libres volume 31, issue 1, pages 1-11 (2021). https://doi.org/10.32655/LIBRES.2021.1.1

Capturing Changing User Goals in Information Seeking Process Using Information Behavioral Grammar Model

Makiko Miwa
The Open University of Japan, Chiba, Japan
miwamaki@ouj.ac.jp

ABSTRACT

Background. Problem-solving support services in Japan's public libraries offer users' problem-solving support by providing information in business, health and medical, legal, and administrative support. Though such services are quite well-developed in Japan's public libraries, there is little research on the information needs of local citizens who make use of these services.
Objective. This study investigated the information seeking processes of two groups of library users—aspiring entrepreneurs and cancer patients—who used public libraries to attain their problem-solving goals. This study used an information behavioral grammar model as the theoretical framework.
Method. Existing interview data of aspiring entrepreneurs and cancer patients were analyzed using the model, applying a constant-comparative method adopted from the grounded theory approach in order to elicit how problem-solving goal (distal goal) and information needs (proximal sub-goals) are modified in information seeking process.
Results. The information behavioral grammar model was found to be useful for characterizing and explaining the change in the distal goal and the information needs for problem solving, together with the emotions of the actor that result in the change. Entrepreneurs and cancer patients use various external services before and after using the public library's problem-solving support service.
Practical implications. It is desirable for public libraries to collaborate with external specialized organizations and professionals in offering user-training on library use, Web search, and specialized data base retrieval.

INTRODUCTION

Even though an increasing number of public libraries offer problem-solving support services, few user studies have been conducted. The present study analyzed potential users' information needs and their problem-solving goals, using data collected in earlier studies by Miwa et al. (2018) and Tamura et al. (2008). We examined how the information needs of business support service users, and health and medical information service users change in the course of the information seeking process, and at what stage the users make use of public library services. We use the goal model of Bandura (1986) and the information behavioral grammar model of Miwa (2000, 2007) as the data analysis framework.

BACKGROUND

This section reviews recent developments in problem-solving support services deployed in Japanese Public Libraries.

The Ministry of Education, Culture, Sports, Science and Technology (MEXT) in Japan amended the "Disable Standard for Library Establishment and Operation" in 2012, in response to diversified regional issues and the changing in operating environment of Japanese public libraries, posit public libraries as not only the place of reading for leisure but also an information base that support the local users' problem-solving. This policy encouraged public libraries to start the problem-solving support service, which is defined as:

> Kinds of [public library] service which intends to help solving local clients' problems concerning their everyday-life and work, as well as to support activities for solving local issues, based on clients' requests and local situations (*National Public Library Council, 2017, p. 63*).

This service can be divided into four main types: business-support, health and medical information, legal information, and administrative support. How these four types of services have developed is outlined in Figure 1 which shows, for each type of problem-solving support service, the cumulative number of public libraries that started offering the service. Business support services was introduced earlier and the number of libraries which offer this service increased rapidly in the 2000s. Legal information service and administrative support service also appeared early but the number of libraries which offer these services grew more slowly. In contrast, health and medical information service appeared a little later in 2003, but grew rapidly to surpass the number of libraries which offer legal information service and administrative support service. From this figure, it can be seen that business support services, and health and medical information services are provided by the most number of libraries.

