

Value chain analysis of information services for visually impaired people:

A case study of contemporary technological solutions

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Abstract

Purpose

People with visual impairment is the second high disability population in Hong Kong, but only two existing information centers provide information services for visually impaired people, which is inadequate. Therefore, this study aims to cover a more in-depth understanding of the information services for visually impaired people in Hong Kong.

Methodology

The Information Accessibility Center (IAC) under the Hong Kong Society for the Blind (HKSB) was chosen as the case in this study. Value chain analysis was applied for analyzing the internal environment and operation of IAC based on an interview with IAC and its website information to highlight some of its current issues and provide relevant technological suggestions for improvement.

Findings

IAC's main problems include limited collection, inconsistent multiple digital platforms for user access, limited service hours, and limited promotion. Some technological suggestions were proposed, which include: expanding its electronic and special collections, establishing a one-stop digital platform, AI-based chatbot for automated caring chats and reference services, and extending its social network marketing.

Originality

Scant studies focus on the information services and management of special libraries for visually impaired people, especially in East Asia. On the other hand, there are limited case studies analyzing libraries with value-chain analysis.

Keywords:

Value chain analysis, case study, visually impaired, library management, inclusion,

INTRODUCTION

Hong Kong is a city encouraging social inclusion so that different groups of citizens, such as disabilities and ethnic minorities, can enjoy equality and respect in aspects areas of life (GovHK, 2017). According to the HKSAR Census and Statistics Department (2004), the group of visually impaired people is the second highest disability population in Hong Kong, with a prevalence rate of 2.4%. Library and information services are vital to visually impaired people for fulfilling their special needs of information seeking, self-improvement, and life-long learning (Lo et al., 2016; 2019). Nevertheless, there are only two local information suppliers in Hong Kong, including the Hong Kong Society for the Blind (HKSB) and Ebenezer School, providing information services for visually impaired people. Concerning the large population of visually impaired citizens in the metropolis, the resources provided by these two institutions cannot adequately meet their demands. Therefore, this study focus on the operations and the derived value produced from the existing information service suppliers in Hong Kong.

To develop an in-depth understanding of the information services for visually impaired people in Hong Kong, the Information Accessibility Center (IAC) of HKSB is selected as the case of this study. IAC is an information center under HKSB which aims at supplying a wide scope of information services include (1) library services, (2) Tele-digital library services, (3) audio description services, (4) cultural and leisure activities, and (5) Netshare service to (a) meet users' information needs, (b) support users' profitable use of leisure time, life-long learning and continuous education, and (c) improve users' quality of life (The Hong Kong Society for the Blind, 2016). As HKSB is the mother organization of IAC, HKSB supports IAC in the aspect of finance and human resources. Different from the library for visually impaired students in Ebenezer School, IAC aims at providing information services for all citizens with visual disabilities certified by registered ophthalmologists in Hong Kong (The Hong Kong Society for the Blind, 2016). As a result, IAC is a unique information service supplier for all qualified visually impaired people in Hong Kong and is chosen as the case of this study.

Similar to the business sector, the library and information sector intends to enhance its competitive advantages to customers by continuously improving its products and services (Weinstein & McFarlane, 2017). Value chain analysis provides a theoretical framework for this research to help the public understand the operations and value of the information service for visually impaired people and the future development of IAC. Another aim of this study is to provide hints for information services suppliers for disabled people to improve their performance by reducing costs, as well as enhancing the quality of information products and services. Facing rapid technological advancement and global adoptions, IAC is facing international competitors like online audiobook stores, free information resources providers, and suppliers of voice-based AI tools. Therefore, it is crucial to review IAC's current operations and resources to meet the current and future demands and expectations of their users.

LITERATURE REVIEW

Library and value

Libraries can be divided into different types, including school, academic, public, national, and special libraries (Gupta, 2012). As IAC belongs to the category of special libraries that supplies specialized information resources and services for specific clientele who are visually impaired (Shumaker, 2011), the library brings in irreplaceable educational and supportive value. According to Trombetta (2017), the library can help generate value in the aspects of the economy, leisure, recreation, arts, and culture, as well as history, which can contribute to the operation and mission fulfillment of the mother organization. Under the competition with different international information sources and content providers on the Web, libraries should consider user needs as a priority and make equivalent improvement of their services (Wienstein & McFarlane, 2017; Stokić et al., 2019).

Existing information service for visually impaired

In 1965, the first library for visually impaired people was founded in the United States to serve as the National Library Service (NLS) for the Blind and Physically Handicapped, Library of Congress. It supports the special information needs of US citizens and those who live abroad with visual impairment and physical handicaps (Cylke, Dixon, & Moodie, 2000). The aims and mission of the NLS are to develop and maintain braille and recorded collections, as well as providing access and library services for eligible patrons (Cylke et al., 2000). According to one of the five laws of library science (Ranganathan, 1957), the library is a growing organism. In 1999, NLS began to develop its collection in the digital form and expand library services to an online platform, which enables visually impaired people and other eligible patrons to use and access the library items without barriers (Cylke et al., 2000). Recently, NLS has made further improvements in its services, according to the article of the National Federation of the Blind (2013), which includes an App to provide mobile information access and retrieval services, demonstrating that the library is growing with the social trends and needs of patrons.

