Adoption of linked data technologies among university librarians in Pakistan: Challenges and prospects

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ABSTRACT

This study aims to explore librarians' perspective about the adoption of Linked Data technologies along with their level of interest to adopt these technologies in Pakistani university libraries. It also identifies their perceived hindrances that obstruct them to adopt and effectively implement Linked Data technologies in libraries. This is a quantitative study based on survey research design. To meet the objective of the study, a self-constructed and validated questionnaire was used to collect data. Findings show that university librarians believe in the effective adoption of Linked Data technology in libraries. They perceive that Linked Data technology can enhance navigation between the traditional online tools to access library resources and Linked Data will soon be the standard for creating metadata and records for information resources management in libraries. They are eager to attend events about Linked Data application in their libraries and willing to explore ways to incorporate Linked Data standards in bibliographic records management as well. Barriers do exist such as the general lack of awareness of basic Linked Data concepts and best practices for this emerging technology. To foster the research and to set Linked Data best practices in libraries and other cultural heritage institutions, there is a potential to invest in this area in terms of financial and social capital.

Keywords: Linked Data; Metadata; Resource Description Framework (RDF); Semantic Web; Academic libraries.

INTRODUCTION

Linked Data is an emerging concept in service organizations similar to libraries. The key principle of linked data to publish structured data on the Web by using Resource Description Framework (RDF) and interlinking these data items from different external data sources. When data is published and interlinked, a single global data space – a Web of data, or Semantic Web, is created. The basic assumption behind Linked Data is that the value and usefulness of data increases by linking it with other data. The World Wide Web, for example, evolved from a Web of Documents (Hypertext) to a Web of Data (Linked Data) in the last two decades. Now Linked Data seems to redefine the web by creating huge datasets on the Internet. These datasets are linked and can be reused, as their relationships are understandable by both machine and human. After linking data sets, these data are published on the Internet to enhance visibility and accessibility for all its users. Berners-Lee

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and Swick (2006), the Internet pioneer and inventor of the term Linked Data said, "*the original vision for the Internet entailed a semantically linked web of data, but this goal of Linked Data has only become technically feasible in the past decade*"(p.3).

Libraries and cultural heritage institutions have vast amounts of rare and authentic information resources that are seldom used as many do not even know that the resources are available in digital format. Libraries acquire, organize and make available information resources for potential users. The literature shows that the Google generation overwhelmingly used search engines in their education and research and put billion of queries in search engines (OCLC 2002; Thompson 2003). However, only a small amount of libraries' digital collections shows up on search engine results. The idea behind Linked Data is that these treasures of knowledge should be made available on the Internet to match the directly proportional increase in library use. Search engines continue to play an important role in information seeking and retrieval resulting in an increased focus on the visibility of search engine result pages (SERPs) by web organizations. The activities and processes of an organization to get a top place on SERPs is referred to as search engine optimization (SEO) (Coyle 2012; Onaifo and Rasmussen 2013). Linked Data plays a significant role to create web visibility of library documents by optimizing search engines. Libraries have deep wells of information and knowledge that need to be unveiled by using, among others, the emerging concept of Semantic Web and Linked Data (Winer 2014).

The convergence of Linked Data technologies in the information service environment has changed the landscape of bibliographic standards and models from AACR2 (Anglo-American Cataloguing Rules, 2nd edition) to RDA (Resource Description and Access) and BIBFRAME (Bibliographic Framework). BIBFRAME was designed to replace the MARC standards, and to use Linked Data principles to make bibliographic data more useful. Libraries were not in the focus when different vocabularies and metadata were being developed and introduced, though these technologies, such as schema.org and RDF triples, stimulate the Library and Information Science (LIS) community to make the rich information resources visible on the web.

Pakistan is a developing country in South Asia and the 6th most populous country in the world with almost 200 million citizens with 55 percent literacy rate. During the last decade, an information society has been emerging in the country and traditional services in all fields of life are shifting to electronic format, such as e-learning, e-library, and e-government. The government has been investing in ICT that positively affects academia, research and libraries. In this digital environment, academic library users have high expectations and information professionals design different strategies to make relevant information readily available. Linked Data is a potential technology to be used in these libraries to provide better accessibility for researchers of all backgrounds.

