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# DIGITAL LIBRARY RESEARCH THEMES: A SYSTEMATIC REVIEW

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## Abstract
*The digital era has given scholars opportunities to explore salient areas of research in digital library (DL). Professionals have carried out a number of researches on DL. However, the absence of review on digital library research (DLR) has made it not prominently conceptualised, the emerging roles anchored by this ever-evolving and dynamic topic. The aim of this study is to explore DLR themes and document it as evidenced in the literature. This review was conducted using guidelines for writing an systematic literature review (SLR) in information systems research by Okoli and Schabram (2010) and, Kitchenham and Brereton (2013). The databases searched are Web of Science, digital library, LISA, Google Scholar and prominent out of the 75 articles were eligible for review after the performance of exclusion exercise. Findings show the themes that emerged are collaboration, users' satisfaction, users' awareness, quality services, needs of special group, amongst others. The generated themes were via thematic analysis by means of coding, selecting, synthesising and interpreting. These act as a guide in digital library study. This paper serves as an index to the librarians and policy decision-makers on the types of software and technologies adopted in a digital library project (DLP). This review covered only research/empirical articles written in English, supposedly, a review should target all relevant literature irrespective of publication, prestige, origin and language to shy away from bias.*

**Keywords:** Digital Library; Research; Themes; Evidence, Literature; Systematic Review

## Introduction
Digital library (DL) research has unbolted the exigencies of writing articles in the field of library and information science (LIS) as well as other disciplines. It has also paved the way for collaborations among professionals. Library is shifting from the unreceptive state of users' information resource providers to a more active role by enabling users via DL to collaborate and share knowledge on daily basis to satisfy their information needs (Aghakhani, Lagzian, & Hazarika, 2013). Number one mission of libraries is to create access to relevant information in satisfying users'

needs (Arora, Trivedi & Kembhavi, 2013). LIS scholars, computer scientist, engineers, etc., have variously defined digital library. Bhattacharyya (2014) posits that DL denotes organisations, services and resources, combination of institutional repositories, special collections, packages of electronic journals and books, etc. Similarly, DL is an establishment that provides resources and personnel whose responsibility is to select, gather, create access, interpret, disseminate, preserve and guarantee its existence over a long period for a target audience (Feather & Sturges, 2003).

DL is a dynamic structure that controls, coordinates, manages, supervises the resources and services including provision of expertise for its accomplishments or a set of electronic resources and associated technical capabilities for creating, searching and using information. DL is as a result of the transformation in demand which necessitates the redefining library's roles pertinent to building, resources, and services (Abrizah, Inuwa, & Afiqah-Izzati, 2016). Okoli & Schabram (2010) adopt Fink's definition of SLR as an organised, unambiguous and re-creational method for recognising, assessing and making the existing body of knowledge created by scholars. Equally, Kitchenham and Brereton (2013) describe SLR as a practically laborious appraisal of investigations' outcome. Booth, Sutton & Papaioannou (2016) assert that a review is a systematic, explicit and reproducible method for identifying, evaluating and synthesising the existing body of knowledge produced by researchers and practitioners. A number of researches have been carried out on DL by professionals, however, the absence of systematic literature review on digital library research, has made it not prominently conceptualised, the emerging roles anchored by this ever-evolving and dynamic topic (DL). Below is the diagram showing the procedures followed:

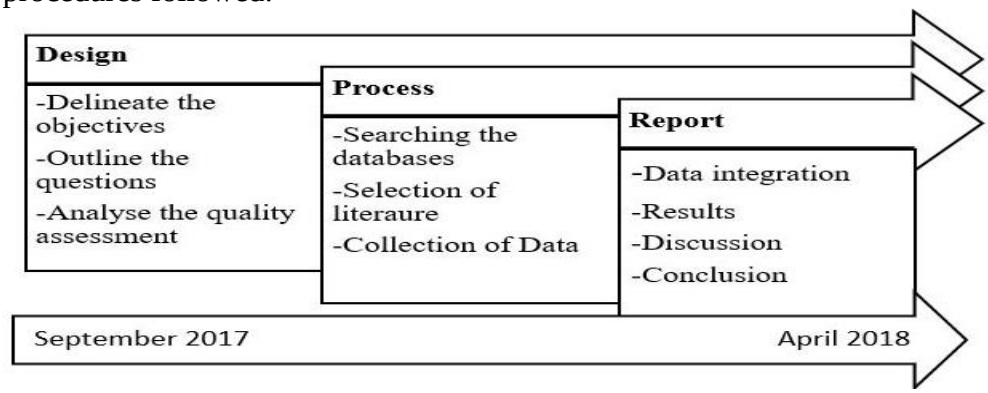



**Figure 1: Research Procedures**

## Objective

The purpose of this review is to identify and document the areas that have been researched in DL using Okoli & Schabram (2010) and Kitchenham & Brereton (2013) guides to conducting an SLR on information systems research due to their uniqueness and similarity with LIS profession. The research question is what are the areas of research explored in DL? This is to aggregate the existing knowledge in DL as a way of creating new direction.

## Methodology

The procedures adopted are study plan, selection, search strategy, data extraction, inclusion and exclusion criteria, quality assessment and data synthesis. It was conducted between September and December 2017 via the proof of identity and assortment of papers with relevant keywords (digital, electronic, virtual, multimedia

libraries). The databases used are Web of Science, digital library, Scopus LISA, Google Scholar, Science-Direct, etc., and based on relevant criteria with topics "digital libraries". The life span of the articles studied was limited to five years (2013-2017) span, due to the voluminous nature of literature in DL.

**Quality Assessment**

This subsection shows quality assessment criteria applied to appraise each article selected for inclusion. This is to guarantee high quality of the review and shy away from prejudice.

**Table 1: Inclusion and Exclusion Criteria**

| S/N | Inclusion (IC) | Exclusion (EC) |
|---|---|---|
| 1 | Empirical Journals | Studies that were not published between 2013 and 2017 |
| 2 | Purely written in English Language | Conference proceedings, conceptual, opinions, reports, reviews, seminars |
| 3 | Extracted from relevant databases and Journals | Duplicate copies of the studies |
| 4 | Within the period of 2013- 2017 | Studies that are not relevant to the research questions |
| 5 | Peer-reviewed journal articles, while they all have "***Digital Library"*** captions | Not written in English |

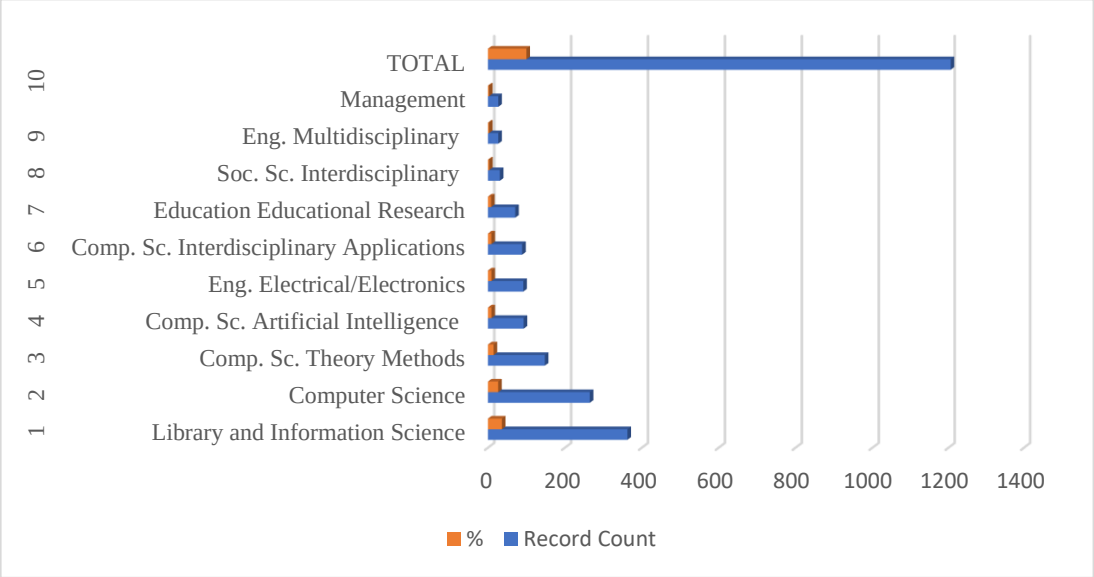



**Figure 2: List of Digital Library Publications by Discipline**

## Findings on Digital Library Research Areas

Findings from the research question generated ten themes: (a) Collaboration; (b) Users' Satisfaction; (c) Users' Awareness; (d) Quality Services; (e) Needs of Special Users; (f) Information and Users' Help-Seeking Behaviours; (g) Education; (h) Management; (i) social media and Use of Mobile Technology; (j) Technology/Software**.**