Concerning the situation in Hong Kong, IAC was established in 1965 to support the information services of all qualified visually impaired in Hong Kong (The Hong Kong Society for the Blind, 2016). Referring to the interview conducted by Lo et al. (2016), IAC is a unique special library that aims at supporting the information needs of visually impaired people in Hong Kong. To satisfy the information needs of visually impaired people, the collections of braille books and audiobooks are offered by IAC for the Hong Kong citizens who are certified as visually impaired (Lo et al., 2016). However, because of the human resources and budget limitation, only 12 to 13 audiobooks are published and created by IAC per month (Lo et al., 2016). In terms of the information services, unlike the public library, IAC also provides chatting, caring, and socializing services in addition to circulation and reference services for patrons. Therefore, IAC is essential for those who require special supports, and it is playing an indispensable role in Hong Kong society, which can take care of the needs of visually impaired that are not covered by other libraries (Lo et al., 2016).

Value chain analysis

Porter (1985) first proposed value chain analysis for a competitive strategy paradigm. The value chain consists of primary activities (including inbound logistics, operations, outbound logistics, marketing and sales, and services) and support activities (including infrastructure, procurement, technological development, and human resource management). Value chain analysis can be used for detecting gaps or weaknesses of chains (Baker,

2004), identifying and further developing the competitive advantages of an organization (Porter, 1985).

Value chain analysis has been demonstrated effective for diagnosing complex organizational and management factors (Khoo & MacDonald, 2011). Baker (2004) briefly outlined the composition of typical libraries' primary activities of the value chain, which provides a framework for our study. Inbound logistics of libraries include hard copy or digital content and related cataloging records and metadata. Operations contain the cataloging and provision of library materials. Outbound logistics include circulation, inter-lending, and document requests. Although libraries are non-profit organizations, they still need the functions of marketing and sales, with a focus on encouraging patrons' participation (Lam et al., 2019) and donations (Rossman, 2016). According to the original notion of service in Porter's (1985) value chain, services in the library context include reference, information, and related help services (in contrast to the provision of information considered as outbound logistics).

Research gap

While Davies (2007) proposed a research agenda and Mulliken and Falloon (2019) concerned information access experiences for the inclusion of visually impaired people to mainstream libraries, scant studies focus on the information services and management of special libraries for visually impaired people, especially in East Asia. Studies that use the value-chain approach to analyze libraries under the current digital, globalized economy are also insufficient. To ensure libraries providing better services for visually impaired people, more research in this area is needed. To fill up the research gap, this case study aims at analyzing updated information and helping readers gain an in-depth understanding of the operation and the value chain of IAC in the current information society. This study is also beneficial for the general public as citizens, especially information professionals and students, to get more ideas about special libraries for visually impaired people and related information service providers for disability. This can help improve the competitive advantages of the library as well as the quality of information products and services under the challenge of facing different international competitors. Besides, scant studies have provided both technological and management suggestions for catching up with technological advancements and meeting the needs of visually impaired people under the current globalized knowledge economy.

VALUE CHAIN ANALYSIS

As a developing organization, IAC is planning to apply technology to assist the operations of the value-added process in the library, so that it can meet users' expectations and enhance the competitiveness under the current worldwide competition of information sources on the Web. However, the budget is limited to the funding that is justified and sponsored by HKSB. Notably, human resources of HKSB is limited, especially in the aspect of information technology (IT) support. As a result, the development of IAC is restricted. To understand the current situation and operations of IAC, which may help IAC plan better for information service development, a value chain analysis is conducted based on an interview with the librarians of IAC (Lo et al., 2016), email inquiries, and its information on the Web. According to Porter's theory (1985), value chain analysis is about the analysis of a full range of activities, which include primary and support activities of the organization, which would

influence the value and benefits of the organization (see Figure 1). Primary activities include (1) inbound logistics, (2) operations, (3) outbound logistics, (4) marketing and sales, and (5) service. Each of them, including firm infrastructure, technology development, procurement, and human resource management, would be introduced and analyzed with support activities as follows.