LITERATURE REVIEW

The W3C's Library Linked Data Incubator Group gave impetus to several initiatives of Linked Data in libraries. Libraries have been organizing and managing knowledge for centuries and library metadata specifically emphasized to facilitate users find and make use of information. Nevertheless, Semantic Web ontologies are working to enable machines to find and understand information by using relational database technology (Onaifo and Rasmussen 2013). Libraries have MARC-based bibliographic records that usually do not expedite its conversion to Linked Data compliant with RDF format. It is assumed that currently library

data is unable to convert automatically due to non-standards Uniform Resource Identifier (URI) tags of many objects (Greenberg et al. 2009). Gonzales (2014) stated, "*the benefits of Linked Data to libraries and their users are potentially great, but so are the many challenges to its implementation*" (p.16). This point is significant for the present paper because it focuses on information professionals' perceptions to adopt Linked Data technologies along with their level of interest and perceived barriers to explore Linked Data technology for compatible bibliographic data.

Alemu et al. (2012) discussed the impact of metadata on successful adoption of Linked Data technologies in libraries. They also predicted the replacement for MARC with good library metadata. Jett et al. (2017) described the importance of legacy metadata for digital collections. Transforming legacy metadata into formats that are Linked Open Data (LOD) friendly, maximizes metadata value and better integrates digital library collections into the emerging Semantic Web. The authors discussed the potential and real applications of Linked Data in library technical services. They also illustrated the transformation of Dublin-Core-based metadata into the Resource Description Framework (RDF) using Schema.org vocabulary.

Isaac et al. (2011) documented different initiatives of Linked Data in national libraries: Library of Congress (subject headings); German National Library (PND dataset and subject headings); Swedish National Library (Libris - catalog); Hungarian National Library (OPAC and Digital Library); and European Digital Library. Miller and Westfall (2011) in his article *Linked Data and Libraries* emphasized the role of libraries in implementing Linked Data: "*not only can libraries contribute to Linked Data efforts, but they also are positioned to lead them. This is an opportunity for libraries, because they are already familiar with how to collect, curate, access, preserve, and deliver data to users*" (p.17).

Semantic Web encourages libraries to collect, link and share their data across the Web in order to ease its processing by machines, mainly to get better queries and results. Digital libraries have great potential to exchange and disseminate data linked to external resources using Linked Data. Hallo et al. (2016) specifically focus on selected vocabularies and ontologies along with the challenges encountered in implementing Linked Data on digital libraries. They selected the National Library of France, Europeana Library, Library of Congress, British Library, and the National Library of Spain to outline the best practices found in each experience, and identified gaps and future trends.

Singer (2009) opined on the interest of librarians to adopt Linked Data by stating that "*it is critical for libraries to become of the Web. Linked Data seems a logical way for libraries to join the larger information community …. if librarians have the will, Linked Data may just have the way*" (p.119). However, Stevenson (2012) in her project *JISC Linking Lives Study* points out that the potential of Linked Data is lower than what is claimed. She suggests that it is time to shift the focus from supply to demand with a viable Linked Data business model that has lower costs and higher quality than MARC-based cooperative cataloging.

The LaPolla's (2013) study entitled *Perceptions of Librarians Regarding Semantic Web and Linked Data Technologies* is relevant to the current study. The author explored the potential of Semantic Web technology application to the library catalog and librarians' levels of understanding to the key concepts and attitudes regarding Linked Data. It also highlighted the barriers to implementing Linked Data, such as financial scarcity and lack of Semantic Web best practices. Its target population is library cataloguers from the United States.

There is lack of relevant literature on Linked Data and libraries in developing countries. Developing and developed countries have difference level of automation, personnel skills in libraries, along with cultural barriers (Ramzan 2004; Hopkinson 2009). Overall, the literature establishes a positive note on the role and potential of Linked Data in libraries and describes a few studies on its implementation. However, there has been no empirical study conducted to show the level of librarians' interest and the challenges they face in adopting Linked Data technologies in libraries in the context of developing nations.

OBJECTIVES AND RESEARCH QUESTIONS

This study aims to present the emergence of Linked Data that has transformed the conventional web into machine understandable, and reusable form in libraries. The key objective of the study is to explore the perception of information professionals to adopt Linked Data technologies along with the barriers to its effective implementation in libraries. Following are the research questions based on the objective of this study:

a) How do the librarians perceive the adoption of Linked Data technologies in libraries in Pakistan?
b) What is the librarians' level of interest to adopt Linked Data technologies in libraries in Pakistan?
c) What are the perceived challenges to adopt and implement Linked Data technologies in libraries in Pakistan?

