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K. Chen. Dynamic Subject Numbers Replace Traditional Classification Numbers

Dynamic Subject Numbers Replace Traditional Classification Numbers

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ABSTRACT: This article presents a new idea on shelving printed books and finding books in libraries. The author advocates that traditional book classification number (TBCN) systems should be replaced by a better indexing method for books in libraries. The author proposes a new way of seeking books for library users wishing to locate them called a 'dynamic book subject number' (DBSN) system. The new system combines new indexing rules and automated system technology to create settings in which a book's 'subject number' can change rather than having a particular permanent classification number assigned to it. The new way encourages library users to seek books through a user-friendly cataloging system by choosing subjects from the embedded database. The database contains thousands of subjects with their corresponding Arabic codes. For printed books, the DBSN ushers in a new era in the relationship between library users and the books.

1.0 Background

In his book on shelf access in libraries, Hyman (1982) provides evidence of the inclination of librarians to make their content directly accessible. It is this inclination and the movement toward ever-expanding direct access to open stack libraries that led to libraries as we know them today (MacCall 2011).

Some library users enjoy the experience when they search for the books they want in the library stacks section (Hancock 1987; Whitmire 2001). Those users like to ramble between the stacks and browse books at random (Maughan 1999; Xia 2004). Yet surveys have found the number one reason undergraduates visit the library is to use computers (Whitmire 2001). Browsing the stacks could be declining for several reasons. For instance, increasing numbers of electronic books are emerging, attracting people to read on-screen. People's reading behavior is changing rapidly. The market for e-books is no doubt growing (Booth, McDonald, and Tiffen 2010; Noh

2010), though they have not proven themselves as a good transformational technology in library services (Joint 2010). Publishers spend huge amounts of money developing electronic readings that suit readers of ages ranging from 1 to 90. The technologies of mobile IT facilities, networks, and software are advancing rapidly (Noh 2010). Besides, open access resources are undergoing a significant transformation in the information-sharing world and having an influence on the publication business. All these developments have created a deep impact on printed books and usual reading activities.

Search engines have changed people's information seeking behavior because people can obtain abundant information through search engines such Google and Yahoo very quickly. Search engine use is now the most popular approach to seeking information online (Fallows 2008). As a result, more and more people use keyword searches to gather information, and this has caused a change in information-seeking behavior. The information acquired from the Internet is possibly fragmental and in-

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complete, but people may be satisfied because they obtain the information conveniently and quickly. In the course of time, people use fragmental information instead of books as the main source of knowledge. However, Bates (1989) argues that people often change their search terms in response to the results returned because the act of searching causes feedback to their cognitive model of the information being searched for.

Many bookstores, including those in shopping malls and supermarkets, provide opportunities for people to read books freely. People then can easily find a place to read and do not need to rely on a library's book collection. Meanwhile, libraries have found that their physical space is becoming inadequate, an issue that becomes more serious year by year (Sun and Chen 2012). Collection management is challenged by a complex situation because a huge book collection in the stacks requires more personnel to maintain. The quality of collection management could decline if a library decides not to allocate more personnel to the tasks. Users might then be annoyed when books are not in the place they should be.

2.0 Problems in stacks

Problems of open access are particularly acute in large academic libraries (Ratcliffe 1968). Kantor (1976) found that only 58% of students using the Michigan Medical Library could find the book they were looking for. It is really a time-consuming job if we insist on finding a book in the stacks. There are several reasons contributing to this problem: other users might have placed the book in an incorrect location; the library staff's reshelving job may not be done well; the book might still be waiting for staff to reshelve it; or the user might miss the book just out of carelessness when looking for it with the naked eye.

No matter what the reason, the book-finding situation can thus become a more or less unpleasant experience. As a result, some users reduce their trust in the library and lose the desire to visit it. Their expectation of the library diminishes. The problem then could lead to a crisis, that is, "library anxiety" (Mellon 1986), with a decline in the number of visitors and the use of books. Ironically, the library continues to buy books and place them in the stacks, worsening the situation. Bigger library stacks cost more money, use more human power, take up more space, create more possibilities of wrong shelving, and incur more complaints by users. All this could lead to one outcome—people feel unsatisfied with the libraries and the amount of returning to them could diminish.

Some will probably say that the problem can be solved within a short time—just ask the library staff to do their reshelving more carefully and educate users not to re-

place books into the shelves untidily. New bookracks are bought and set beside the old ones, making the stacks section more crowded. At the same time, library managers are struggling to obtain more external resources.