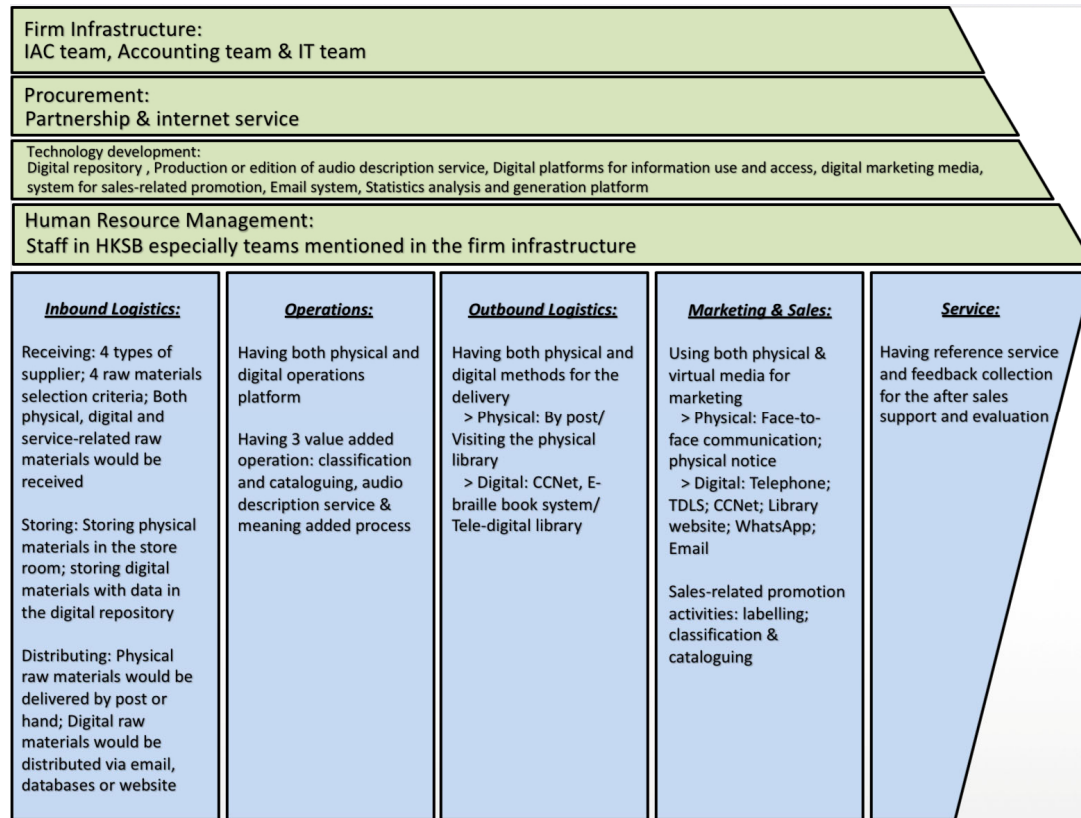


Figure 1. Value-chain of IAC

Inbound logistics

Table 1. Products and Services of IAC (Adapted from The Hong Kong Society of Blind, 2012; 2016)

Type of resources	Existing library items
Physical collections	<ul style="list-style-type: none"> • Braille books • Music compact discs • Talking books • CD-ROMs/VCDs/DVDs
Digital collections	<ul style="list-style-type: none"> • E-braille books
Tele-digital voice-based collections	<ul style="list-style-type: none"> • Talking books • Periodicals • Newspapers
Other physical library items	<ul style="list-style-type: none"> • Smart Globe • Audible-touch China Map

Inbound logistics is about the preparation activities of raw materials, which consists of receiving, storing, and disseminating raw materials (Tuomola, 2014). Inbound logistics is essential to the whole supply chain and value-added process since it is the basis of other primary activities, such as operations, outbound logistics,

marketing and sales, and services. If the preparation process is not managed well, the establishment of the remaining steps in the value chains may be jeopardized (Daugherty et al., 2019), and the competitive advantages and the value chain of IAC would be affected. Therefore, this section first introduces the raw materials in IAC and analyze the production process of raw materials in detail.

Raw materials are substances that apply in the primary production of goods manufactured for bought and sold on the worldwide commodities exchange (Banton, 2019). Similar to other libraries, IAC appears not to be involved in the selling or exchanging process in commercial operations, as the users of IAC need not pay for borrowing or using the information products or services. However, according to the interviewees, the government and sponsors of HKSB have already paid for the supply of information products or services in IAC, which means they have taken up the cost burdens for their users. The received funding is not only used for supporting the consumption of information products or services, but also for the raw materials acquisition and the development of IAC.

However, there are two concerns about the scale of the existing raw information resources: (1) limited electronic resources and collection type and (2) insufficient featured collections. As for the limitation of the scale of the electronic resources and collection, for example, in terms of digital collections, only e-braille books are provided on the online platform. The interviewees opined that this could hardly meet the expectations of visually impaired people group or compete with other suppliers of information collections such as Amazon and Penguin.

Table 2. Primary and supportive activities of inbound logistics

Primary activities related to inbound logistics	Details of the primary activities related to inbound logistics
Receiving	<ul style="list-style-type: none"> • <i>Materials supplier</i>: (1) donors, (2) foreign English materials suppliers, (3) HKSB and (4) IAC • <i>Receiving criteria</i>: (1) users' interest, (2) the trendy bestseller or popular monographs, (3) professionals' or volunteers' recommendation and (4) the balance between different subjects of library collections • <i>Types of received materials</i>: Physical materials, digital materials with descriptive data, information services and experiences
Storing	<ul style="list-style-type: none"> • <i>Physical materials</i>: stored in the storeroom before the processing • <i>Digital materials</i>: on the backend digital repository • No media and repository for storing the events held by IAC
Distributing	<ul style="list-style-type: none"> • <i>Physical materials</i>: by post or hand • <i>Digital materials</i>: via the online databases or website or by email
Supportive activities	Details of the supportive activities
Firm infrastructure	<ul style="list-style-type: none"> • Accounting team • IAC team • IT team
Procurement	<ul style="list-style-type: none"> • Partnership with donors and foreign English materials suppliers
Technology development	<ul style="list-style-type: none"> • Digital repository for storing materials with data
Human resource management	<ul style="list-style-type: none"> • Staff in the accounting team to assist the receiving process, IAC team to assist the whole inbound logistics process and IT team to assist the storing and distributing process