Business support services have been developed in conjunction with the government

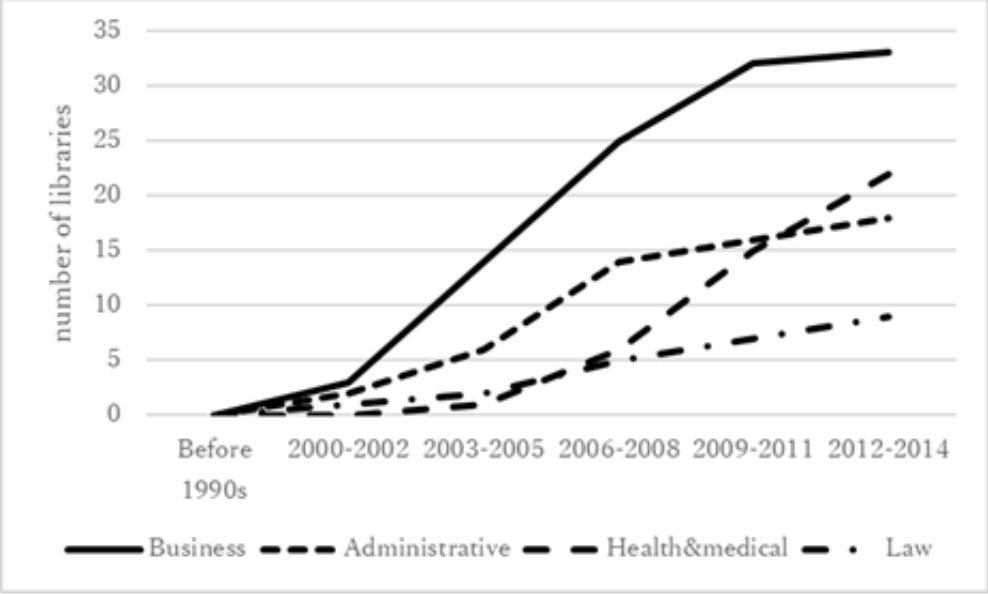

Figure 1. Cumulative number of libraries offering each type of problem-solving service (based on the dates the services started)

Source: National Public Library Council. (2017, p. 18). Report on problem solving support services in public libraries.

policy of "supporting entrepreneurs" in industry. Health and medical information services are based on national and regional policies reflecting the declining birthrate and aging population, to support reading for pleasure and also to help solve the problems of people living in the area. Thus, problem-solving support services are expanding the role of public libraries from a place of providing materials for pleasure reading to provision of useful information to citizens.

Even though problem-solving support services have been expanding in public libraries in Japan, few libraries have conducted user studies or market research on these support services. To address this gap and to support evidence-based service design and operation, we analyzed the information needs of users embedded in their information seeking process. We sought to understand user goals and how a library's problem-solving service helped users attain their goals by fulfilling information needs at different stages in the information seeking process.

This study focused on users who intended to start a small business (i.e., users of business-support information), and cancer patients (potential users of health & medical information services). The data analysis was guided by the following research questions:

RQ1: How is the information behavioral grammar model useful in analyzing the modification of user goals in the information seeking process for problem-solving?

RQ2: How are problem-solving goals (distal goals) and information needs (proximal sub-goals) changing throughout the users' information seeking process?

What kinds of activities or services are offered by public libraries under the name of "problem-solving support"? Table 1 shows the service elements, in descending order of frequency, provided by a public library that implemented the service (National Public Library council, 2017, p.6).

Once a public library starts offering a problem-solving support service, the library collects materials of the target genre more actively, sets up a corner to exhibit relevant library materials, prepares a list of relevant materials held in the library, creates a pathfinder on relevant topics, and adds hyperlinks to relevant websites. The library also subscribes to relevant online databases to provide free access to library clients, and holds user training sessions. Some libraries work with other related organizations to hold seminars, symposia,

Table 1. Components of a problem-solving support service

Actively collecting materials related to the type of problem-solving support service
Opening a special corner
Providing materials lists, path finders, and links to relevant external collections
Providing free access to online databases relevant to the service type
Holding online database training sessions
Holding seminars, symposia, etc. on relevant topics
Providing guidance on the use of partner organizations, and providing information on their programs and events
Holding consultation meetings jointly with partner organizations
Opening a reference window dedicated to the service type

Source: National Public Library Council. (2017, p. 6.). Report on problem solving support services in public libraries.

etc. on relevant topics, to provide guidance on use of the partner organizations, and introduce their programs and events to library clients. Staff of related organizations may be invited to hold individualized consultation meetings. Some libraries open-up a reference service window dedicated to the problem-solving support service.

The list of service components in Table 1 reflects the significance of collaboration with outside organizations. This is because selection of materials and answering of reference questions in the target domain, such as business, law, government, and health and medicine, require specialized knowledge. Collaboration with external organizations specialized in the target genre is indispensable in providing reliable problem-solving support.

Three challenging issues in the provision of problem-solving support has been identified: (1) cooperation with relevant external organizations, (2) specialized knowledge on the target genre, and (3) selection of materials (National Public Library Council, 2017, p.6). These issues may be addressed by public libraries by employing evidence-based service design based on user studies and market research. However, no such studies have been published yet. This is the motivation for the present study.

