identifying the characteristics of variables and the relationships between those variables (Kaemkate, 2008,).

Regarding how data was collected, it appeared that questionnaires were the most popular tools (30 papers), and the second most popular were interviews (20 papers). Besides, observations, content analysis, group interviews, informal conversations, were also used as research tools. In a number of research papers studied, multiple data collection methods were used together, for example, using questionnaires with interviews, interviews with observations, and content analysis with interviews.

The above results are similar to those of Upatum's study (2016 b.), indicating that the tools used in the research papers were interviews, questionnaires, and observation logs, and in some of them, two types of tools were used together.

The fact that some researchers used multiple data collection methods or triangulation techniques may be because they considered that these techniques would produce both quantitative and qualitative data with comprehensive and deep insight, resulting in the least amount of error, so that the results could be compared with each other, and the reliability of data discovered could be confirmed. In addition, this may be because the researchers realized that the target population were the elderly who may feel tired of completing questionnaires, or may have reading difficulties such as blurred vision and limitations in understanding the content read from questionnaires. Therefore, using interview methods instead of questionnaires or in conjunction with completing questionnaires may help facilitate the elderly to provide information.

**Table 3** Research approaches

Studied issues Research approaches	Needs (2)	Seeking (1)	Reception (2)	Uses (4)	Overall Information behavior (6)	Technology -oriented behavior (30)	Total (45)
Survey Research	2		1	2	5	21	31
Correlational Research		1		1		4	6
Documentary Research				1		2	3

**Table 3** Research approaches (cont.)

Studied issues Research approaches	Needs (2)	Seeking (1)	Reception (2)	Uses (4)	Overall Information behavior (6)	Technology -oriented behavior (30)	Total (45)
Ethnographic research			1				1
Case Study Research					1	2	3
Phenomenological Research						1	1

**Studies issues and overall results:** The studies issues on the elderly's information behavior could be classified into 6 large groups (Table 4). The content in some research papers were found to be associated with more than one group, even so the authors put them in only one group due to their research titles, keywords, objectives, and content proportion presented by the researchers. However, the research papers with more than one studied issue clearly specified in its title, were put in the group of studying overall information behavior.

In addition, the study results also showed that a number of research papers were focused on studying the issues of modern information technology use rather than those of information behavior directly, but after reviewing the full text, it was found that part of their studies or results also reflected the information behavior of the elderly, which corresponded to our literature selection criteria (Item 4), so they were included in this study.

The fact that most of the research papers (30 pieces) were focused on information behavior based on the use of new information technology, such as social media and the Internet, can possibly be due to the influence of leap and bound progress in information technology and innovation on human everyday life has been increasing, as if it has become part of human behavior related to information. As a result, researchers turned their attention to studying the relationship between information technology and the elderly, so that they can provide information to relevant agencies for the policy formulation and implementation to promote the use of information technology for continuous learning in aging adults. (Dodd, Athauda, & Adam 2017) (Table 4.)

**Table 4** Studied issues on information behavior

Studied Issues	2015	2016	2017	2018	2019	Total
Information needs	1 [23]			1 [29]		2
Information seeking	1 [26]					1
Information reception			2 [22,25]			2
Information uses		1 [45]	1 [28]	2 [30, 42] (English)		4
Overall information behavior		2 [8,39]	1 [1] (English)	1 [4] (English)	2 [43, 44]	6
Technology-oriented behavior	6 [2, 14, 17, 19, 21, 27] (English1)	4 [5,7, 12, 33]	4 [3, 10, 20, 38]	8 [11,18, 32,34, 35, 36, 37, 41] (English1)	8 [6,9, 13,15, 16, 24, 31, 40) (English3)	30
Total	8	7	8	12	10	45

1) The study on information needs: The findings of the study on information needs in particular and as part of overall information behavior showed that what the Thai elderly needed the most were health information, such as health and nutritional care to keep their bodies healthy, disease prevention, and the ways to do when getting sick with common diseases, such as hypertension, diabetes, etc. The secondly preferred information was about welfare, learning support and services provided by the government to the elderly, government's demographic policy on the elderly, legal rights of the elderly, and information with uplifting content, such as Buddhism, etc.