### Collaboration

Digital library heightens collaboration among university postgraduate students, scholars and policymakers. Aghakhani et al. (2013) state the benefits of collaboration as developing tools, data sharing, social networking, and aids technical support. Also, Alipour-Hafezi and Nick (2015) indicate that the Iranian research institutes performed averagely in DL operation with respect teamwork. Similarly, tremendous output production of research articles in science, social science, arts and humanities; between 2005 and 2009 was recorded, compared to the previous five years and this had also correlated with the articles downloaded among the 50-member university of the consortium (Arora et al., 2013).

### Users' Satisfaction

Library's paramount mission generally, is to satisfy users' information needs in all considerations. Cendon & Souza (2015) conduct research on users' satisfaction with quality of the system in respect of three constructs such as usability, access and search resources among faculty members, the result reveals a little variation among them and shows greater satisfaction with the quality of journal contents and the portal. Similarly, Chen et al. (2016a) in the cause of their investigation, identify that attitude towards using is considerably affected by perceived usefulness, perceived ease of use, user satisfaction and consequently, users' satisfaction is synonymous with attitude towards using. The study also acknowledges that information system, service quality, individual net benefits, had no direct consequence on attitude towards using, rather it had indirect effects on these variables. Furthermore, Lai & Zeng (2014) discover that a combination of the proposed research models of ECM, TAM, and upgraded Deleon and McLean IS success model, all had a virtuous illuminating influence on excellent prerequisites of users' persistent intention of using digital library.

### Users' Awareness

Digital library has attracted a lot of clientele, ranging from university and other institutions' students, academic scholars, researchers, hobbyists, historians, genealogists, casual and those who are ICT compliance in their cause of services, usage pattern, and awareness. Anaraki (2013) and Catlow, et al. (2015) investigate students cum context awareness and unveil that the degree of awareness and utilisation of the DL portal among students of the sampled universities are lower than average. The study also confirmed that lack of awareness of portal is one of the major challenges and this makes the students use a general search engine for their information need instead of DL portal of the universities. The students acknowledge the use of EndNote, Elsevier, Thomson, Scopus, and ProQuest databases frequently. Awareness campaign like in business is a market strategy that the librarians need to adapt for the promotion of their resources and services in the digital era. Furthermore, Catlow et al. (2015) research users of DL and the result revealed that among users of DL, there were hobbyists, academics and students who constitute an integral portion of users. Besides, Cendon & Souza (2015) findings depict that persistent use of DL

resources and determinations, contribute to students' research output productions and satisfactions.

Likewise, Weng (2016), investigates the subscription of item-set via the use of a recent frequency college (RFC) model and the proposed model is found to be more effective than the conventional way in forecasting library user subscription item-set. Aside this, the study also unravels that the model is effective in tracking relevant materials from circulation and therefore suggests that researchers should use the RFC framework from circulation transaction status. Conversely, Lawton (2015) categorises users of DL into five, based on the track record of users and discloses that visitors to a particular university had the lion share, followed by university staff while faculty was the lowest. The author also discovers that visitors use images for personal use like inspirational and creative drives. Equally, Crymble (2016) explores DL search preferences amongst historians and genealogists of British history online (BHO) users and the result affirm that academic historians use DL for research and they prefer online materials only.

**Quality Service**

Quality services of DL is like a building in which the structure lies on its solid foundation. Suffice to say quality service of DL is one of the bases for its existence. Stejskal & Hajek (2015) investigate the success of DL service through the provision of remote access in society that could help in financial decision-making and improve the quality as well as a range of services unlike services provided within the library. Credibility and a good reputation of sources of information enormously influence the usefulness of information, especially now that there is abundant information on the web. Similarly, Zha, Zhang,Yan (2015a) explore DL usage from the perspectives of the elaboration likelihood model (ELM) and the result unveils that source, trustworthiness and reputation have a positive impact on information worth which invariably inspires DL usage. This means that the more DL information is highly reliable and upright, the more useful it is and the better for DL. Still, in line with DL quality services, Kortemeyer (2016), evaluates a model on a limited set of transactions and learnt that putting into consideration the learners' characteristic of ability enhances quality item metadata when compared to item response theory (IRT). In another vein, Albertson (2015) investigates the perceptions of users on the criteria designed for video DL and discloses that DL had the highest retrieval performance of video DL followed by a user interface, quality of resources and backing from DL staff. This demonstrates the importance of video DL usage views among its users. This has also illustrated that remote access in society enhances decision-making compared to services restricted to the library while credibility, trustworthiness and good reputation of sources contributed to the richness of information.