THEORETICAL FRAMEWORK: INFORMATION BEHAVIORAL GRAMMAR MODEL

This section explains the theoretical framework adopted for the data analysis. We used an information behavioral grammar model derived from goal model, a component of Bandura's (1986) social cognitive theory.

Social cognitive theory is a comprehensive theoretical framework that explain human behavior in general, advocates the existence of interdependence between human behavior, internal factors, and external factors. This theory is a multi-level theory in which posits (1) human cognitively depicts desirable future events, and (2) set criteria for ongoing actions and their outcomes to achieve them. It is considered to be adjusted by multiple levels of goals.

Bandura's goal model distinguishes between distal goals and proximal sub-goals. The former "serve as general directive function" and the latter "determine people's immediate choice of activities" (Bandura, 1986, pp. 473-474). Applied to information seeking behavior, the goal model suggests that information needs are considered as the proximal sub-goals, and what users intend to accomplish through meeting the information needs are considered as the distal goals.

Based upon Bandura's goal model, the information behavioral grammar model, presented in figure 2, makes it suitable for analyzing information seeking process in context (Miwa et al., 2008). The information behavioral grammar model has the following characteristics:

1. Multiple levels of goals: the model distinguishes distal (long-term or primary) and immediate goals. A distal goal is a problem-solving goal such as a procedure relating to starting a business, while an immediate goal is an information-seeking goal such as getting information on procedures for starting a business. There can be multiple levels of goals, which can change over time.
2. Shifts in affective states: affective states which can change over time are an important dimension that affect information seeking behavior.
3. Relationships of self-efficacy, use experience and evaluation: evaluation of a library service is affected by multiple factors, including past use experience and self-efficacy.

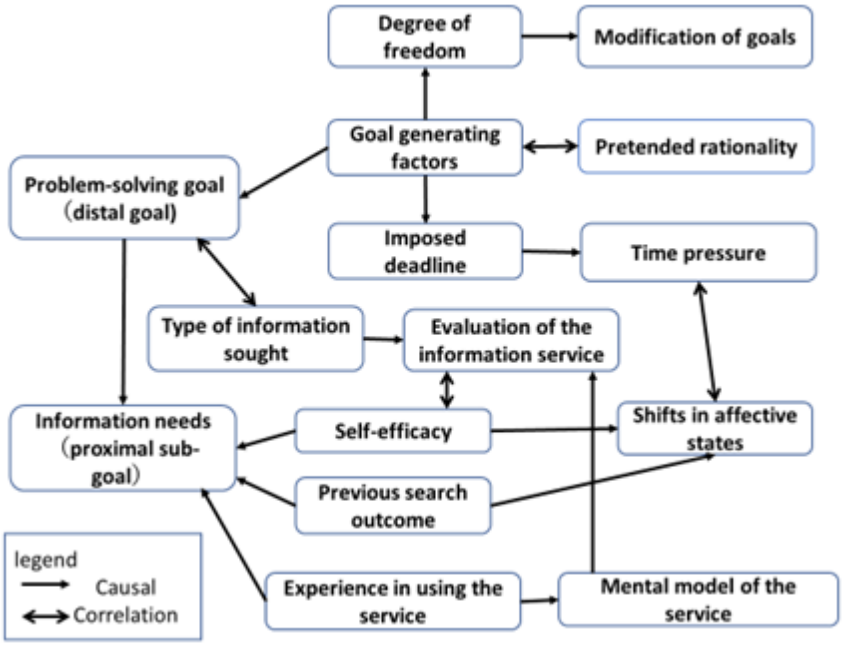

Figure 2. Information Behavioral Grammar Model
Source: Miwa, M. (2007, p.2)

The characteristics and factors in the information behavioral grammar model, described above, can be used as a lens for analyzing information seeking behavioral motivated by the distal goals.

METHODOLOGY

This section describes the data sources and data analysis methods used. We analyzed two existing sets of interview data:

- one dataset on the information seeking process relating to starting a small business, collected from users of business information services at several public libraries (Tamura, et al., 2008), using a critical-incident interview method (Flanagan, 1954) , as well as a timeline interview technique (Adriansen, 2012) .
- the other dataset is on the information seeking process of cancer patients, collected from cancer patients and their family using a questionnaire survey and a timeline interview (Miwa et al., 2018).