As for inadequate featured collections, unlike other libraries such as the National Library Service (NLS) for the Blind and Print Disabled, Library of Congress, or the HKU Libraries, IAC has no special collections or raw materials to establish its prominent features. Although the raw materials are specialized for the needs of users who are qualified as visually impaired in Hong Kong, increasing the current budget and enhancing electronic resources and featured collections are required to fulfill the information needs of the users and increase the competitiveness of IAC. Besides, a special collection can be established, which may help IAC to gain recognition in the local and global communities. After identifying the raw materials, the raw materials production process in IAC is illustrated in Table 2, with some related supporting activities.

Receiving raw materials. For the preparation of receiving raw materials, the staff in IAC needs to find suppliers who can provide the physical, digital, and tele-digital raw substances for users based on four information acquisition criteria : (1) users' interest, (2) trendy bestsellers and popular monographs, (3) professionals' or volunteers' recommendation, and (4) the balance between different subjects of library collections (Lo et al., 2016). Based on these criteria, IAC can acquire the raw materials in three ways: (1) donation, (2) purchasing English materials from foreign countries, and (3) creating and translating Chinese materials like braille books and audiobooks from HKSB. Therefore, the donors of IAC, foreign English materials suppliers, and HKSB are considered as its supplier of raw materials. Besides, IAC itself is also the main information supplier, which provides cultural and leisure activities for the users by delivering different information and promote cultural value (Jiang et al., 2019).

Storing raw materials. Similar to other information organizations, physical raw materials are stored in the storeroom before the processing, and digital raw materials are saved on the backend repository (Van Duinkerken et al., 2018). However, IAC does not have enough physical or digital media to record or store their events. As users cannot review the activities held by IAC, the performance of the value chain, the competitiveness of IAC, and the users' experience would be affected.

Distributing raw materials. Similar to other information centers and libraries, donors, foreign English materials suppliers, and HKSB pass physical raw materials to IAC by post or hand. For digital materials, the raw materials are passed to IAC with description and metadata via online databases or by email.

Operations

Operations refer to the process of transforming raw materials to the final products (Grant, 2010). During the process of operations, as value is added to the raw materials enhancing the final products, operations are critical to the whole value chain process. In IAC, the processes of classification, cataloging, meaning given, as well as audio description service are involved, according to the nature of different raw materials before they are transformed into final products (see Table 3).

Classification and cataloging. As for the physical materials, Chinese and English raw materials are classified based on the New Classification Scheme for Chinese Libraries and the Dewey Decimal Classification (DDC) so that these raw materials can be more retrievable and better managed (Lo et al., 2016). For digital materials, based on the descriptive data provided by the supplier, data and metadata are added and presented in the digital platform, which benefits the retrievers and users. In this way, value is added to both physical and

digital materials for providing better services to users.

Table 3. Primary and supportive activities related to Operations

Primary activities related to operations	Details of the primary activities related to operations
Value-added operation	Classification and cataloging Audio description service Outreach activities
Operation platform	Physical: Shau Kei Wan Rotary Training Centre Digital: CCNet Library Management System, Netshare, E-braille book system or Tele-digital library; No centralized digital operation platform
Supportive activities	Details of the support activities
Firm infrastructure	IAC team IT team
Technology development	Digital repositories for storing materials with data: Netshare, e-braille book system or Tele-digital library Production and edition of the audio description
Human resource management	IAC staff assist the whole operations process, and the IT team assists the development of digital repositories and the audio description production and edition.

Audio description service. Audio description service is about describing visual images by using precise and concrete languages that make the visual images accessible to visually impaired people (The Hong Kong Society for the Blind, 2016). For the raw materials that related to movies and without audio description, or when it comes to the situation of holding cultural and leisure activities, audio descriptions are added to the raw materials for the visual images concretization. In this way, value is added to the raw film-related items, and user information needs would be met to a further extent.

Outreach activities. According to the interviewees, unlike other information centers or libraries, the events of IAC concern not only cultural and leisure aspects but also other areas, such as promotions of the institution and education. So, the meaning of the events given by IAC can provide a good reason for fundraising, attracting targeted users, and enhancing competitive advantages (Rossman, 2016). As the first execution stage to face the users directly, operations work as a bridge to link users with information sources provided by information suppliers. Therefore, both physical and digital operation platforms are essential for the effectiveness and efficiency of delivering valuable products or services to improve users' experience and their competitiveness (Appleton, 2016).