3.0 Problems in classification systems

Now may be the time to reconsider the function and role of the 'call number' system for libraries. The call number consists basically of a classification number (CN) and an author number. The major part is the CN, which directs the book user to a particular location. No matter which CN system in the world is used, a book can only be given one CN, and that indicates a particular location in the stacks section. Generally speaking, there are three major functions of a CN: 1) to keep together books with the same or similar classification; 2) to indicate the location of a book in the book stacks section; and 3) to construct the relationships of the entire existing human knowledge system (or, in some systems, a defined portion of it). The first function meets library users' needs quickly with different titles; the second guides library users and staff to find or return books, using a consistent rule; and the last shows people what the items in human knowledge are and how close they are in the classification system.

These functions can be met in alternative ways:

- For the first function, each book can be described in terms of one or more 'key subjects.' These can precisely reflect the characteristics and the main themes of the book. The cataloging librarians then use key subjects rather than CN to represent the book and users can find the different descriptors by searching the catalog system. Users can then identify books which may meet their precise need more effectively
- For the second function, the library will have a better option for reshelving and finding books for users. One of the popular ways is to use radio-frequency identification (RFID) facilities to help.
- For the third function, human knowledge is growing daily. More and more new 'knowledge units' appear (e.g., 'cloud technology'). A mature traditional book classification number (TBCN) system such as the *Dewey Decimal Classification* (DDC) revises its contents regularly for updating. However, this has no direct impact on library users because they do not generally need to know how their subject relates to the overall knowledge context. That is to say, people actually do not mind how library experts organize the knowledge web or how further expertise develops. Most people are concerned only about their own fields of interest. Even if people need to be aware of the knowledge links and relationships between their field and others,

they can easily use other tools to search. They can use special electronic databases and Internet search engines. Few people visit a library for that reason today.

There are several issues concerning the current CN system which create problems. This CN system convinces users that the book cannot be found unless they follow the principle of the system the library adopts. Some libraries, however, use different TBCN systems to classify and place their books. That occurs particularly in megalibraries and in libraries with a large number of medical collections. Book seekers then must first understand those different systems. People moving from one library to another can experience confusion about the different TBCN systems. This is the first issue. The second issue is that users must become familiar with the layouts and the routes of book stacks sections when they enter the library building. Users can waste their time in a library with a huge stacks section, walking around and seeking the appropriate stacks, especially if the route design is poor. The third issue is that users are obliged to use the naked eye to get to the books on their own. Sometimes the bookshelves are too high or too low. Sometimes users have poor vision and cannot make out the small printed figures on the books' stickers. The fourth issue is that every shelf has limited space in terms of its length. Forty to fifty volumes may fit onto a shelf. When newly arrived books come to the same shelf, library staff might find there is no space for them, and therefore put them on neighboring shelves where space exists, but which are incorrect places for those particular books. The fifth issue is that users might note down the CN from the library catalog but make a mistake in transcribing it. They may write a wrong number or miss an English capital letter, confuse the CN and author number, only write the CN, or write some other figures (e.g., ISBN) which cannot help. All these can cause difficulty when seeking books.

To summarize, a TBCN system can hinder library users from getting the books they seek and can consume library personnel time in maintaining book stacks. With the rapid growth of library collections of printed copies, the problem is exacerbated.

4.0 Rationale for the change

The proposed new book classification system and new layout of stacks may provide an answer to partly resolve the above problem. The author believes that a typical classification system can only classify a book with a particular classification number and, based on the number, place the book into a fixed position in the stacks. The number also guides users to discover the book. This is a kind of 'one-way' approach – the person (staff or user)

gets the book because the catalog and classification number say that it should be there.

The one-way approach reveals two kinds of weakness: the first is the costs and the mistakes problems mentioned earlier; the second is the classification system that creates a 'dead' classification number which confines the character of the book and restricts the book-seeking behavior of library users. As we know, the classification number is usually given by a cataloging librarian who uses his or her knowledge and experience and maybe consults related materials or people to make the decision as to classification. The author believes that there is a risk involved. The risk is that the themes and the character of the book may be misidentified or incompletely prescribed. The risk may be attributable to the librarian's bias, superficiality, or carelessness. To develop a broader vision for book seeking, the classification number allocation should be improved.