The reason why the elderly need health information was that they were aware of changes in physical conditions and health problems. Therefore, they needed information to increase their potential, quality of life, confidence, and illness treatment success (Upatum, 2016 b.) For this reason, the proportion of the studies aimed at healthcare improvement appeared to be greater than other topics. (Brown & Sirichote, 2015). Besides, it was worth noting that there was one research [43] (classified as group 5) showing that information needed the most by the sample group was about career, finance and investment, followed by health information. This may be because this research studied on the information needs of aging workers (40-55

years old), in order to support their retirement. Therefore, this group of individuals realizes the importance of finding information about preparing and supporting their livelihood financially after retirement from full-time jobs.

The above results were consistent with those of Upatum's study (2016 a.), indicating that the elderly required information to meet 3 basic needs, namely "physical needs", focused on information about healthcare, "psychological and security needs", focused on information about government welfare and laws, and social engagement, and "Intellectual needs" focused on new learning information.

As for sources and forms of information needed by the elderly, The findings revealed that they need 1) personal information sources, especially person in charge of care coordination for seniors or expert speakers with specialized knowledge, 2) printed sources, such as newspapers, audiovisual materials (radio programs, announcement on a public address system, and 3) electronic sources, such as information on the Internet, etc.

2) The study on information seeking: There was one research paper [26] studying the relationship between the elderly's tourism information seeking behavior and their decision-making to undertake domestic travel. Moreover, there was another one research [34] studying the relationship between the elderly's pursuit of knowledge related to communication through social media and their attitudes towards communication through social network (classified as group 6), so it is worth noting that a popular approach to study information seeking was investigation of the relationship between variables and information seeking.

3) The study on information reception: There were 2 research papers [22, 25] studying the information reception behavior as part of their studies on the condition / model of information communication done by the elderly, which reflected the information cultural context of the elderly influenced by government agencies, in other words, referring to the reception of information related to health, nutrition and old age living allowance provision from the health authorities, such as the Office of Public Health and Environment, sub-district health promoting hospitals, and social services agencies, such as the Bureau of Social Welfare, etc. However, since one of the above two researcher papers [25] was not focused on the study on elderly people in particular, its results could not be considered as a direct reflection of the elderly's information reception behavior.

Besides, as the results of both research papers indicated that personal information source was one of the main communication channels used by the elderly to receive messages from government agencies, important suggestions from both of them were consistent with each other, indicating that the persons in charge of communication, either the personnel belonging to the office of social welfare for the elderly or health professionals, were required to have good communication skills, including speaking slowly, clearly and simply to make their conversation easy to understand, and make the elderly realize the importance of communication issues. Moreover, since another one main communication channel popular among the elderly to receive information was found to be “television and radio”, the number of social programs containing the content for the elderly, such as what related to public health or laws, should be increased by the relevant agencies. In addition, as the problems experienced by the elderly appeared to be “insufficient number of service staff”, adding necessary personnel was recommended to the relevant organizations.

4) The study on information uses: There were 4 research papers [28, 30, 42, 45] studying the information usage behavior of both the elderly in general and the elderly in particular groups, such as the elderly with non-communicable diseases, elderly tourists, etc. Regarding research topics, there were a variety of them, including media use, information use and usage impacts, factors that affect usage habits and usage problems. The results of the above research indicated that television and radio were the media most used by the elderly, but online media were also very likely to be used more. The purposes and reasons of using the media were for entertainment, daily livelihood, information reception, communication with family members and acquaintances (LINE application). Educational and social factors, family condition and economic status, and physical factors such as living spaces, were all considered to affect media habits. The usage impacts were shown in both negative and positive aspects, on both physical and mental health. Regarding the problems in using information, there were those caused by physical condition, a lack of understanding of languages, commands / programs, a lack in equipment using skills. As a result of research [28], the ways to develop media for the elderly were recommended, for example, providing opportunities and encouraging the elderly to participate in media production at every stage and producing media with the content appropriate to the elderly's various physical limitations, which could meet the elderly's requirements. In addition, it was noted that there was still little research on the elderly and

media, and most of them were quantitative studies. There was still a lack of research in understanding the requirements of the elderly for using media, which were different from those of general people. In particular, for online media, the physical health conditions of the elderly must also be appropriately considered.