About the physical platform, IAC is established at Shau Kei Wan Rotary Training Center, where most of the physical collections are stored on the shelves in an air-conditioned environment and well-organized for users to access. Users can retrieve physical materials by asking the library staff, using desktop computers to search the CCNet Library Management System, or using the telephone to browse the Tele-digital Library System. Therefore, users have multiple ways to search for their targeted information source, and value is added with its reachable features for convenience and meeting their needs.

IAC also provides two types of digital platforms: a tele-digital library platform and online platforms. For the tele-digital library platform, voice-based library catalog, collection, supermarket sales items information, and information about leisure and cultural activities are stored, organized, and available for users to search and access. For the online platforms, the Netshare and e-braille book systems are used for storing, retrieving, and organizing e-braille books and other resources. However, storing digital collections on three different platforms may lead to retrieval inconsistency, such as inconsistency of metadata schemes, data, and searching methods, causing confusion and performance degradation of the information supply chain and user experience.

Outbound logistics

Table 4. Primary activities and related supportive activities of outbound logistics

Primary activities related to outbound logistics	Details of the primary activities related to outbound logistics
Physical product delivery	Visiting the physical library By post
Digital product delivery	Netshare E-braille book system Tele-digital library
Cultural and leisure activities	Site visits Talks Listening to the movie
Library services	Chatting and caring service Supportive library facilities, e.g., Cyberworld, Digital Talking Book Reader, Braillewriter, Braille Display, Closed Circuit Magnifier, Magnified Software, Screen Reader, Printer and scanner
Supportive activities	Details of the supportive activities
Firm infrastructure	IAC team IT team
Procurement	Partnership with the Hong Kong Post, Hong Kong Telecommunications (HKT) Limited and The Community Chest of Hong Kong
Technology development	Digital platforms for information use and access: Netshare, E-braille book system, and Tele-digital library
Human resource management	IAC team assists the whole outbound logistics process IT team assists the development of digital platforms

The process of disseminating the final product to the client is called outbound logistics (Libertore and Millerm, 2016), which is the linkage between final information products or services and users. Thereupon, the effectiveness and efficiency of delivering final products or services would affect users' experience and competitive advantages. Concerning this issue, IAC applies both physical and digital outbound logistics for general users to maintain the steady quality of its service. (see Table 4). For physical outbound logistics, IAC provides users with circulation service to check out the physical collections after locating the physical items by themselves or with the help of library staff on-site. Besides, registered users may also request their chosen braille books or periodicals to be sent via the Post Office under the free-postage scheme of "Free Matter for the Blind." This reveals that the diversification of physical outbound logistics in IAC can fulfill users' information needs in a convenient way, which improves IAC's competitive advantage.

As for digital outbound logistics, users may access via the Netshare, E-braille book, and Tele-digital library systems. On the Netshare platform, users can access, use, and listen to Chinese online news, periodicals, and other information. In the E-braille book system, users can search for e-braille books online and reserve them for physical access. For the Tele-digital library, 24-hour voice-based service, which is sponsored by the Hong Kong Telecommunications Limited (HKT) and The Community Chest of Hong Kong, provides information on catalog, collections, supermarket sales, leisure, and cultural activities. Yet, one problem is service availability, which would affect clients' satisfaction and loyalty towards IAC. Although the chatting and caring service have been provided in the physical location of IAC or via the telephone during office hours, it cannot offer care and interaction to users immediately anytime.

Besides the problem of inconsistency caused by three different platforms, another problem is found on the Netshare platform, which provides information sources in Traditional Chinese but not Simplified Chinese. However, new immigrants may not understand Traditional Chinese well and have difficulties in accessing and understanding the materials and information. Moreover, another weakness of IAC is that it does not provide any mobile platform for users, while many other libraries, such as the NLS for the Blind and Print Disabled and Library of Congress, are providing mobile services to their patrons (National Federation of the Blind, 2013).

Marketing and sales

Table 5. Primary and supportive activities for marketing and sales.

Primary activities related to marketing and sales	Details of the primary activities related to marketing and sales
Marketing	<ul style="list-style-type: none"> Targeted promotion groups: the library users who are certified as visually impaired by registered ophthalmologists, staff, volunteers, potential cooperation organizations and sponsors Marketing media: TDLS, telephone, CCNet, face-to-face communication, library website, WhatsApp, email and physical notice like event announcements, newsletters, and annual reports in audio or written form Not enough promotion media for marketing IAC to the targeted marketing groups, except the library users
Sales	<ul style="list-style-type: none"> Labeling Classification and cataloging
Supportive activities	Details of the supportive activities
Firm infrastructure	<ul style="list-style-type: none"> IAC team IT team
Technology development	<ul style="list-style-type: none"> Marketing media including TDLS, CCNet, library website, email platform Sales related dissemination activity: the system/platform for classification and cataloging
Human resource management	<ul style="list-style-type: none"> Staff in IAC team to assist in the whole marketing and sales process and IT team to assist in the development of marketing media and the system/platform for classification and cataloging

Marketing and sales represent all activities that aim at distributing the final product to the appropriate groups of clients for promotion purposes, which include advertising, dissemination channel, and promotion-related activities in the value chain (Li, 2014). All marketing activities should be focused on targeted client groups. In

IAC, the targeted client groups are (1) library users certified as visually impaired by registered ophthalmologists, (2) staff, (3) volunteers, (4) potential cooperation organizations, and (5) sponsors.