Information seeking process related to starting a small business

We interviewed 18 heavy users of business information services at four public libraries. The interviews were conducted from May to December, 2006. The interviewees signed a consent form, which assured them of the confidentiality of their personal information, and were offered a book token for their time. The interviews were audio-recorded, transcribed, and analyzed.
Interview questions covered:

1. the last time the interviewee visited the public library and used the business information service;
2. the goal of the use;

3. the process leading to the generation of the goal;
4. use of other sources to meet the goal;
5. detailed description of the use of the business information service at the library to attain the goal, and
6. the evaluation of the service.

The transcribed interviews were content-analyzed using the constant–comparative method of the grounded theory technique (Glaser & Strauss, 1967).

Nine of the interviewees were looking for information for business start-up (the distal goal). Their transcribed interview were analyzed using the framework of the information behavioral grammar model, and concepts related to modification of goals were extracted. The results are presented in the next section.

Information seeking process of cancer patients

We conducted a survey of 100 Japanese cancer patients and their family members employed as volunteer panel members of the Center for Cancer Control and Information Services at the National Cancer Center on their use of public libraries for medical information on cancer treatment, and received 24 responses (23 from patients and one from family). One of the survey questions asked whether respondents were willing to participate in face-to-face or telephone interviews for additional information. Nineteen of the 24 survey respondents agreed to participate in an interview, and these interviews were conducted between December 2014 and February 2015 using a semi-structured interview with timeline technique. Interview questions covered:

1. the timeline of their cancer diagnosis and their course of treatment,
2. their knowledge of cancer before the diagnosis,
3. their information needs related to the cancer, and the sources used to fill those needs,
4. collaboration with others during the course of the information-seeking process,
5. changes in their knowledge on cancer during the information-seeking process,
6. criteria used to evaluate the information and sources,
7. their requests to the public library health and medical information services, and
8. suggestions on information-seeking strategies for new cancer patients.

We sent an email to each of the 19 respondents outlining the interview questions, interview method (face-to-face or telephone) and available dates and times.

We conducted face-to-face interviews with six respondents between 6 and 19 December 2014, and telephone interviews with 13 respondents between 16 January and 14 February 2015. The face-to-face respondents signed a consent form, which assured the confidentiality of their personal information, and were offered a book token. Telephone respondents gave verbal consent. All interviews were audio-recorded.

We transcribed all interviews except one, which had very poor sound quality, leaving a total of 18 respondents. The content of transcribed interviews was analyzed using the constant–comparative method of the grounded theory technique (Glaser & Strauss, 1967). The goal of the study was to identify cancer patients' requests for the health and medical information services.

We documented the findings related to the respondents' use of public libraries embedded in their information-seeking process. We analyzed changes in problem-solving goals (distal goals) and information needs (proximal sub-goals) over time.

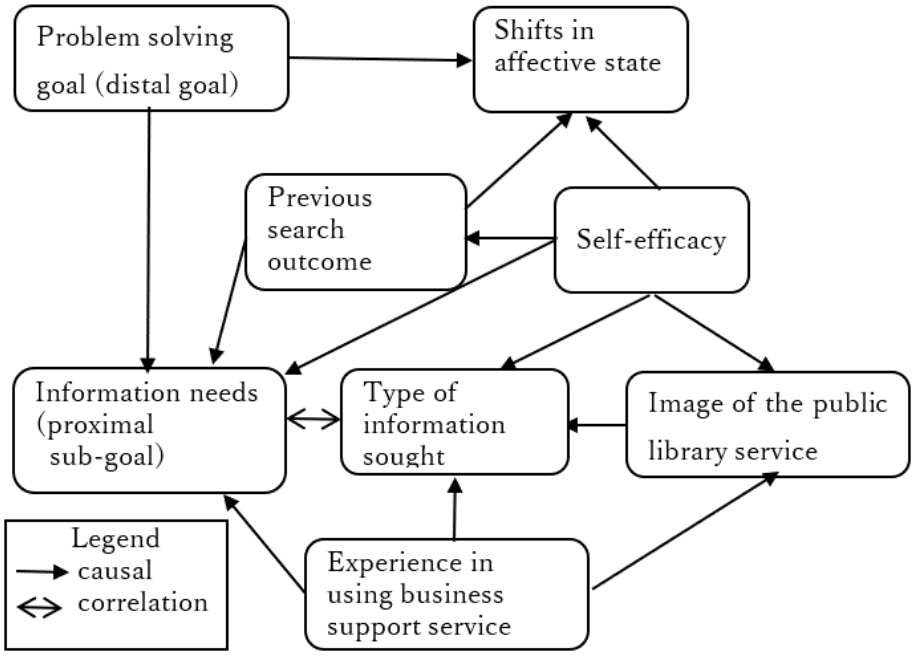

Figure 3. Goals and associated factors of information seeking for starting a business

RESULTS

Modification of Goals in Information Seeking Process for Starting a Small Business

Figure 3 shows the relationship among goals and associated factors identified in the information seeking process of people seeking to start a small business, using the information behavioral grammar model as the analytical framework.