5) The study on overall information behavior: There were 6 research papers [ 1, 4, 8, 39, 43, 44] studying overall information behaviors in several aspects, such as studying the elderly need in conjunction with the use of information [1], studying the elderly need in conjunction with the pursuit and the use of information [4, 8, 43]. Regarding the research topics, such as the information content required, information sources pursued, including the problems arising from such information behavior. However, there was only one unique research paper [39] that studied the elderly need and behavior of watching TV shows.

Most of this group of research was aimed at studying health information behavior. The main causes of problems the elderly faced could be classified into 2 aspects, namely the first aspect was limitation from the elderly, such as their background and physical condition (vision and hearing impairments, competence for reading, using technology and internet, information searching and information evaluation, etc.) and the second aspect was the information sources and media characteristics, for instance, the preferable information source was far away, necessary information was difficult to access and use, the content presented with too many technical terms was difficult to understand, the font size displayed was too small, there was too much advertisement on radio. Therefore, it was recommended to accelerate and promote the development of information behavioral potential of the elderly, in the aspects of information access, information evaluation, information and technology use. Moreover, information services agencies were required to improve their infrastructure related to communication and information technology to facilitate the elderly's information access and information service use, including supporting the production of various forms of information media suitable for the elderly.

6) The study on technology-oriented behavior: The 30 research papers focused on new technology-oriented behavior, can be classified into 3 aspects, according to the type of information technology studied.

(1) *The aspect of Internet and websites*. There were 4 research papers [5, 19, 27, 41] studying the relationship between the characteristics of the population, economics, society,

environment and the elderly's Internet use, and factors affecting the use, including analyzing factor elements related to Internet use. Part of the research results showed that in Thailand most of the elderly using Internet lived in municipalities. Factors affecting Internet use were administrative district, education level, work status, age, income, use of computers, tablets, smartphones, Internet accessibility and living with people using Internet. There were 4 factor elements in using health information, namely 1) attitude towards Internet and health information usage, 2) Internet usage related education and experience, 3) quality and quantity of health information on the Internet, and 4) Internet literacy of the elderly. Health information usually searched from the Internet by the elderly was general knowledge of diseases and illness, treatment methods or treatment options, therapeutic technology and aged care programs.

(2) *The aspect of social media and applications.* There were 19 research papers [2, 3, 6, 10, 11, 12, 13, 14, 15, 16, 17, 18, 21, 24, 33, 34, 35, 36, 37] in this group. Besides studying information seeking behavior through social media, overall use of social media, use of a particular type of social media such as LINE and Facebook, some of them also studied on other issues related to social media, which the results could be used as a guideline to develop social media and to increase efficiency in social media use. For example, the study on usage satisfaction, the study on the relationship between motivation to use and satisfaction in use, and the study on personal factors and behavioral factors that affect the use of applications, etc.

The reason that the proportion of research in this area was the highest might be because the continuous growth of social media over the past 5 years (Digital Government Development Agency 2020 a; 2020 b), resulting in social media usage popularity among the elderly, especially the use of the LINE application, kept the researchers interested in studying to understand more aspects related to these issues.

- *Case studies on the LINE application usage.* There were 8 research papers [3, 6, 10, 15, 18, 21, 33, 36] studying the use of the LINE application covering the reasons for using, frequency, devices used, experience of using, benefits and effects of using. Besides, there was one research paper [15] analyzing the types and meanings of images chosen by the elderly in communication (Semiology analysis)

- *Case studies on the Facebook usage.* There were 3 research papers [12, 16, 37] studying the use of Facebook covering the purpose of using, time and duration of using, factors affecting usage [37], initial awareness in using, such as privacy, threats, and information sharing [12], analysis of content and communication pattern appearing on the Facebook page for the elderly [16].

The overall results of this study could be concluded that the elderly used social media for making contact, searching for health information, information follow-up, self-modernization, reducing stress and loneliness, adding communication channels, stimulating memory, delaying the onset of dementia. Factors affecting usage were education level, occupation, revenue and revenue sources. The major obstacle to use social media was that the devices and Internet service were rather expensive. The guidelines for communication application development were using icon symbols that could clearly and differently represent each menu, placing menus most being used in an easy-to-see location, displaying only the relevant menus and showing not too many of them on one page, and designing large keyboard letters. The scope of content studied in this group of research could be classified into 3 aspects, similar to the study results of Coto, et al (2017), namely the aspect related to the elderly, the aspect related to the technology, the designs and the development of software, and the aspect related to the quality of life.