METHOD

Librarians are instrumental to take Linked Data initiatives in libraries as they organize knowledge and data for its effective retrieval and usage. Unfortunately for developing countries, there is no available evidence on Linked Data usage in libraries except for a few planning efforts (Warraich 2016; Warraich 2017; Kumar 2018). It is important to explore this significant phenomenon in the context of developing countries. This work is part of a larger study that was designed to investigate perception and application of Linked Data technologies in libraries in Pakistan. To meet the objective of the study, an online questionnaire was used to collect data from librarians working in university libraries in Pakistan.

This study is divided into three parts: (a) the development of survey instrument based on the literature; (b) experts' feedback on the questionnaire through a sorting activity; and (c) data collection from Pakistani library professionals through an online questionnaire developed using Surveymonkey. A multiple item self-administered questionnaire (Appendix) was used to measure three constructs: (a) interest and willingness, (b) perceptions of librarians; and (c) barriers to adopt Linked Data technologies in libraries in the current work.

There is no sampling frame available to do the random sample, therefore the first author, who is an LIS educator in a Pakistani university, used her personal contacts to collect data. There are 177 Universities/Degree Awarding Institutes in the public and private sector chartered by the Government of Pakistan (Pakistan, HEC 2016). All these 177 academic institutions have libraries and information centers and information professionals to facilitate the users in their academic and research needs. It is expected that almost 350 professionals are working in these libraries and information centers. Social media networks, e-mails, and telephone calls were used to contact the potential population and get their responses. The

questionnaire link was shared on social media websites along with professional Listserv in the second week of March 2016.

After many efforts and e-mail reminders, 136 responses were received in a period of four weeks. Linked Data is an emerging concept in libraries in Pakistan and many professionals are hesitant to complete the questionnaire due to lack of knowledge on the novel concept of Linked Data. From the 136 questionnaires received, only 86 were fully completed. The response rate is 24.6 percent. The data of these 86 complete questionnaires were analyzed and interpreted.

FINDINGS

Demographic Information

The fully completed 86 responses were used for analysis. Data showed that more than half 45 (52.33%) of the respondents have the designation 'librarian' and a majority of respondents, 58 (67.44%), had masters' degree qualification, of which 25 (29.7%) had MPhil degree (18 years of education) and only three (3.49%) had completed their doctorate.

Respondents' Perceptions to Adopt Linked Data Technology in Libraries

There were five statements in this construct to evaluate information professionals' perception about Linked Data initiatives in libraries. These statement were measured on a seven-point Likert-type Scale from 1=Strongly Disagree to 7= Strongly Agree; along with one option of Do not Know/Not sure/Not Applicable. The Cronbach's Alpha value of these statements is 0.886, showing a good reliability of the items. Findings in Table 1 indicate that the respondents believe that Linked Data technology enhances navigation between the traditional online tools to access library resources and the broader web environment with the highest mean value of 5.50 on a 7-point scale.

Table 1: Respondents' Perception of Linked Data Technology Adoption in Libraries

I believe that Linked Data technology:	**Mean**	**SD**
can enhance navigation between the traditional online tools to access library resources and the broader Web environment	5.50	1.35
will soon be the standard for creating metadata and records for information resources management in libraries	5.37	1.28
will soon become a standard model for information resources management in libraries and their Web portals	5.36	1.35
especially Resource Description and Access (RDA), will soon replace AACR2	5.21	1.49
adds little value to information resources management in libraries and library services	2.97	1.58

Scale: 1=Strongly Disagree, 2=Disagree, 3=Slightly Disagree, 4=Neutral (Neither Disagree nor Agree), 5=Slightly Agree, 6=Agree, 7=Strongly Agree, Do not Know/Not sure/Not Applicable

Respondents perceive that Linked Data technology will soon be the standard for creating metadata and records for information resources management in libraries (m=5.37 sd=1.284) (Table 2). These findings indicate that respondents are convinced of the benefits offered by Linked Data technology application in the information service environment. They also consider that RDA will soon replace AACR2 (m=5.21 sd= 1.488). Respondents deem that Linked Data technology adds little value to information resources management in libraries and library services (m=2.97 sd=1.58). It is interesting to reveal that they disagree with this

negative statement on Linked Data in libraries.