5.0 Literature review

In the digital age, information is presented to people in various ways. More and more books contain multimedia components such as text, video, audio, and image (Lin, Chen, and Chang 2010). As a result, book authors are able to introduce their ideas and show their creativity for the books in a broader way. For book readers, they should find that many books become more interesting and more comprehensive. One of the impacts of the phenomena described above on libraries would be the suitableness of book classification schemes, because formal classification schemes are expected to precisely indicate the main characteristic or theme of the book. This is the major principle of all traditional classification schemes, but the principle appears not so proper for a book which contains several different subjects and themes.

With the rise of Web 2.0, the problem of the suitableness of book classification schemes can probably be solved to some degree. The development of folksonomy or tagging has drawn the attention of information professions, including librarians (Anfinnsen, Ghinea and de Cesare 2011). According to Yi and Chan (2009), approximately two-thirds of all tags used in a popular collaborative tagging system can be matched with the *Library Congress Subject Headings* (*LCSH*). Peterson (2009) found that only a few patrons took advantage of adding their own tags, but that the folksonomy tags were a positive focal point.

Folksonomy is "the resulting list of tags of information… and a classification done by untrained individuals" (Bianco 2009, 136) and "created in an environment where, although people may not actively collaborate in their creation and assignation of tags, they may certainly

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access and use tags assigned by others" (Spiteri 2007). The folksonomies are merely the set of terms or labels made by a group of users to tag content with. The terms or labels are certainly not predetermined (Mathes 2004). According to Cosentino (2008), library users sometimes cannot relate to the subject headings assigned by *LCSH* on OPACs. Social tagging provides the people the chance to use categories that are meaningful. Some libraries are adding tagging features into their OPAC, in addition to using standardized subject headings to encourage a more participatory or Web 2.0 nature to the catalog (Steele 2009).

Tagging "enables users to create subject headings for the object at hand" (Pradhan and Panighahi 2010, 460). Some concur tags are important because book readers are able to, and allowed to, classify the content of the book and assign a subject heading using their own controlled vocabularies. "The combination of folksonomies and controlled vocabularies will be a valuable tool in the continuing development of client-based customizable features in library catalogues" (Spiteri 2007, 3). "While library catalogs and databases rely on controlled vocabularies and traditional subject guides, and pathfinders often address only broad categories, tags allow library staff to assign worthy links multiple tags in … plain language" (Rethlefsen 2007, 27). Social tagging or annotations may make a library catalog system look disorganized, "but there is value and life in a physical or virtual space that has a lived-in, well-used and well-loved appearance" (Gazan 2008; Kim et al. 2008). El temasi, Naghshineh, and Fooladi (2011, 480-481) find that library users tag:

> their required information upon retrieval, thus contributing to a useful database of tagging commonality . . . the keywords suggested by both students and the faculty were free formed and were stored without any vocabulary control, so it was very user friendly and it result was more satisfied and effective communication.

One of the significant advantages of social tagging is to bring (Arch 2007, 80):

> gray literature to light. Much valuable online information created by experts and scholars cannot be found easily. Students, for example, may have a hard time finding these resources if they are not connected to the associations or scholarly networks that share this literature.

Both library users and staff are encouraged for participation in social tagging. Tasha Saecker, for instance, notes that del.icio.us, one of the most popular social bookmarking service platforms, helps "less tech-savvy librarians have an equal voice in the collection instead of having one or two librarians editing a static web page" (cited in Rethlefsen 2007, 26).

Speller (2007) sees the consensus viewpoint as another advantage. This relates to the theory of "wisdom of crowds" (Sinha 2006) and the contention of Clay Shirky (2005) that the bottom-up view of knowledge world is more valid than any one view imposed from the top down. Speller says that "even using theoretical perfection as a measure of practical success leads to misapplication of resources" and relates distributed classification to the use of faceting in classification and searching (Ellis and Vasconcelos 1999; Slavic 2008; Broughton and Slavic 2007), especially in pseudo-faceted classification, in which objects are classified using several aspects of their nature simultaneously, and analogue classification, where "the essence of a book isn't the ideas it contains. …Thinking that library catalogs exist to organize concepts confuses the container for the thing contained" (Shirky 2005). Speller (2007) also cites several authors as claiming an advantage of distributed classification in its flexibility and ability to reflect changing terminologies, and some who feel that it is an excellent tool for browsing by chance. Even if the contents of books are digitally available in the catalog, people can still browse the contents. Although one may doubt that this would bring further copyright issues, there seems no reason to believe they could not be sorted out when checking recent developments in relation to copyright of online materials.