(3) *The aspect of information technology & digital technology.* There were 7 research papers [7, 9, 20, 31, 32, 38, 40] focused on information technology & digital technology, covering the study about requirements, the access, the utilization patterns, the suitable model for using, internal and external factors affecting the use, restrictions & problems in using, effects of using, determination and development of capacity in using, and the needs of capacity enhancement in using digital technology. Some of the interesting study results indicated that suitable models of using technology for the elderly could be classified into 3 groups: 1) the elderly aged 60-79 years needed to notify the relatives in case of emergency, 2) the elderly aged 80-89 years needed a reminder system, such as date of birth, medication taking and appointments, and 3) the elderly aged 90 Years or older needed self-care equipment to reduce the burden on family members. Technological skills of the elderly could be classified into 6 aspects, namely 1) communication: using mobile phones and connecting to the Internet through mobile phone for making contact or communication, 2) information management:

covering online information access & evaluation 3) online society: covering interaction, participation & membership, knowledge sharing, group Initiative, online social group management 4) security: covering Internet threat prevention, data loss & privacy prevention, password setting, virus monitoring & checking system, checking of device security settings, 5) integration in daily life: covering the use of information technology to solve problems and promote quality of life, such as to pursue knowledge, to entertain, to facilitate traveling, to use online financial services, to do online shopping, and 6) moral, ethics, attitude: covering the use of information technology in the ways that was not against the principles of moral and ethics, realizing the importance, the value, the benefits of using information technology. Capacity improvement needed by the elderly was what related to software, hardware and computer networking system. There were both internal factors such as skills and experience of the elderly with technology, and external factors such as influence on using technology from a closed group of people. However, although most elder people received financial and information technology support, they still did not feel being cared for. This might show that concrete support could not be substituted for the emotional and psychological needs of the elderly.

## 8. Conclusion

The results of all the above-mentioned studies have shown the gap in information behavioral research on the Thai elderly over the past five years: 1) Regarding the group of the aging population studied, there were still very few research papers studying the people who were about to step into the early elderly group (50-60 years old). The information in this area might be useful for policy planning and implementation related to appropriate elderly accommodation in the near future. 2) Regarding financial literacy, this skill is very important for the elderly's livelihood. However, no research study on the information behavior of the Thai elderly financial literacy has been done. Therefore, it is recommended to promote financial literacy among the elderly, including budgeting, investment, insurance, loan agreement, taxation, etc. 3) Regarding information accessibility & evaluation, although both government and private sectors have produced and disseminated information for the elderly in a variety of formats, declining physical and mental conditions of the elderly can increase difficulties in accessing and evaluating such information, which can sometimes result in failing

prey to misinformation. Education to help the elderly understand the information access process and increase their information assessment skill will result in successfully promoting the utilization of information. In addition, the research approaches used by the previous researchers are mainly survey studies that are aimed to describe the characteristics of elderly behavior as a whole rather than creating a deeper understanding of elderly people's behavior in a particular context. Therefore, the analysis obtained from these studies may not be finely detailed enough to be applied to the elderly with different limitations or in different contexts. The addition of qualitative research using an ethnographic research approach, a case study research approach, and a sociological research approach may greatly enhance understanding of the elderly and discover new connection, leading to making appropriate response and best solutions for Thailand's elderly.

## 9. Research Limitation

Since the research papers collected and analyzed were the ones searchable and accessible with full text from only 9 databases for Thai papers and 9 databases for English papers, there might be a number of other research papers which were in line with the criteria but did not appear in this literature review.

## References

Brown, P.Y., Sirichote, P. (2015). Content analysis of Khon Kaen University theses on the elderly. (In Thai). *Journal of Information Science*, 33(3), 56-78.

Coto, M., Lizano, F., Mora, S. & Fuentes, J. (2017). **Social media and elderly people: Research trends**. Retrieved April 25, <https://www.researchgate.net/publication/317173038> DOI: 10.1007/978-3-319-58562-8\_6

Department of Older Persons. (2021). **Current aged society and economics in Thailand**. (In Thai). Retrieved December 10, 2021, from <https://www.dop.go.th/th/know/15/926>

Digital Government Development Agency. (2020 a.) **2020 Thailand internet user profile**. (In Thai). Bangkok: Ministry of Digital Economy and Society.