Based on different features of the targeted marketing groups, IAC staff have designed and implemented eight distribution channels for the final product dissemination and marketing purposes (see Table 5). These include (1) Tele-digital Library System (TDLS), (2) telephone, (3) CCNet, (4) face-to-face communication, (5) library website, (6) WhatsApp, (7) email, and (8) physical notice like event announcement, newsletter, and annual report in audio or written form. However, most existing marketing methods are based on the information needs of only the patrons. It may affect the effectiveness of disseminating the library information and reaching other potential marketing groups besides the patrons. This limitation may influence the whole value and supply chain process, in which volunteers may not well arrange their spare time for volunteer work (Oh, 2019). Thus, the existing marketing methods, especially the library website, should be extended to include other promotion methods.

About the sales-related distribution activities, as an information service provider of a non-government organization, IAC does not have mainstream sales-related dissemination activities like pricing and managing sales-force. However, it still obtains good results in a variety of statistics, such as visiting, borrowing, and event participation, which are vital in fundraising, locating the users' information needs, seeking cooperation organization, and attracting sponsors (Rossman, 2016).

Services

Table 6. Primary and supportive activities related to services

Primary activities related to services	Details of the primary activities related to services
Reference service	<i>Purpose:</i> Asking questions about the borrowed item and used the services <i>Media:</i> telephone, face-to-face communication or email
Feedback collection	<i>Methods:</i> the complaint rate, activities' attendance or application, oral feedback and different IAC's statistics
Supportive activities	Details of the supportive activities
Firm infrastructure	IAC team IT team
Technology development	Email reference service Statistic analysis and generation platform
Human resource management	The IAC team assists in the whole service process, and the IT team assists in the development of the email system and platform for statistic analysis and generation

In the value chain, performance maintenance activities after production are considered services (Grant 2010). The information services of IAC should not be mixed up with that of the general library. Under such context, this mainly refers to the reference service in which users can ask questions about different events and services via telephone, email, or face-to-face communication. However, such activities are only be provided during office hours.

Another essential performance maintenance activity is the collection of user feedback (Matthews, 2017). This procedure is essential for the development of IAC because it helps IAC staff evaluate the performance of

implemented information products and services, identify problems during the production process, and seek relevant solutions to handle the identified issues. Khan and Milan (2016) highlighted that the success of the libraries relies on their ability to provide users with the right information at the right time. According to IAC staff, four methods have been applied for the feedback collection: (1) the complaint rate, (2) activities' attendance or application, (3) oral feedback, and (4) different IAC's statistics.

DISCUSSION

Based on the findings of the value chain analysis, Table 7 includes the stages in the value chain with relevant problems highlighted in the value-chain analysis. Regarding the highlighted problems, solutions, especially those based on technology innovations (Wójcik, 2019), are suggested to enhance the competitive advantage of IAC and its business process in the value chain, so that IAC can satisfy the information needs of users better and improve customer value.

Table 7. Issues of IAC and suggestions according to the value chain analysis

Stage in the value chain	Issues	Suggestions
Inbound logistics	Limited electronic resources and collection Inadequate featured collections No documentation about the cultural and leisure activities	Expanding the scale of electronic collections Special collection development
Operation	Inconsistent multiple digital storage & retrieval platforms	Development of centralized repository with retrieving platform
Outbound logistics	Inconsistent digital accessing platforms Limited Traditional Chinese materials through Netshare service only Limited service hour of offsite caring and chatting services No bridging platform for linking the physical library to the catalog and digital contents	One-stop digital platform 24-hour office chatting and caring service Multi-language Netshare service
Marketing and sales	Limited promotion to non-members	Social media marketing with multimedia and hashtag analysis
Service	No 24-hour reference service	AI reference service

Electronic collections

Recently, a large number of publishers have joined the competition in publishing electronic collections, which have become ubiquitous (Wang et al., 2016). Using e-books as an example, this concept can be traced back to the launch of Project Gutenberg, which intended to digitize and archive cultural media in 1971 (OECD, 2012). Despite e-books' advantage of saving the process of physical logistics, e-books have not become popular until Amazon introduced the Kindle e-reader in 2007. By 2014, about 50% of American adults owned either a

dedicated e-reader or tablet (Gilbert, 2015). This development illustrates that e-books seem to have become a new trend for global readers in the 21st century, and it is essential for IAC to increase its limited electronic resources (Lo, Cho, et al., 2017; Wang et al., 2016).

As far as this issue is concerned, three measures would be suggested to expand the e-collections' scale: (1) merging the existing digital collection, (2) ask for donations, and (3) development of a special collection. First, integrating the tele-digital collection and the electronic collection into a voice-based electronic platform enables IAC to provide centralized resources in digital form, which may achieve better collection management and save costs for IAC.