Respondents' Level of Interest and Willingness to Adopt Linked Data Technology

In this construct there are five statements to understand information professionals' level of interest to adopt Linked Data technologies in libraries. These statement were measured on a seven-point Likert-type Scale from 1=Strongly Disagree to 7= Strongly Agree; along with one option of Do not Know/Not sure/Not Applicable, with Cronbach's Alpha value = 0.886. The term '*level of Interest and Willingness*' is a one construct that aims to measure the librarians' readiness and concern to adopt Linked Data technology in Libraries.

Table 2 shows that respondents are interested in 'attending events where the topic of creation of bibliographic records that aim to incorporate Linked Data standards is discussed' (m= 5.59). However, the Standard Deviation (1.508) is also highest among these five statements. It shows that respondents' opinion on attending events relating to Linked Data standards are not consistent as the SD value shows that their opinions are unlike to each other. This mean value of 5.59 also shows that respondents are curious to know more about the application of Linked Data on bibliographic records in an information setting (Table 2).

Respondents were also 'willing to explore ways to incorporate Linked Data standards in bibliographic records management' at their own libraries with the second highest mean (5.33; SD=1.359). It shows their readiness to adopt Linked Data technology for bibliographic records management. They are the recipients of new trends in their institutes. The SD (1.359) value indicates that respondents' opinion is not numerically very different with each other to incorporate Linked Data standards in libraries.

Table 2: Respondents' Interest about Linked Data Application in Libraries

I am:	**Mean**	**SD**
Interested in attending events where the topic of creation of bibliographic records that aim to incorporate Linked Data standards is discussed	5.59	1.51
Willing to explore ways to incorporate Linked Data standards in bibliographic records management at my institution/library	5.33	1.36
Interested in exploring the creation of bibliographic records that aim to incorporate Linked Data standards at my institution/library	5.30	1.28
Willing to promote incorporating Linked Data standards in bibliographic records management at my institution/library	5.29	1.40
Interested in advocating for creation of bibliographic records that aim to incorporate Linked Data standards at my institution/library	5.19	1.36

Scale: 1=Strongly Disagree, 2=Disagree, 3=Slightly Disagree, 4=Neutral (Neither Disagree nor Agree), 5=Slightly Agree, 6=Agree, 7=Strongly Agree, Do not Know/Not sure/Not Applicable

The statement '*interested in exploring the creation of bibliographic records that aim to incorporate Linked Data standards at my institution/library'* has the third highest mean value (5.30) with lowest SD (1.28). Respondents' opinions on 'exploring the creation of bibliographic records' are more consistent as the SD (1.28) value is low. However, they were ''*interested in advocating for creation of bibliographic records that aim to incorporate Linked Data standards at my institution/library''* had the lowest mean (5.19) and SD (1.36). Data show that respondents are in the early stage of Linked Data awareness and are more interested in attending events to get more familiarity with this concept. They also want to explore Linked Data standards and see how so they may apply them to their institutes. They

are least interested to promote and advocate Linked Data standards application in bibliographic records management to others because they themselves are not very well-versed with this concept.

Challenges to Implement Linked Data Technology in Libraries

Respondents were asked about the perceived barriers to implement Linked Data technology in libraries. There are five statements in this construct ranging from Strongly Disagree to Strongly Agree on a 1-7 Likert-type scale. Reliability statistics on these five statements show that Cronbach's Alpha is 0.875. It is considered a good reliability value. Responses varied regarding perceived barriers to implement Linked Data technology in libraries. Survey participants were given five statements regarding barriers to explore Linked Data technologies and were asked to mention if they agreed or disagreed using a seven-point Likert-type Scale. The respondents rated the statement ''there *is a general lack of awareness of the basic concepts of Linked Data among library and information professionals''* with the highest mean (5.92) and lowest Standard Deviation (1.321). Table 3 presents the findings.