Digital Government Development Agency. (2020 b.) **2016 Thailand internet user profile**. (In Thai). Bangkok: Ministry of Digital Economy and Society. Retreived December 10, 2021, from [https://data.go.th/it/dataset/item\\_6aa9b49a-84b3-4c30-8821-322c165efd29](https://data.go.th/it/dataset/item_6aa9b49a-84b3-4c30-8821-322c165efd29)

Dodd, C., Athauda, R. & Adam, T. P. (2017). Designing user interfaces for the elderly: A Systematic Literature Review. *Australasian Conference on Information Systems*.

Foundation of Thai Gerontology Research and Development institute (TGRI). (2021). **2020 situation of the Thai Elderly.** (In Thai). Nakhon Pathom: Institute for Population and Social Research, Mahidol University.

Kaemkate, W. (2008). **Research methodology in behavioral science.** (In Thai). Bangkok: Department of Educational Research and Psychology, Faculty of Education, Chulalongkorn University.

Ministry of Social Development and Human Security. Department of Older Persons. (2019). **Measures to implement national agenda on aged society (Revised edition).** (In Thai). Bangkok: Amarin Printing and Publishing Public Company.

Pettigrew, Fidel, R. & Bruce, H. (2001). Conceptual frameworks in information behavior. *Annual Review of Information Science and Technology* 35, 43-47.

Upatum, P. (2016 a.) Information services for empowering the elderly. (In Thai). *Suthiparitth Journal*, 30(96), 223-232.

Upatum, P. (2016 b.) Online health information seeking behavior of elders. (In Thai). *Phranakhon Rajabhat Research Journal (Humanities and Social Sciences)*, 11(1), 252-261.

#### Appendix: Research papers in the study

1. Boonchuay, K. (2017). **Day-to-day information needs and use of the elderly in Songkhla province, Thailand.** Retrieved from [http://intra.fsktm.um.edu.my/~aini/sistem/pgres2017/Lampiran/DC/007\\_Kongkidakorn\\_31\\_7\\_fullPaper.pdf](http://intra.fsktm.um.edu.my/~aini/sistem/pgres2017/Lampiran/DC/007_Kongkidakorn_31_7_fullPaper.pdf)
2. Buntadthong, K. (2015). **Social network usage behavior and Bangkok older person's satisfaction.** (In Thai). Independent study in Communication Arts, Graduate School, Bangkok University. Retrieved from <http://dspace.bu.ac.th/handle/123456789/1298>
3. Chaichuay, W. (2017). Elderlies' experience in using LINE application: a phenomenological study. (In Thai). *Veridian E-Journal, Silpakorn University (Thai Edition)*, 10(1), 905-918. Retrieved from <https://www.tci-thaijo.org/index.php/Veridian-E-Journal/article/view/87705>
4. Chaiwchan, W., & Nookhong, J. (2018). Health information behavior of elderly in digital age. *International Journal of Management and Applied Science*, 4(5), 35-39. Retrieved from [http://www.iraj.in/journal/journal\\_file/journal\\_pdf/14-469-153303561535-39.pdf](http://www.iraj.in/journal/journal_file/journal_pdf/14-469-153303561535-39.pdf)
5. Chansiriwat, T., Loipha, S., & Herbst, J. (2016). Factors influencing website accessibility of the elderly. (In Thai). *Journal of Industrial Technology Ubon Ratchathani Rajabhat University*, 6(2), 166-181. Retrieved from <https://ph01.tcithaijo.org/index.php/jitubru/article/view/74760>
6. Chawirin, W. (2019). **Using application Line behavior that affects the quality of elder life in Bangkok.** (In Thai). Independent study in Communication Arts, Graduate School, Bangkok University. Retrieved from <http://dspace.bu.ac.th/handle/123456789/4335>