Under a limited budget, holding fundraising events would be an effective strategy (Rossman, 2016). Based on user interest and the aims of the information center, IAC can consider cooperating with organizations with similar missions, such as the Equal Opportunities Commission, Ebenezer School, and other charitable organizations. IAC can also encourage the general public to donate raw information materials to the library. Based on the designated selection criteria mentioned above, receiving justifications and decisions can be made to the donation list. After making the acquiring decision, if needed, the process of transforming physical materials into digital form can also be applied. Eventually, the e-collection can be expanded at a low cost to meet user demands and expectations.

To address the problem of inadequate featured collections and lacking activity recording, a special collection related to the cultural and leisure activities can be created by IAC in physical or electronic form. Each activity can be annotated and published as a braille book with a CD or uploaded to the digital platform with audio descriptions. Such collection may increase users' loyalty by providing them sufficient information and collective memories. Moreover, a special collection about the history and publications of HKSB and IAC, together with resources for visually impaired people, including education, social resources, psychology, practice, and counseling, can be developed. Besides, related professionals and the general public can gain further understanding of visually impaired people, as well as IAC.

24-hour caring chat and reference services

For the development of a 24-hour caring chat and reference service, two solutions can be taken into consideration: (1) expanding the chatting and reference service by hiring staff or volunteer to responsible for the over-night duty and (2) developing the artificial intelligence (AI) chatting and reference service. Besides hiring experienced staff to take up the over-night duty, volunteers and interns working from home may also be a desirable solution to some extent, but the quality and availability of service may not be as reliable.

In real-life situations, human resources are often limited, but demand is constantly increasing. To overcome this problem, automation is an effective way to reduce the workload of staff (Clayton, 2018). Nowadays, AI customer service is a trend and widely adopted in the business and social media sectors (Wilson & Daugherty, 2018; Cox et al., 2019), such as Taobao, Amazon, Google, and Facebook, in which the success of AI in customer service has been demonstrated. AI customer service technologies allow organizations to provide a level of service beyond human capacity, especially in customer identification and predictive personalization, although the ability of the emotion-sensing of AI is inferior to humans (Lytras et al., 2019).

Introducing AI, such as chatbots, is also an effective solution for IAC, since it can not only reduce the workload of IAC's staff, but also can provide multiple users with high-quality services anytime.

AI caring chat and reference services provided by IAC may be modeled after Siri on iPhone, an AI chatbot platform called LivePerson, or Google answer boxes (Zhao et al., 2019). These approaches can provide immediate responses to users according to different questions or topics in natural language. Based on the special information needs of visually impaired people, the service should be voice-based with words in large font size on a Web or tele-digital platform. To develop an effective AI chatting and caring service, IAC staff need to provide typical answers to the questions usually asked by users to support the development of the machine learning process. The development and tailoring of the system can be planned as collaboration projects with universities under various knowledge exchange and research funding schemes. Further personalized library services can be provided through AI and cognitive computing (Lytras et al., 2019). As such, issues in outbound logistics and services can be improved.

One-stop digital platform with multilingual support

According to Table 7, inconsistent multiple digital storage and retrieval platforms has caused issues in operations and outbound logistics. A system to integrate those distributed information resources is needed to satisfy users' demand for shared access to multiple platforms (Singh, 2019; Mulliken & Falloon, 2019; Chiu et al., 2005). In other words, developing a one-stop digital library is a solution to the problem for IAC. Digital libraries can work as a digital repository to store and centralize all the information collections in digital formats and integrate the digital resources in IAC for searching, browsing, and accessing functions. As for voice-based searching function, this is readily available as front-end technologies on various operating systems such as Android, Windows, and iOS. Therefore, the voice-based searching function can work as a fundamental function for digital libraries (Jeng et al., 2016). To develop a digital library of IAC, all the digital resources may need to be rearranged. This additional human resources requirement can be fulfilled by recruitment and intern placement from the Library and Information Management programs offered by different local universities (Lo, Chiu, et al., 2017), as well as volunteers.

RFID is an effective technology for reducing cost, improving library service quality (Curran & Porter, 2007), and tracking assets (Meng et al., 2010). After adding RFID tags on the physical items, they can combine with Bluetooth transmitters, Braille signs on the shelves, and physical paths on the floor, to provide functions similar to Google Map and the location-aware App created by the University of Oklahoma (Dent et al., 2018). After a target item is selected and the user intends to seek the physical item personally, the user can use the voice-based location function through the App to lead them to the designated shelves by the Bluetooth and RFID signals.

Furthermore, the one-stop digital platform should support the user front-ends in two versions, the Web and the mobile version (Fung et al., 2016). The functions of the one-stop digital platform can be divided into primary and supportive functions (see Table 8). Six primary functions could be developed: voice-based searching, location guide for physical items, the digital library of IAC, digital resources download, service and materials reservation, as well as AI caring chat and reference services. Two supportive functions for supporting users'

operational are required: enlarging function and multilingual support. Since libraries need to provide users with the right information at the right time to satisfy their needs (Khan and Milan, 2016), the searching and browsing records, circulation records, and reservation requests collected in the one-stop can provide more information for this purpose.