**Needs of Special Users**

Literature shows that DL had certainly influenced society, institutions, organisations, life of individuals including family and children as well as taken care of the needs of special group of users. According to Babu and Xie (2017), 17 families with their children are interviewed on the frequency of visits to the library and reading with their kids. The result presents various time devoted by these families to read with their kids, go to the libraries and bookshops. The implication this development has on DL is that children visiting the libraries between ages 7, 9, 10, 11, had significant correlation to use of DL in near future. Similarly, the literature unveils that children's cognitive abilities are tested on the use of 2 and 3-dimensional DL while the result

discloses that they tend to have less time in the 2D interface and more time for 3D which involves a lot of tasks. By implication, their cognitive ability is not equal to 2D and 3D interface respectively. Therefore, there is need for an adjustable game-like interface that suites their level as children (Wu & Chen, 2016). This shows that early exposure of kids to the use of library by families can give rise to the creation of passion for use of DL in future.

So also, Babu & Xie (2017) find out that American Memory Digital Collection (AMDC) was not blind user-friendly, while some problems associated with the use of DLs by the blinds are recognised. These include trouble in distinguishing, functioning and understanding content control desires aimed at information openness and repossession. These warrant investigation on the helping circumstances faced by the blinds. These are categorised into physical (struggling to access information, recognising existing status and path, appraising information competently) and cognitive (misperception about programmes, construction, trouble in understanding information, use of DL features, and avoidance of specific applications) (Xie et al., 2015).

**Information and Help-seeking Behaviour**

DL users vary in their characteristics; talent and understanding technicalities accompanying the use of DL. The study undertaken by Goodale, et al. (2014) on analysis of four short 5-minute information-seeking tasks postulated that the time spent on searching varies according to tasks such as extended, simple fact-finding and exploration was smaller than open-ended. Whereas browsing in cognitive styles shows that holistic is likely to end their task than analytics. This signifies that users be given proper guidance and orientation on searching and browsing relevant information needs to avoid prolong searching which may lead to their discouragement. Also, the study of Volovici, et al. (2016) on university faculty members and students' information-seeking behaviour in DL, reveals that group one (students before the internet era) wholly visited the library 1-2 times per week, while less than half believed librarian plays a major role in finding relevant information to their need. The result equally indicates that all the respondents never consulted a librarian for assistance while group two (students during the internet era) searched and accessed information on the net ranging from 2-3 hours daily; some subscribed to both online and offline journals for their studies.

In another development, Zerehsaz (2017) research on help-seeking behaviour through the information-seeking model of university students, findings indicate that majority of the help requests were supervisory help due to users' inadequate guidance and their indifferent attitude toward the help-seeking procedures. The interactive sessions yielded fruitful results as the information-seeking model is accomplished.

**Education**

Education is a key determinant factor to achieve success in career aspirations. Suffice to say success in DL resources and services is dependent on the rigorous education and training of both staff and users of DL. The study investigated by Audunson & Shuva (2016) shows that the majority of LIS schools and departments had incorporated digital librarianship in their curricula, 39 of 49 European countries had LIS schools. The study stresses the importance of practical aspects, relevant journals, and books needed in DL. congruently, Khan & Bhatti (2017) investigate digital competencies for building and managing DL among librarians and reveal that the fundamental principles of digital skills are categorised into three (mounting, handling and safety information). The researchers expatiate that all these could be

accomplished via training programmes offered by higher education commission (HEC), Library Association, LIS schools, in-house training, online tutorial, professionalism offered by expertise. Again, Rahrovani et al. (2017) compare trained users' mental models versus untrained users and the result shows that users' mental models are more compatible with the search icon than that of untrained users in the use of software application interface