7. Cheyjunya, P. (2016). Utilization patterns and factors influencing on the elderly's communication technology uses. (In Thai). *Journal of Chandrakasemsarn*, 22(43), 121-135. Retrieved from <https://li01.tci-thaijo.org/index.php/crujournal/article/view/73110/58794>
8. Dinkhundod., C., & Loifar., S. (2016). Health information behavior of the elderly in Nakhon Ratchasima. (In Thai). *Journal of Information Science*, 34(2), 75-89. Retrieved from <https://so03.tci-thaijo.org/index.php/jiskku/article/view/66897/54635>
9. Hanpanich, P., Pongsuwan, W., (2019). IOTS requirements from Thai's aging (case study Samutprakan province). (In Thai). *Journal of MCU Social Science Review*, 8(2), 254-262. Retrieved from <https://www.tci-thaijo.org/index.php/jssr/article/download/142907/141262/>
10. Intamusik, W. (2017). **The study on usage behavior and effect of Line application on life and mind among the elderly of Ban Pan Rak association.** (In Thai). Independent study in Communication Arts, Graduate School, Bangkok University. Retrieved from <http://dspace.bu.ac.th/handle/123456789/2777>
11. Junjiraporn, T. (2018). **A study of usage behavior and guidelines for development of communication application for elderly users.** (In Thai). Master's thesis in Computer Science, King Mongkut's University of Technology North Bangkok. Retrieved from [https://tdc.thailis.or.th/tdc/browse.php?option=show&institute\\_code=52&bib=34507](https://tdc.thailis.or.th/tdc/browse.php?option=show&institute_code=52&bib=34507)
12. Kampasri, S. (2016). **The factors influencing sharing personal information online, among older Facebook users in the Bangkok metropolitan area.** (In Thai). Independent study in Science, Thammasat University. Retrieved from [http://ethesisarchive.library.tu.ac.th/thesis/2015/TU\\_2015\\_5702037259\\_3934\\_2521.pdf](http://ethesisarchive.library.tu.ac.th/thesis/2015/TU_2015_5702037259_3934_2521.pdf)
13. Kheokao, J., Ubolwan, K., Tipkanjanaraykha, K., & Plodplueng, U. (2019). Online health information seeking behaviors among the Thai elderly social media users. *TLA Research Journal*, 12(1), 60-76. Retrieved from [https://so06.tci-thaijo.org/index.php/tla\\_research/article/view/155427](https://so06.tci-thaijo.org/index.php/tla_research/article/view/155427)
14. Khoocharoensin, S., & Khawloueng, D., & Jamkrajang, M. (2016). **The study of using social media behavior of the elderly in Muang district Chonburi province.** (In Thai). Master's thesis in Education, Burapha University. Retrieved from [http://digital\\_collect.lib.buu.ac.th/dcms/files/56910163.pdf](http://digital_collect.lib.buu.ac.th/dcms/files/56910163.pdf)
15. Lhuengusakul, O. (2019). **Reflection of thinking through pictures sent via Line application of the elderly.** (In Thai). Independent study in Communication Arts, Graduate School, Bangkok University. Retrieved from <http://dspace.bu.ac.th/handle/123456789/4182>
16. Lim, P. (2019). An analysis of content and communication patterns of Thai elderly fan pages. *Proceedings of the 5th World Conference on Media and Mass Communication*. (110-119). Pita Kotte, Sri Lanka: TIIKM. Retrieved from <http://tiikmpublishing.com/proceedings/index.php/medcom/article/download/195/249>