Table 8. Functions of the proposed one-stop digital platform

Primary functions	Details
Voice-based searching function	Similar to the Google voice searching function, users can enter the inquiry by using natural language in voice or typing.
Location guide for physical items	Via RFID and Bluetooth technologies, shelves, and books can be located.
Digital library of IAC	All digital items can be accessed in the digital library like e-braille books, digital periodicals, special collections, and so on
Digital information resources download	After selected the targeted digital information material for offline use, the information source can be downloaded with this function.
Service and materials reservation function	Users can use the online reservation function for reserving materials and the mailing of them. This function also supports the reservation for cultural and leisure activities.
AI caring chat and reference service	Users can ask questions and find the answer on the AI reference service corner, or for caring chats.
Supportive functions	Details
Font enlarge function	Users can adjust the font size freely based on his or her level of vision disability.
Multilingual supportive	As some users are not local, the multi-language function can better support the users. In the beginning, English, Traditional Chinese, and Simplified Chinese should be supported.

As only Traditional Chinese is supported in the current Netshare service, the information needs of new immigrants or people who cannot fully understand Traditional Chinese cannot be fulfilled. According to the population statistics provided by the Government of Hong Kong (2019), Chinese, Philippino, Indonesian, and Indian are the main population in Hong Kong. Therefore, many users may have difficulties in understanding Traditional Chinese. To solve this problem, more language(s) such as English and Simplified Chinese should be added in the current Netshare service for support, so that users of IAC who are not familiar with Traditional Chinese can access the service and fulfill their information needs. Regarding the translation efficiency of the online service, Google Translate can be installed and implemented for supporting multiple languages before the full implementation to maintain the usability of online services.

Social network marketing

As shown in Table 7, the promotion of IAC is insufficient, which is only focused on their current users instead of the general public. Casaló et al. (2008) found that organizations can increase their reputation by making good use of communication tools like social media to highlight the advantages of their products and services. Recently, social media has been widely adopted in libraries for the promotion (Lam et al., 2019; Fong et al., 2020; Deng et al., 2019). Although HKSB, the parent organization of IAC, has a Facebook page, promotions of the activities held by IAC are limited there. Thus, IAC can establish a separate page on social media platforms rather than relying on its parent organization. As Facebook and Instagram are two of the most widely implemented and

popular social media platforms in Hong Kong (Lister, 2018), IAC may consider developing social media pages on Facebook and Instagram for marketing purposes.

While creating promotion posts, multimedia such as videos and photos are recommended for attracting the attention of the targeted promotion group (Lam et al., 2019; Fong et al., 2020). Hashtags should be adopted to enhance the searching rate and opportunity of exposure in front of the target audience (Del Bosque et al., 2012), which is important for increasing the effectiveness of social media marketing. To seek appropriate trendy hashtags, hashtag analysis is recommended, such as Keyhole, RiteTag, Pixlee's Free Instagram Analytics, and TweetReach. For example, after entering the keyword "Blind" in the search box in RiteTag, the top three hashtags are "love," "news," and "video." IAC can try to use those popular hashtags for assisting in IAC's promotion.

CONCLUSIONS, LIMITATIONS AND FUTURE WORKS

In this case study, the current situations and practices of the services of IAC for visually impaired people have been revealed thoroughly via the demonstration of the value chain analysis. By analyzing this case study with the value chain approach, value-added activities and processes in IAC, including inbound logistics, operation, outbound logistics, marketing, and services, can be better understood. In particular, key problems of IAC include: (1) limited collection, (2) inconsistent multiple digital platforms for user access, (3) limited service hours, and (4) limited promotion. As a developing organization, IAC needs to keep on improving its information services and products and offer its users better experiences and satisfy their information needs. Based on the findings, suggestions based on contemporary technologies have been proposed to enhance the competitiveness and sustainable development of IAC in the long term, which includes: (1) expanding its electronic and special collections, (2) establishing a one-stop digital platform, (3) AI-based chatbot for automated caring chats and reference services, and (4) extending its social network promotion.

Although this study has covered various information sources such as the interview with IAC, on-site observations, and its website, many internal records and documents of IAC are not available. Due to the consideration of the balance on the technological development cost, the difficulty of cooperation with the third-party operating systems, and the possibility of technical realization, the feasibility of the suggestions proposed in this study still requires further investigation.

Regarding these issues, a questionnaire survey and focus-group meetings could be held to evaluate the feedback from different stakeholders. As the proposed measures are remaining in the investigation stage, interdisciplinary collaboration from different university departments is suggested to develop technology-based projects. Under the process of knowledge exchange between different disciplines, such development will become more sustainable, while the target of social inclusion may be more achievable. Related internship programs and volunteers are suggested to provide an opportunity for both LIS students and the general public to understand more about IAC as well as the needs of visually impaired people. Further, we are interested in emerging technology-intensive library services for visually impaired people, such as maker-space (Liang et al.,

2019; Maceli, 2019), three-dimensional printing (Bossart et al., 2019), and usability issues (Silvis et al., 2019; Fung et al., 2016).

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