Table 3: Challenges to implement Linked Data Technology in Libraries

Statements	Mean	Std. Deviation
There is a general lack of awareness of the basic concepts of Linked Data among library and information professionals	5.92	1.32
There is lack of best practices with respect to Linked Data and their application in libraries	5.53	1.40
Linked Data technology is too new and unproven in libraries	5.26	1.49
The technology is too complex to implement a Linked Data compliant catalog in libraries	5.01	1.52
Implementing Linked Data technology would be too costly for libraries in terms of financial and human resources	4.97	1.46

Scale: 1=Strongly Disagree, 2=Disagree, 3=Slightly Disagree, 4=Neutral (Neither Disagree nor Agree), 5=Slightly Agree, 6=Agree, 7=Strongly Agree, Do not Know/Not sure/Not Applicable

Data show that respondents acknowledge that they themselves are not fully aware of how to implement Linked Data technology in libraries and the lowest value of SD shows that their opinion is consistent to each other and they have consensus on it. They considered lack of awareness as the major barrier to implement Linked Data technology in libraries. Table 3 also addressed other barriers, such as the lack of best practices, unproven nature of Linked Data technology, too complex to implement in libraries and the expenses in terms of trained personnel and moneys. Responses to the second statement provided information related to the lack of best practices. Respondents agreed that the lack of best practices is a key hindrance to implement Linked Data technology in libraries. These findings are consistent with the findings of LaPolla (2013). The respondents are of the opinion that '*Linked Data technology is too new and unproven*' (m=5.26 sd=1.49). They have apprehension about the future of Linked Data application, as this is an emerging technology. They are uncertain about it and hesitant to take initiatives in their institutions.

The respondents rate the statement about the complex nature of technology with the second lowest mean (m=5.01 sd=1.52). It shows that respondents have difference of opinion or variability of this statement. They are not sure about the complex nature of technology and have different viewpoints. Interestingly, they believe that the cost of Linked Data implementation is the least important barrier for libraries (m= 4.97 sd=1.46). These findings

are contrary to LaPolla's (2013) findings that finances and costs are a major source of concern to implement Linked Data technology. It is evident from the findings in Table 3 that the majority of information professionals considered their lack of awareness to the basic concepts of Linked Data a major barrier to implement it in libraries. Jett et al. (2017) highlight the benefits and challenges of linked data, and thoughts on how the library community can contribute to the linked data effort.

DISCUSSION

The findings of this study indicate that the respondents believe that Linked Data technology enhances navigation between the traditional online tools to access library resources and the broader web environment. They perceive that Linked Data technology will soon be the standard for creating metadata and records for information resources management in libraries. These findings indicate that they are convinced with the utility of Linked Data technology in the information service environment. They also believe that RDA will soon replace AACR2 (Table 1). The finding of LaPolla's (2013) study is similar to the current study. It also highlighted the challenges to implementing Linked Data in libraries such as financial scarcity, lack of Semantic Web best practices and shortage of trained professionals.

Librarians are interested and willing to explore Linked Data technologies in their institutions. Survey respondents are certainly curious to know more about the application of Linked Data on bibliographic records and willing to explore ways to incorporate Linked Data standards in bibliographic records management' at their own libraries. One point worth noting is that it is their self-perception and no statistical method is used to verify these findings experimentally. The answer of the second research question was positive regarding the respondents' Interest about Linked Data application in libraries (Table 2). A recent study of Wang and Yang (2018) supports the findings of the current study. They have predicted that in next decade most bibliographic records kept in silos in libraries would appear as Linked Data. This library data will be openly accessible and searchable due to many national libraries linked data initiatives. The authors also discuss that the challenge is for libraries "to get bibliographic data into the search path of Internet search engines" (p.18).

The third research question is about the perceived challenges and findings show that lack of awareness of the basic concepts of Linked Data as the major challenge for its effective implementation in libraries. Furthermore, respondents addressed that lack of best practices, unproven nature of Linked Data technology, complexity in implementation and the expenses in terms of trained personnel and monies are obstacles to effective Linked Data adoption and development (Table 3). McKenna, Debruyne, and O'Sullivan's (2018) study is also similar to current study and it explored the challenges to use linked data in libraries, archives and museums as perceived by information professionals. Findings indicated that the most challenging task for information professionals is to design Linked Data tools that match with the workflows and skills of information professionals. Saleem, Butt and Warraich (2018) also support the findings of this study and identified the technical, legal and conceptual challenges faced by libraries to implement Linked Data technologies. Findings divulged that lack of awareness; scarce resources to train the professionals; lack of best practices to publish data on web; limited ontologies development, and insufficient data protection policies are the issues faced by library community.