There are however a few issues to consider when applying social tagging in libraries: "users with bad intentions can tag unsuitable sites for their own profit or simply to create havoc. Another issue is the inevitable variation in tags and the varied degree of user understanding of how to choose keywords" (Arch 2007, 81). Difficulty in dealing with synonyms and homonyms is another problem (Speller 2007).

Tagging experts like Spalding are cautious about tagging in the library's catalogs, saying "you need to structure a tagging system so that people want to tag. They do it for themselves, not for you." He continues, "even if a library catalog did make the user's experience the payoff, the center of tagging, it would still fall short. People are not as motivated to tag in a library catalog as they would be in something like LibraryThing" (Rethlefsen 2007, 28). Although domain analysis is a new paradigm for library and information science (Hjørland and Albrechtsen 1995), using a folksonomy is less costly than engaging an expert to perform a domain analysis (Sinclair and Cardew-Hall 2008).

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6.0 What is a DBSN?

The author has invented a new identification number for books, called the 'dynamic book subject number' (DBSN). The DBSN is simple to understand. It consists of two parts: one or more capitalized English letters and one or more sets of Arabic numbers, such as A1265A340 1C2308. The sets of Arabic number indicate the subjects that are represented in the book. For example, consider a book containing three major themes or issues: 'family relationships,' 'peer influence,' and 'socialization in school.' Three levels are employed for ranking these themes, namely A, B, and C, indicating how close the key subject is to the book's core concepts. In the above example, 'family relationship' (code: 1265) is a key subject and 'A' indicates that the book focuses very much on that subject; 'peer influence' (code: 3401) is another key subject and 'A' indicates the book focuses greatly on that subject as well; 'socialization in school' (code: 2308) is also a key subject and 'C' indicates that the book focuses on the subject to a lesser degree.

The DBSN will not be permanently fixed on the book because each time users search for books they want they will use 'subject selection' (SS) as a means of finding those books. Users will be asked to select subjects from the database to match the book they are seeking. The selection result will decide the new DBSN of the book and will help the next user to search more accurately for the book. Library users actually do not need to understand what the letters mean. Only library staff do. In other words, the number is only for temporary use. Once the book has been borrowed and returned, the number may or may not change. This is why the new number is call 'dynamic'. DBSN may not really help staff get the books stored or shelved on the shelves. DBSN is used mainly to help library users to better find the books they exactly want. For books stored and shelved issue, DBSN can actually help little. Table 1 provides a comparison of the two indexing systems focusing on 'number composition,' 'number fixity,' 'main function,' 'user,' and 'relationship to call number.'

Thus there is no longer any actual need for the TBCN because it has no function in the new model. People have no need or intention to get a book through the TBCN system. Rather, people who need a book make a call on the 'made-to-order' system. Library staff get the order from the system, find the book in the stacks and deliver it to the person in need.

7.0 The 'made-to-order' model

The author therefore suggests abandoning the use of the TBCN. Instead, it is suggested that libraries make a change

	TBCN	DBSN
Number composition	varies among different classification systems	is related to only one format
Number permanence	very high	low
Main function	to mark the book's category to show the book's position with respect to the entire knowledge framework to indicate the book's physical location in the stacks	to help display the subjects and their relative importance in the book
User	library users and staff	library users
Relationship to 'call number'	directly related	indirectly related

Table 1. Comparison of two indexing systems

in the management of the book stacks under a new 'made-to-order' system, in which the users find book information (bibliographic record) in the catalog and then ask to acquire the book. This new idea is based on the following contextual conditions:

- There is pressure on space in the stacks and the pressure is becoming serious. A large stacks section area normally occupies more than half the space of the entire public area of the library.
- Users have been changing their use of libraries. In the library, they want various functions—reading, thinking, searching, discussing, homework doing, film watching, and so on. Printed copies satisfy only a part of users' needs.
- More staff time will be spent if the stacks continue to grow. The cost will devour the library's budget.
- Library users have diverse options for acquiring information.

In the 'made-to-order' model there are two paths to find a book: the CN for locating the book in the stacks, and the SS for searching for the book in the knowledge framework. The former, the new DBSN system, is not designed for library users to browse in the stacks. Certainly the book stacks must be changed to closed stacks. With the latter, users find book information through the SS interface. In other words, for each book in the library, a CN and a set of subject descriptions belong to it. The collection management staff don't need to know SS details; they are for the users and are only shown on the catalog. Conversely, users don't need to know the DBSN system at all.