The distal goal of interviewees is starting a small business such as a café, house cleaning service, beauty massage service, agricultural production, shop, etc. At an early stage, this distal goal is vague, and interviewees are wondering whether or not to start the business, or what preparations are necessary for the business. As the preparation for business starts, the distant goal is gradually clarified.

Information needs (immediate sub-goals) also change with the progress of the start-up process. In the early stages, interviewees tried to clarify the image of the new business by referring to written materials about trends in the business area, in bookstores and libraries. In the "entrepreneurship seminar" provided by the local library, interviewees listen to lectures by people who have succeeded in entrepreneurship, and acquire general tips for starting a new business. The seminar also plays a role as a place to meet people who help each other in entrepreneurship, which reduces anxiety associated with entrepreneurship.

Individual entrepreneurial consultation meetings with a consultant at the public library involves consultation on the business plan for the proposed company, securing initial funding, and permission and approval procedures.

The normal reference service helps to fulfill information needs, which is the immediate goal, but entrepreneurship support is a service that supports starting up a new business, which is a distal goal. The user is seeking more than just information. Their needs include business planning, fund acquisition, store acquisition, permission application, and other information and advice that are impossible for public libraries to provide alone. Therefore, cooperation

with related organizations such as the Industrial Promotion Division or the Chamber of Commerce that can provide such consultations is essential. Librarians are expected to introduce external agencies and experts related to entrepreneurship.
At the stage of initial and vague ideas for entrepreneurship, the Industrial Promotion Division and the Chamber of Commerce represent high threshold barriers to users, but public libraries can be used freely by anyone and represent a low threshold of access. In addition, the public library is open on weekends and evenings, so it is an easy-to-use environment for working people.

For local governments considering regional promotion, it can be said that the environment of a public library with its easy access is highly useful as a place to encourage aspiring entrepreneurs to learn about starting a business . If such a win-win relationship is established between libraries and local government, the collaboration will likely succeed and continue.

Modification of Goals in Information seeking process of cancer patients

Figure 4 shows the relationship among goals and associated factors identified in the information seeking process of cancer patients, using the information behavioral grammar model as the analytical framework. How does the cancer patient's information needs, or the immediate sub-goals, change along with the treatment stage?

Some cancer patients do not have clear or overt symptoms; the disease is uncovered during a medical examination. A patient may have vague feelings and ideas about their physical condition, and are investigating possible health reasons and which hospital and doctor is appropriate to visit. At this stage, the Web and bookstores are used more often than public libraries.

Immediately after being diagnosed with cancer, it is often the case that the patient is in shock and cannot think clearly. Some do not understand the terminology used by the doctor at the time of diagnosis; they try to look it up on the Web or go to a public library to look up books on the particular cancer to make sure that the doctor's diagnosis is correct.