Additionally, Virkus (2015) findings acknowledge that students of DL learning most suitable approach to training are seminars and lectures, practical, hands-on training, discussions, experiments, fieldwork, and case studies. It also unveiled that from 2007-2013, students opted for different learning skills on DL such as demonstrations, publications, coaching/mentoring/one-on-one learning, teamwork, etc. Similarly, Zha, Zhang,Yan (2015) investigate Digital Humanities (DH) in DL among LIS students and find that DH's technological advanced method provides both opportunities and challenges. The opportunities are a partnership; research and instruction exercise; creation of foremost networks; development of apparatuses and datasets in the sustenance of diverse projects.

**Management**

Management is an indispensable entity in any venture. DL is an expensive project and therefore deserves befitting supervision and utilisation. Lagzian, Abrizah & Wee (2013) explore salient points considered important to the growth, administration, and sustainability of DL resources. The authors categorised them into enthusiasm, possessions, stakeholders, procedures, systems and time. In other words, these six key constructs are formidable elements to the successful development of DL and its sustainability. On the other hand, Li et al. (2016) investigate the early sign of danger inherent on copyright violation, built on theory and discover that the model is active in differentiating the level of possible menace of copyright breach of trust in DL while the adequate measure is taken against it.

**Social Media**

Researchers are exploring DL technology in various dimensions. Lamont & Nielsen (2015), in their findings on the use of social media campaign in propagating DL resources, disclose that the crusade yielded a positive result to DL and small return on investment as San Diego state university (SDSU) DL had 5 followers of Pinterest, few of repins, 7 followers and many likes on Tumblr. Google Analytics unveil that 2 followers had emerged from Pinterest, 1 link of Tumblr to DL, 24 were produced from Facebook where DL had no attendance. Secondly, Xie & Stevenson (2014) carry out a research on the application of social media in DL and reveal that there are problems associated with the use of social media in DL and most popularly used social media by the institution studied are Facebook, Twitter, followed by Flickr, blogs, RSS, YouTube, Pinterest, podcasts, etc.

In another development, Zha, ZhangYan (2016b) explore the acceptance of DL in mobile settings and show that the use of mobile technology does not only impact on users' intention to accept mobile libraries but also facilitate effective drift of knowledge and abundant connection on usage intention. The researchers conclude that a wave of skill, usage framework, universal connection, and innovation are the main factors affecting usage intention. Moreover, the same authors Zha et al. (2015a) further compare users' perceptions of web DL and mobile DL flow of skills. The result portrays that there are fewer users of web DL. However, the authors observe that DL is facing serious competition in current dispensation in the use of mobile libraries and

cite China as an example of country undergoing a transition from web DL to mobile libraries. Lastly, the same intellectual writers conduct research on evaluating DL in web and mobile context in terms of the digital divide and find that many users believed that DL is easy to use and very useful unlike mobile with respect to ease of use and effectiveness of DL while network supersedes mobile DL.

**Technology/Software**

Technology adoption and software application are essential to the successful operation of DL. Paknejad (2013) appraises the use of Greenstone software in DL development in Iran and finds that there is a compromise on the competencies of the software between the researcher and specialists. The study concludes that if the national body supports the local development of Greenstone, it will be an appropriate solution for Persian DL since it is free software. Similarly, Cherukodan et al. (2013) reveals that Cochin University of Science and Technology (CUSAT) in India has successfully implemented DSPACE open source software for the development of DL which had attracted visits from 78 countries. Furthermore de Smet (2014) explore DL J-ISIS technology in comparison with GSDL and reveal that J-ISIS is capable of processing documents quicker and with cost-effective storage capacity, hence imploring UNESCO to invest more into it, to give room for more advanced features of Greenstone. Equally, Oguz (2016) examine the organisational decision influences on technology adoption through Roger's Diffusion of Innovation and Wenger Community of Practise. The researcher identifies building, leadership style, sense of direction and relationship with external stakeholders as determinant factors to suitable technology adoption of DL project. The illustration below is the extracted DL themes:

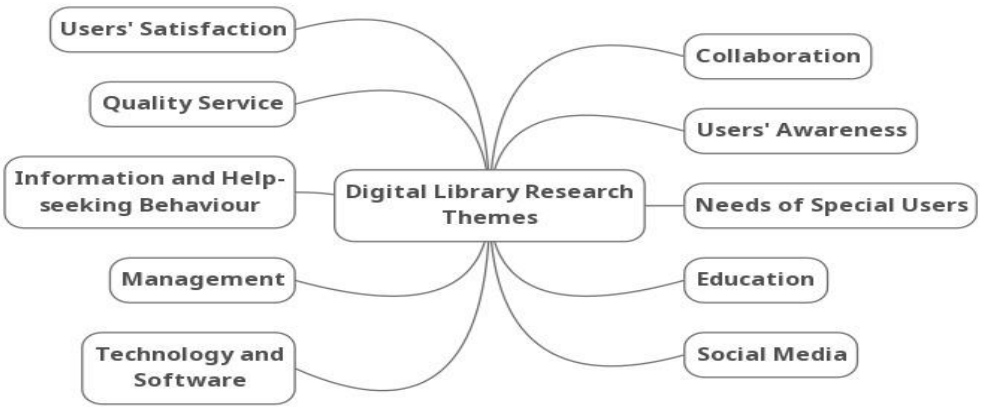



**Figure 3: An Overview of Digital Library Research Themes**

**Discussion**

DL literature has outlined the benefits in collaboration such as enhancement of data sharing, aids technical support, promotion of social network, increase output production of research. It has demonstrated that users' satisfaction is synonymous with perceived usefulness and ease of use, access and search outcomes, creating awareness as well as quality service delivery. Research on DL has navigated information-seeking and help-seeking behaviours of users in terms of browsing, searching, downloading as well as requesting assistance from librarians where and when necessary. It has shown the characteristics of two groups of users which depend heavily on before and after the commencement of the internet era. DL has succinctly

itemised the relevant software packages, theories and models suitable for DL project with adequate training and education of both staff and users.

**Conclusion**

This is a systematic appraisal of DLR after clearly sorting out eligible articles via a set of criteria. The review serves as a threshold to the establishment and development of DL project in any organisation. It acts as a guide to the relevant stakeholders intending to create DL from the perspectives of software, technology synergy, models, etc. This is tip of an iceberg in unravelling the DL research themes.

**References**

Abrizah, A., Inuwa, S. and Afiqah-Izzati, N. (2016). Systemati c literature review informing LIS professionals on embedding librarianship roles. *The Journal of Academic Librarianship, 42*(6), 636-643.

Aghakhani, N., Lagzian, F. and Hazarika, B. (2013). The role of personal digital library in supporting research collaboration. *Electronic Library, 31*(5), 548-560. https://doi.org/10.1108/El-01-2011-0005

Albertson, D. (2015). Synthesizing visual digital library research to formulate a user-centered evaluation framework. *New Library World, 116*(3-4), 122-135. https://doi.org/10.1108/Nlw-07-2014-0087

Alipour-Hafezi, M. and Nick, H. A. (2015). Evaluation of digital libraries of Iranian research institutions based on the DigiQUAL protocol. *Electronic Library, 33*(4), 824-841. https://doi.org/10.1108/El-07-2013-0131

Anaraki, L. N. (2013). Investigating the awareness and abilityof medical students in using electronic resources of the integrated digital library portal of Iran: a comparative study *electronic library 31*(1), 70-83.

Arora, J., Trivedi, K. J. and Kembhavi, A. (2013). Impact of access to e-resources through the UGC-

Audunson, R. A. and Shuva, N. Z. (2016). Digital Library Education in Europe: A Survey. *Sage Open, 6*(1). https://doi.org/Artn 2158244015622538

Babu, R. and Xie, I. (2017). Haze in the digital library: design issues hampering accessibility for blind users. *Electronic Library, 35*(5), 1052-1065. https://doi.org/10.1108/El-10-2016-0209

Bhattacharyya, S. (2014). *How context matters in digital library use.* Syracuse University,

Booth, A., Sutton, A. and Papaioannou, D. (2016). *Systematic approaches to a successful literature review*: Sage..

Catlow, J. et al. (2015). Students as Users of Digital Libraries. *Qualitative & Quantitative Methods in Libraries*, 861-869.

Cendon, B. V. and Souza, J. L.. (2015). A method for measuring satisfaction of users of digital libraries: a case study with engineering faculty. *Qualitative & Quantitative Methods in Libraries*, 11-20.