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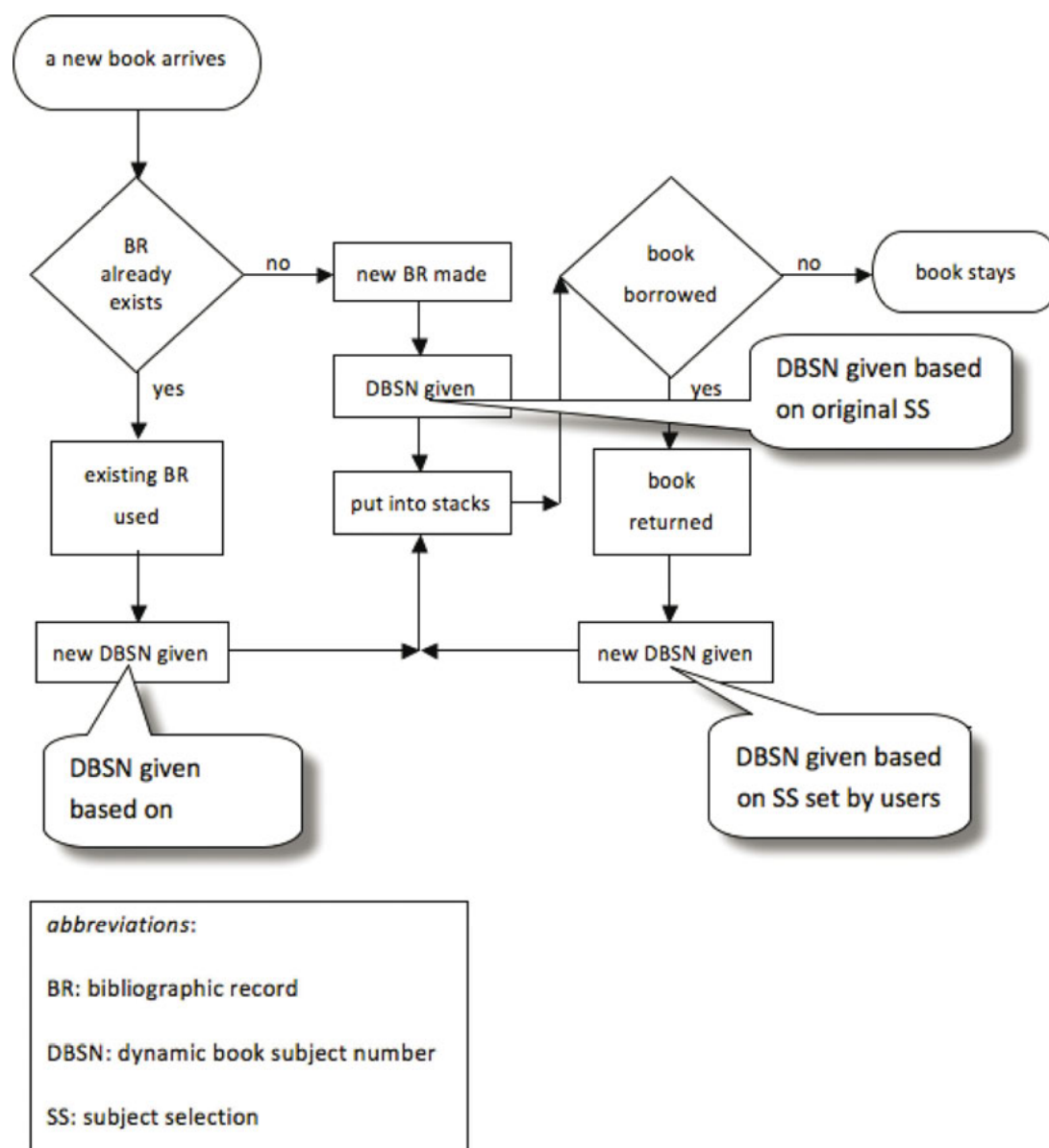
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Figure 1. Book delivery flow

In the new model, every book will have its own bibliographic record (BR) and a DBSN. Figure 1 shows the new book delivery flow in the library.

When a new book arrives at the library, librarians should first check on whether the BR of the book already exists in the library system before the book is sent to stacks. If there is no BR existing, the librarian should initially create a new BR according to the 'cataloging in publication' (CIP) record on the book. This is what every librarian usually does. Then, the librarian uses the subject information provided by the CIP as a guide to create a DBSN. If there is already a BR, then the librarian should establish a DBSN for the book according to that of another copy (i.e., the same book) in the library. That DBSN was adopted by a library user who selected the

subjects of the book the last time it was borrowed. After the librarian has finishing the process of dealing with the book one way or the other, the book should be delivered to the stacks section immediately. Once the book is borrowed and then returned, a new DBSN is created, since the user must select subjects before borrowing the book and, as already explained, the DBSN is allocated according to the result of SS and social tagging.