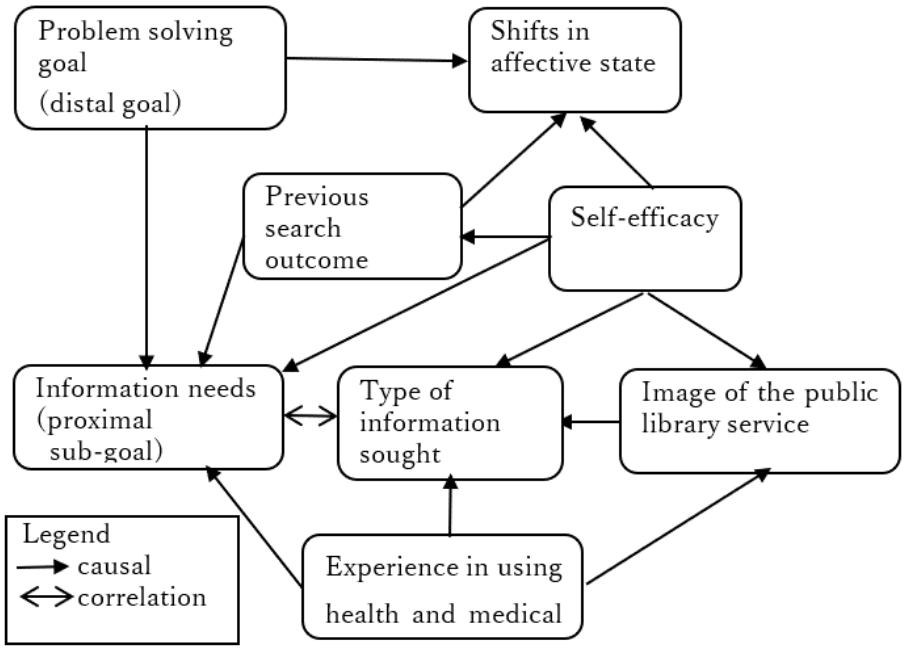

Figure 4. Modification of goals of cancer patients

If the doctor's diagnosis is not convincing, some people seek information on alternative explanations, or look for a specialist to get a second opinion. In this case, acquaintances and medical institution Web pages are consulted.

After the shock of the diagnosis, cancer patients begin to look for detailed information on their disease and treatment. They tend to exhibit the information behavior of searching through all kinds of information sources, such as the Web, public libraries and acquaintances. Above all, checking the "five-year survival rate" for the disease is common for cancer patients. Some start preparing their own funerals if the five-year survival rate is poor.

At this stage, many interviewees attended patient meetings and visited blogs to seek dialogue with other patients with the same disease. They seek not only information provision, but also two-way dialog and information exchange.

A cancer patients may need to choose a particular treatment from several alternatives. Informed consent requires the patient to agree to the treatment before the start of the treatment. Treatment is generally conducted according to clinical practice guidelines, but cancer patients are looking for information on which treatment is likely to allow them to live longer. Thus, large public libraries that provide health and medical information services have clinical practice guidelines in their collection.

Some patients who need to be hospitalized for undergoing surgery or anti-cancer treatment, especially mothers with small children, also look for information on municipal services, such as support services to care for their children during the hospitalization. On the other hand, young cancer patients tend to seek information on whether they can bear children in the future.

Information seeking continues even after receiving treatment. An interviewee articulated “I am looking for information on post-treatment responses, such as whether I can get medical assistance.” Another said, “What kind of diet should I have as a stomach cancer patient?”

Patients who are experienced in searching for work or hobby-related information are comfortable in searching for information on the Web or from a medical institution; but patients who are not used to information searching have to learn how to search the Web or in a public library. An interviewee said, “I have had a lot of trouble finding books in the library.” Some people rely on family and friends for information.

Depending on the stage of cancer treatment, cancer patients need to understand the meaning of technical terms used by the doctor, and the kinds of treatment for the diagnosed disease. Information sought includes understanding and selecting a treatment, receiving medical support, and obtaining health and medical advice. It is impossible for public libraries to provide the needed information alone. Cooperation with related organizations including health institutions is essential.

IMPLICATIONS

This section discusses theoretical implication of using the information behavioral grammar model in analyzing goal-oriented information seeking processes, and practical implications for problem-solving support services in public libraries.

Theoretical Implications

In the content analysis of interview data, the information behavioral grammar model was found to be useful in identifying the changing pattern of goals and associated affective, cognitive and behavioral states in the course of the information seeking process. In the

context of starting a small business, the model captured how actors' distal goals gradually change from ambiguous to concrete, while immediate sub-goals of information needs change in accordance with the progress of business start-up. The model could capture the anxiety commonly associated with entrepreneurship, and identified how it was reduced through mutual help by attendees of entrepreneurship seminars.

In the context of cancer patients, the model identified patients' shock and feelings of depression immediately after diagnosis, and how they recovered from the negative feelings to address the disease. Patients' distal goal is always to overcome cancer, but their immediate sub-goals change according to their understanding of their disease—selecting hospitals and doctors, seeking second opinions, selecting treatment from alternatives, preparing for hospitalization, managing medical expenses, handling medical insurance, and so on.