These findings concentrated on the need to develop courses on Linked Data application in libraries by professional organizations to move toward more practice based research rather

than educational efforts. Institutional administration should encourage professionals to keep themselves up-to-date and explore the potential of Linked Data technologies in libraries. The findings of the study show the readiness of information professionals to learn about and implement to Linked Data technologies in libraries. The respondents are willing to explore ways to incorporate Linked Data standards in bibliographic records management at their institutes. Nevertheless, they perceived some potential barriers that impede Linked Data effective implementation and considered major barriers to building relationships between data on the web and understanding and interpreting that data.

Linked Data is an emerging set of standards and technologies that could potentially enable information environments such as libraries to publish and interlink their hidden data on the web for better global accessibility. However, data will no longer be in silos and it is desirable to conduct more empirical Linked Data studies about information professionals' viewpoints that are influential to Linked Data application.

To foster the research and to set Linked Data best practices in libraries and other cultural heritage institutes, there is a potential to invest in this area in terms of financial and social capital. On the basis of the finding of the study it is recommended that training programs are substantial for information professionals to get them updated with Linked Data application. Funding opportunities also play a positive role to develop better Linked Data practices and research in libraries.

It is a quantitative study and it will serve as a baseline study. Though, there is a need to conduct more in-depth qualitative studies in the information service environment to explore the phenomenon. Best practices in Linked Data compliance bibliographic records will enhance the retrieval and services of libraries.

CONCLUSION

Linked Data in libraries is an emerging concept and there is wide-open field to conduct research on its different aspects. Linked Data technologies in libraries are significant to making their rich data available on the web. However, further analysis is required to make it more user-centered. These technologies, e.g. semantic cloud, and Linked Data make the information available in a format that is easily understood by the common user. Respondents acknowledge that they themselves are not fully aware how to implement Linked Data technology in libraries and lack of awareness as the major barrier to implement Linked Data technology in libraries. Though there is no magic in Linked Data, yet it is useful and interesting, and has affordances in libraries. It is also vital for information professionals to develop vocabularies and also work on non-library ontologies with the collaboration of IT professionals according to library needs.

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APPENDIX

Adoption of Linked Data Technologies among University Librarians in Pakistan

Part I: Demographic Information

1. What is your current position/rank? (Please choose only one of the following. If you have multiple positions, choose the primary one)
    - Assistant Librarian
    - Librarian
    - Senior Librarian
    - Deputy Librarian
    - Chief Librarian
    - Other (Please specify): _____

2. What is the highest level of education you have completed? (Please choose only one of the following)
    - Bachelor's degree
    - Master's degree
    - Mphil
    - Doctoral degree (PhD)
    - Other (please specify):_____

3. Your institutional affiliation: _____

Part II: Linked Data: Perception, Level of Interest & Barriers

Please indicate the extent to which you agree or disagree with the following statements. 1=Strongly Disagree; 2=Disagree; 3=Slightly Disagree; 4=Neutral (Neither Disagree nor Agree); 5=Slightly Agree; 6=Agree;7=Strongly Agree; Do not Know/Not sure/Not Applicable

4. Interest and Willingness about Linked Data Application in Libraries

I am:

- working at an institution/library that has already implemented Linked Data standards for bibliographic records management, sharing, and access
- interested in exploring the creation of bibliographic records that aim to incorporate Linked Data standards at my institution/library
- willing to explore ways to incorporate Linked Data standards in bibliographic records management at my institution/library
- interested in advocating for creation of bibliographic records that aim to incorporate Linked Data standards at my institution/library
- willing to promote incorporating Linked Data standards in bibliographic records management at my institution/library
- interested in attending events where the topic of creation of bibliographic records that aim to incorporate Linked Data standards is discussed

5. Perceptions of Librarians to Adopt Linked Data Technology in libraries

I believe that Linked Data technology:

- will soon be the standard for creating metadata and records for information resources management in libraries

- will soon become a standard model for information resources management in libraries and their Web portals
- can enhance navigation between the traditional online tools to access library resources and the broader Web environment
- adds little value to information resources management in libraries and library services
- especially Resource Description and Access (RDA), will soon replace AACR2

6. Barriers to Implement Linked Data Technology in Libraries

- Linked Data technology is too new and unproven in libraries
- Implementing Linked Data technology would be too costly for libraries in terms of financial and human resources
- There is lack of best practices with respect to Linked Data and their applications in libraries
- There is a general lack of awareness of the basic concepts of Linked Data among library and information professionals
- The technology is too complex to implement a Linked Data compliant catalog in libraries