It is noted that the DBSNs of all books are allocated automatically by the library system except when a book comes to the library for the very first time. The system has the ability to identify the SS selection result, trace it, and store it. Library users have no other way of finding books than to search the catalog affiliated with the system and select subjects from the SS mode database of the system.

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8.0 The library system

To support the aforementioned model, the author suggests that the library system should be an interactive one through which library users can retrieve and respond. The system has normal modules such as cataloging and purchasing, collection management, generation of statistics, catalogs, user profiles and records, and so on. In addition to those, the new system creates brand new settings so that users have the opportunity to change the DBSN of the books. Through the user-friendly catalog the users select subjects from the embedded database. This is just like the way people flip pages on modern mobile phones. In the database there are thousands of subjects to be browsed. After a user selects one or more subjects, the system shows a few book lists for the user to browse. A book can appear in different lists because it contains more than one theme or subject.

The most significant advantage of the new system is that the users can feedback their opinions on the books they have borrowed by making a change to DBSN of those books. Users can add or delete existing subjects of the book from its SS list and also change the relativity weighting (the English letters in the DBSN). To be responsible, users are required to log in the system with their account name and password before doing so. Users can also type new subjects to recommend to the library to add them.

Through the Internet, users can easily retrieve a book catalogue at any point as long as it can link with the library system. As a result, users can place an order to reserve books remotely. Users can pick up the books or ask for document delivery at some other time. This will save considerable time compared to hunting for books in the stacks section of libraries. For library staff—both cataloging librarians and collection management staff—their jobs become more meaningful and efficient. Cataloging librarians can save energy and time spent in classifying books. In other words, cataloging librarians do not need to give a book its classification number as they usually do. All the cataloging librarians need to do is check the subjects and the bibliographic records. Classification numbers are no longer necessary in the new model. On the other hand, collection management staff save energy and time in reshelving books.

The new model will also benefit the library in terms of space economy because the library can maintain its book collection in a compact way. That is, library users will not see the traditional book stacks area. Instead, the area will be a closed stacks section with a compacted layout to save space. The library will certainly save electricity and manpower, as well.

9.0 Conclusion

Classification is one expression of the conceptual order of human knowledge. Bibliographic classification is a common technique of presenting the order of knowledge. Libraries, for instance, have adopted the technique in the service of book collection management for decades. Time has pressured libraries to change in many ways by "challenging the current presumptions about libraries, sweeping aside those that no longer make sense and determining if and how it makes sense to work around those that remain" (Pradhan and Panighahi 2010, 462). Information technologies, publication markets, people's information-seeking behavior, and social mobilization force librarians and their users to define how a modern, well-functioning library operates. One of the crucial issues is thinking about the meaning of the display order of books. Libraries have traditionally used and followed the classical classification disciplines, placing each book in its physical position in the stacks and the building.

This rule basically helps to present all the books in a particular order and to ensure that they are returned to the same position. Library users can also embed in their minds the rules that guide them to find and browse the books they want, maybe without even checking the catalog. But now library managers need to think of another way to place books because 1) space and cost issues affect library development; 2) interesting reading contexts (reducing the number of people coming to libraries to borrow books); and 3) people have a wide variety of ways to acquiring the information they need. Therefore the author suggests that libraries consider a proposed model that contains a new 'call number' system called 'dynamic number' for better storage of printed books and display of the bibliographic records in the library system. As Mathes (2004) describes, "if information retrieval systems begin to incorporate user-centered information management tools, the organizational schemes developed by the users have the possibility to be of great interest to other users and improve the systems". Both library staff and users should then change their ways of searching for books in libraries.

The author is confident that, with the new model, library staff, users, and the library itself will benefit. This is a contribution to the domain of knowledge organization. The major advantages would be that libraries save budgets in energy, staffing, and space in the long term and pay more attention to developing a better bibliographic classification system; the system will provide powerful functions and convenient settings for users with which they can precisely discover the resources of book collections and place orders to obtain the books they want to access;

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errors of book reshelving and users' complaints will be reduced; and the DBSN system allows users to take part in updating the classification of the books and this could lead users to interact with libraries and other users about the character of the books.

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