A Decision Support System for Managing Demand-Driven Collection Development in University Digital Libraries

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ABSTRACT

In recent years, academic digital libraries have become a very important source of information. Academic digital libraries provide a rich collection in order to satisfy user need for information. The augmentation of user population and the volume of new publications causes many challenges to librarians in the collection development process and determining user needs of information is the fundamental challenge that librarians face. This article presents a demand-driven collection development decision support system based on the PROMETHEE II method. The DSS supports the librarians to make decisions in the collection development process to provide a rich collection that meets the users’ needs. The DSS evaluates and determines a set of electronic resources for purchase, subscription, contract reviewing or cancelation. The decision support system extracts users’ queries from log files to determine user preferences. Then, the revised Simos’ procedure is used to derive the criteria weights. Finally, the authors applied the PROMETHEE II method to evaluate and rank the electronic resources.

KEYWORDS

Academic Digital Libraries, Collection Development, Decision Support Systems, E-Resources Selection, Patron-Initiated and Demand-Driven Collection, PROMETHEE II Method, Revised Simos’ Procedure

INTRODUCTION

The rapid advancements in information and communication technologies have increased the need for web-based information sources. With these changes, academic digital libraries have become a fundamental source of information for teaching, learning, and research activities (Kadir, Dollah, Saaid, & Diljit, 2009; Lee, Han, & Joo, 2008; Xie & Joo, 2009). A digital library provides access to many of the knowledge networks around the world, and enables users to search for specific information in virtual space (AlvaroTejeda-Lorente, Porcel, Peis, Sanz, & Herrera-Viedma, 2014).

Academic digital libraries offer an organized set of electronic resources (e-resources) to the users to satisfy their information needs. The collection of e-resources must satisfy users to avoid that academic digital libraries fall into oblivion and terminate their operation (Cabrerizo, Morente-
Molinera, Pérez, López-Gijón, & Herrera-Viedma, 2015; Kadir, Dollah, Saaid, & S. Diljit, 2009). Therefore, academic digital libraries are evolving to meet the needs of teaching and learning and identify issues for continued development.

In recent years, the growth of available electronic materials and users’ population make the collection development process very difficult to manage. The large number of data sources and high volumes of data to be analyzed are the main challenges faced by librarians in the collection development process (Koenig, 1985; Tramullas, Sánchez-Casabón, & Garrido-Picazo, 2013). These challenges may lead librarians to make bad analyses, and force them to make decisions based on wrong or weak information, which means unsatisfied users, and libraries lose their users and money.

The collection development process must provide a collection that meets the appropriate needs of its users’ population within the limits of its fiscal and personnel resources of the digital library (Atkinson, 2004; Johnson, 2014). A collection development involves many activities like e-resources acquisitions, budget management and digitization (Kaur & Gaur, 2017). The fundamental process in collection development is e-resources selection for different collection development activities. The selection process may be highly complex, given the numerous factors that can be involved and that must be taken into consideration as the information needs of users community, e-resources prices and library budget (Siguenza Guzman, Saquicela, & Cattrysse, 2014).

This paper proposes a decision support system (DSS) based on PROMETHEE II method and revised SIMOS procedure (Brans, Vincke, & Mareschal, 1986; José Figueira & Bernard Roy, 2002) for evaluating and selecting e-resources based on users’ information needs. The proposed DSS tries to answer the following questions: what are e-books preferred by users? What is the e-journals and databases wanted by users? Since academic digital libraries and other type of digital libraries as well are designed for people (its users) to use, selecting e-resources by users is the most important. Simply the proposed DSS extracts users search queries from log files, and then analyzes search queries to get each user preferences, and finally, use these preferences to evaluate and rank e-resources by PROMETHEE II method.

Several approaches are proposed to support librarians in digital libraries management activities, (Ahmad & Abawajy, 2014; Cabrerizo et al., 2015; Hu & Yu, 2019; Kadir et al., 2009; Kao, Chang, & Lin, 2003; Li & Liu, 2019; Tramullas et al., 2013; Yue, 2019). They focused on general evaluation of services and systems of digital libraries to inform librarians about the state of their services. However, to help librarians in collection development activities and to give them the ability of solving collection development problems in a more structured way, it is important not only to obtain the quality level of collection offered by the academic digital library but also to provide users’ needs or decision alternatives to the librarians.

**MAJOR CONTRIBUTION**

The DSS to be introduced here have many effects on academic digital libraries. Most importantly, it provides academic digital libraries with the necessary information that they need and improving the visibility of users information needs to the librarians. Besides, the DSS will augment the usage of e-resources by users and attract new users.

The main novelty of the DSS is that it uses demand-driven acquisition models to select e-resources to improve the collection offered by the academic digital libraries in order to increase the number of users utilizing them, and provides librarians with a view on behavior and social change in users’ community that allow them to better understand their users and responding to the changes by making effective decisions.

This paper is organized in the following way. Section 2 introduces the theoretical bases of the DSS. It is followed by the review of related works. Section 4 presents the concepts of multiple criteria decision support systems. In the following section, we present the DSS that generates ranking of e-resources to the staff of the academic digital libraries to improve collections offered by the academic
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