Practical Implication

The results from content analysis of the interview data confirm that the information seeking process of aspiring entrepreneurs and cancer patients are goal-oriented information behavior, and the immediate goals of actors change according to the progress of steps toward the distal goals. These findings imply that problem-solving support services of public libraries should be designed to support attainment of users' distal goals. That is, users are expected to look for different information depending on the stage of their search process. During the process, library users use various external services before and after using the library. Thus, librarians are expected not only to help clients use the internal resources of the library system, but also to provide navigation to external information sources, including materials, organizations and professionals relevant to the search stage of the client. Collaboration with relevant external organizations is essential for libraries to help users navigate to appropriate institutions.

Local government agencies, Chambers of Commerce, and healthcare institutions are expected to hold lectures and conferences to educate residents. However, having these meetings held at local government offices or hospitals is a high barrier to participation by residents. For instance, one may be more hesitant to go to a business seminar held at the Chamber of Commerce and the City Hall than at a library when one is still unsure whether to start a business. Similarly, for health and medical seminars held at hospitals, other than a sick person or his family members, people generally hesitate to go to hospitals. So they are unlikely to attend health and medical seminars held in hospitals or other healthcare institutions. However, if these seminars are held at a public library, then people are more likely to attend even if they have only a casual interest. Thus, collaboration between public libraries and local organizations is of great benefit to local government and organizations, including Chambers of Commerce and medical institutions.

Cancer patients who used public libraries for the first time after being diagnosed with cancer had difficulty finding books in the library. Also, patients who were not experienced in Web searching had difficulty finding information on their disease. By teaching inexperienced users how to use the library, how to conduct Web searches, and how to use specialized databases, the public library is in effect providing information literacy, digital literacy and health literacy training, and increasing the number of experienced library users and information searchers in the local population.

CONCLUSION

We analyzed the information seeking process of aspiring entrepreneurs and cancer patients who are considered potential users of problem-solving support services, increasingly being

offered in Japan's public libraries. We focused on business support services, and health and medical information services to identify the information needs of local citizens using previously collected interview data. We used the information behavioral grammar model, derived from the Bandura's (1986) goal model which distinguishes between distal goals and proximal sub-goals, and posits that the former generate the latter.

The results identified how problem-solving goals and information needs of aspiring entrepreneurs and cancer patients were modified through the progress of their information seeking process. It was suggested that the Miwa's information behavioral grammar model (Miwa, 2000, 2007) is useful for grasping the change of the distal goal and the information needs in the information search process for problem solving together with the emotion of the actor and the factor that causes it. Practical implications for problem-solving support service offered in public libraries are: aspiring entrepreneurs and cancer patients use various external services before and after using the problem-solving support service of public libraries, the significance of collaboration with external specialized organizations and professionals, and the possibilities of offering user-training on library use, Web search, and specialized database retrieval.

REFERENCES

Adriansen, H. (2012). Timeline interviews: A tool for conducting life history research. *Qualitative Studies, 3*(1), 40-55. https://doi.org/10.7146/qs.v3i1.6272

Bandura A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice Hall.

Flanagan, J. C. (1954). The critical incident technique. *Psychological Bulletin, 51*(4), 327.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Aldine de Gruyter.

Miwa, M. (2000). *Use of human intermediation in information problem solving: A user's perspective* (Publication No. 304663843) [Doctoral dissertation, Syracuse University]. ProQuest Dissertations & Theses Global. https://www.proquest.com/docview/304663843

Miwa, M. (2007). Verification of information behavioral grammar model: Role of searchers. *Proceedings of the American Society for Information Science and Technology, 44*(1).

Miwa, M., Ikeya, N., Tamura, S., Suga, C., Yamaki, C., Takayama, T., & Koshizuka, M. (2018). What cancer patients expect from public libraries in japan. Paper presented at the *8th A-LIEP Conference, Bangkok, Thailand, Chulalongcorn University, November 13-15.*

National Public Library Council. (2017). *Report on problem solving support services in public libraries, 2017* [In Japanese].

Tamura, S., Miwa, M., Koshizuka, M., Ikeya, N., Saito, S., Kasai, Y., Saito, Y., & Awamura, N. (2008). Satisfaction and the perception of usefulness among users of business information service in Japan. *Information Research, 13*(4) paper 366. http://InformationR.net/ir/13-4/paper366.html