17. Linla, C. (2015). **Factors affecting behavior on using applications on smartphones and tablets of elders in Bangkok.** (In Thai). Independent study in Business of Administration, Rajamangala University of Technology Thanyaburi. Retrieved from <http://www.repository.rmutt.ac.th/xmlui/handle/123456789/2756>
18. Meesattayanan, P., Choonkor, R., Kerdchuen, K. & Ponkaew, W. (2018). Social media: LINE application and elderly health care. **2018 ANPOR Annual Conference.** Bangkok: ANPOR. Retrieved from <https://journal.anpor.net/index.php/proceeding/article/view/128>
19. Ministry of Digital Economy and Society. National Statistical Office Thailand. (2015). **Factors in internet usage of Thai elderly people in 2014: A critical report.** (In Thai). Bangkok: National Statistical Office. Retrieved from <http://service.nso.go.th/nso/nsopublish/themes/files/elderlyInternet57.pdf>
20. Monthatipkul, D., Techataweewan, W., & Prasertsin, U. (2017). Needs assessment for competency development of using information and communication technology for learning of elderly people in Bangkok. (In Thai). **Journal of Library and Information Science Srinakharinwirot University,** 10(2), 49-62. Retrieved from <http://ejournals.swu.ac.th/index.php/jlis/article/view/9956>
21. Narkwilai, M., Funilkul, S., & Supasitthimethee, U. (2015). Factors influencing the Thai elderly's intention to use social network for quality of life: A case study LINE application. **2015 7th International Conference on Information Technology and Electrical Engineering (ICITEE).** (593-598). New York, U.S.: IEEE. Retrieved from <https://ieeexplore.ieee.org/abstract/document/7409016/> authors#authors
22. Niranon, P., & Sirichote, P. (2017). Information communication model for the elderly in Khon Kaen municipality. (In Thai). **Journal of Information Science,** 35(1), 53-72. Retrieved from <https://so03.tci-thaijo.org/index.php/jiskku/article/view/96038/86562>
23. Norajit, R. (2015). **Television program policy of television media organization in mobilizing aging society and television program content desire of elderly in Bangkok.** (In Thai). Master's Thesis in Communication Arts, Chulalongkorn University. Retrieved from <http://cuir.car.chula.ac.th/handle/123456789/51094>
24. Notakao, S., & Pitchayachananon, P. [Lyn]. (2019). Gender difference towards social media usage among Thai elderly. **Proceedings of the 14th National and International Sripatum University Conference (SPUCON 2019).** (179-187). Bangkok: Knowledge Bank at Sripatum University. Retrieved from <http://www.dspace.spu.ac.th/handle/123456789/6571>
25. Polpichit, P., & Vongprasert, C. (2017). Health information culture in Thai rural community. (In Thai). **Journal of Library and Information Science Srinakharinwirot University,** 10(2), 63-77. Retrieved from <http://ejournals.swu.ac.th/index.php/jlis/article/view/9957>

26. Puangmaha, L. (2015). **Domestic travel information search behavior and purchasing decisions for Thai senior tourists.** (In Thai). Bangkok: DRU Intellectual Repository. Retrieved from <http://cms.dru.ac.th/jspui/handle/123456789/1226>

27. Rattanawarang, W. (2015). Elderly's internet usage for health information in Bangkok region. (In Thai). **Journal of Behavioral Science for Development**, 7(1), 169-186. Retrieved from <http://ejournals.swu.ac.th/index.php/jbsd/article/view/5142/4926>

28. Sap-in, R., & Khaoroptham, Y. (2017). The elderly and media in Thailand. (In Thai). **Dhurakij Pundit Communication Arts Journal**, 11(2), 367-387. Retrieved from <https://commarts.dpu.ac.th/journal/upload/issue/pUZ0rrr9NH>.

29. Saraphon, T. (2018). Information needs to improve quality of life for the elderly of elderly school in Ma-Aue sub-district, Thawatburi district, Roi-et province. (In Thai). **NRRU Community Research Journal**, 12(3), 114-123. Retrieved from <https://tci-thaijo.org/index.php/NRRU/article/download/108602/115264/>

30. Saribut, S. (2018). Using correspondence analysis to explore the relationship between information sources and elderly tourist segments. **Modern Applied Science**, 12(5), 89-99. Retrieved from <https://pdfs.semanticscholar.org/7eb9/dd41eaf95877f2e670aad4cef495d1c32bd4.pdf>

31. Savangkit, W. (2019). Development of elderly people's information technology competency in Chiang Rai province by competency-based training. (In Thai). **Journal of Chandrakasemsarn**, 25(2), 80-94. Retrieved from <https://li01.tci-thaijo.org/index.php/crujournal/article/view/175749>

32. Sinsomboonthong, R., & Wuttisen, S. (2018). Information technology intention behavior and perception in health promotion of aging people in Bangkok, Thailand. (In Thai). **The 5th National Conference Nakhonratchasima College 2018 (The 5th NMCCON 2018)**. (359-368). Nakhonratchasima: Journal of Nakhonratchasima College. Retrieved from [http://journal.nmc.ac.th/th/admin/Journal/2561Vol7No1\\_36.pdf](http://journal.nmc.ac.th/th/admin/Journal/2561Vol7No1_36.pdf)

33. Somvatasan, K., & Sataruji, K. (2016). The study of communication behaviour in Line application data sharing of elderly people. (In Thai). **2016 National Academic Conference: Communication Arts and Management Innovation**. (14-26). Bangkok: Faculty of Communication Arts and Management Innovation, National Institute of Development Administration (NIDA). Retrieved from <http://www.gscm.nida.ac.th/public-action/Proceeding/2559/2.pdf>

34. Srimanta, D., (2018). The pursuit of knowledge, attitudes and communication behaviors through social networking sites of the elderly in the Bang Kaeo, Bang Phli, Samut Prakan. (In Thai). **Dhurakij Pundit Communication Arts Journal**, 12(2), 177-219. Retrieved from <https://commarts.dpu.ac.th/journal/upload/issue/F9ZfS5klnt.pdf>

35. Suchartpong N., Taengkiang, B., Sangthong, K., & Inprom, M. (2018). Phruttikam khong phusung ayu nai kanchai susohiannetwoek korani suksa tambon Cha Mai amphoe Thung song changwat Nakhon Si Thammarat [Seniors' behavior in social media network usage: A case study of Chamai sub-district,

Thung song district, Nakhon Si Thammarat province]. (In Thai). **Walailak Procedia**, 2018(1), 1-8. Retrieved from <http://wjst.wu.ac.th/index.php/wuresearch/article/view/5269>

36. Sunonthanam, N., (2018). *The self-esteem of the elderly through Line application*. (In Thai). Master's Thesis in Arts, Chulalongkorn University. Retrieved from <http://cuir.car.chula.ac.th/handle/123456789/63298>

37. Sutthipum, F. (2018). **Identity of Thai elderly in Facebook social network**. (In Thai). Master's independent studies in Communication Arts, Graduate School, Bangkok University. Retrieved from <http://dspace.bu.ac.th/handle/123456789/3680>

38. Tayati, P., Disathaporn, C., & Onming, R. (2017). The model of Thai elderly learning management for information and communication technology literacy. (In Thai). **Veridian E-Journal, Silpakorn University (Thai Edition)**, 10(3), 1,613-1,629. Retrieved from <https://he02.tci-thaijo.org/index.php/Veridian-E-Journal/article/view/110158>

39. Teetakaew, T. (2016). **The development of television programs for older persons and completed aged society**. (In Thai). Doctoral dissertation in *Population Studies*, Chulalongkorn University. Retrieved from <http://cuir.car.chula.ac.th/handle/123456789/59355>

40. Thisaphak, P., Oranop Na Ayutthaya, C., & Pathumcharoenwattana, W. (2019). Media, information, and digital literacy indicators for advocating democratic citizenship of Thai elderly. (In Thai). **Journal of Mass Communication**, 7(1), 147-190. Retrieved from <https://so03.tci-thaijo.org/index.php/masscomm/article/view/184164>

41. Tirakoat, S.& Polnigongit, W. (2018). Internet usage behaviors, literacy, and attitude towards utilization of wellness content on the internet among Thai elderly. **Journal of Nursing and Health Care**, 36(1), 72-80. Retrieved from <https://he01.tci-thaijo.org/index.php/jnat-ned/article/view/127046/95905>

42. Tungthumkul, S., & Marangkul, W. (2018). **The study of information use behavior and problem of elderly in Talay Noi, Khuan Khanun district, Phatthalung province**. (In Thai). Songkhla: Research Information Srivijaya System. Retrieved from <https://riss.rmutsv.ac.th/project/?id=3458>

43. Upatum, P., Plangcheep, S., Tanhan, P., & Balankura, T. (2019). Information behavior of senior worker for retirement planning. (In Thai). **TLA Bulletin**, 63(2), 78-93. Retrieved from [https://so06.tci-thaijo.org/index.php/tla\\_bulletin/article/view/233929/160851](https://so06.tci-thaijo.org/index.php/tla_bulletin/article/view/233929/160851)

44. Upatum, P., Yenbamrung, P., Gray, R., & Sriborisutakul, S. (2019). Information behavior of older persons for lifelong learning. (In Thai). **TLA Research Journal**, 12(2), 21-34. Retrieved from [https://so06.tci-thaijo.org/index.php/tla\\_research/article/view/235207/161653](https://so06.tci-thaijo.org/index.php/tla_research/article/view/235207/161653)

45. Vorakulrungson, U. (2016). Outcomes of the use of health information for older adults with chronic non-communicable diseases: Case studies of patients with health Centers. The Municipality of Chumphon, Muang Chumphon. (In Thai). **TLA Research Journal**, 9(2), 53-69. Retrieved from [https://so06.tci-thaijo.org/index.php/tla\\_research/article/view/73674](https://so06.tci-thaijo.org/index.php/tla_research/article/view/73674)