Chen, J. F. et al. (2016). Integrating ISSM into TAM to enhance digital library services A case study of the Taiwan Digital Meta-Library. *Electronic Library, 34*(1), 58-73. https://doi.org/10.1108/El-01-2014-0016

Cherukodan, S., Kumar, G. S. and Kabir, S. H. (2013). Using open source software for digital libraries A case study of CUSAT. *Electronic Library, 31*(2), 217-225. https://doi.org/10.1108/02640471311312393

Crymble, A. (2016). Digital library search preferences amongst historians and genealogists: British History Online user survey. *Digital Humanities Quarterly,* 10(4).

Feather, J. and Sturges, P. (2003). *International encyclopedia of information and library science*: Routledge.

Goodale P., Clough, P. and Fernando, S. (2014). Cognitive styles within an exploratory search system for digital libraries. *Journal of Documentation, 70*(6), 970-996. https://doi.org/10.1108/Jd-03-2014-0045

Khan, S. A. and Bhatti, R. (2017). Digital competencies for developing and managing digital libraries An investigation from university librarians in Pakistan. *Electronic Library, 35*(3), 573-597. https://doi.org/10.1108/El-06-2016-0133

Kitchenham, B. and Brereton, P. (2013). A systematic review of systematic review process research in software engineering. *Information and Software Technology, 55*(12), 2049-2075. https://doi.org/10.1016/j.infsof.2013.07.010

Kortemeyer, G. (2016). Scalable continual quality control of formative assessment items in an educational digital library: an empirical study. *International Journal on Digital Libraries, 17*(2), 143-155.https://doi.org/10.1007/s00799-015-0145-3

Lagzian, F. Abrizah, A and Wee, M. C. (2015). Critical success factors for institutional repositories implementation. *The Electronic Library, 33*(2), 196-209.

Lai, Y. and Zeng, J. (2014). Analysis of customer churn behavior in digital libraries. *Program-Electronic Library and Information Systems, 48*(4), 370-382. https://doi.org/10.1108/Prog-08-2011-0035

Lamont, L. and Nielsen, J. (2015). Calculating value: a digital library's social media campaign. *Bottom Line, 28*(4), 106-111.https://doi.org/10.1108/Bl-07-2015-0010

Lawton, A. (2015). Usage Data of Images from a Digital Library Informs Four Areas of Digital Library Management: Metadata Creation, System Design, Marketing and Promotion, and Content Selection. *Evidence Based Library and Information Practice, 10*(2), 164-166.

Li, C., Zhang, W. D. and Lan, Y. X. (2016). Early warning of risks of copyright infringement in digital library based on extension theory. *Electronic Library, 34*(2), 250-264. https://doi.org/10.1108/El-04-2014-0064

Oguz, F. (2016). Organizational Influences in Technology Adoption Decisions: A Case Study of Digital Libraries. *College & Research Libraries, 77*(3), 314-334. https://doi.org/10.5860/crl.77.3.314

Okoli, C. and Schabram, K. (2010). A guide to conducting a systematic literature review of information systems research.

Paknejad, A. (2013). Technical assessment of Greenstone toward development of digital libraries in Iran. *The Electronic Library, 31*(5), 593-607.

Rahrovani, S., Mirzabeigi, M. and Abbaspour, J. (2017). The trained and untrained users' mental models compatibility with the icons of search modules in Iranian digital library applications. *Library Hi Tech, 35*(2), 290-302. https://doi.org/10.1108/Lht-06-2016-0071

Stejskal, J. and Hajek, P. (2015). Effectiveness of digital library services as a basis for decision-making in public organizations. *Library & Information Science Research, 37*(4), 346-352. https://doi.org/10.1016/j.lisr.2015.07.001

Virkus, S. (2015). Student Expectations and Competencies in the Digital Library Learning/DILL Master Programme. *Qualitative & Quantitative Methods in Libraries*, 77-85.

Volovici, R. et al. (2016). Digital Libraries Impact on Students' Learning Behaviour. Case Study: Medical Students. *Qualitative & Quantitative Methods in Libraries*, 23-29.

Weng, C. H. (2016). Knowledge discovery of digital library subscription by RFC itemsets. *Electronic Library, 34*(5), 772-788. https://doi.org/10.1108/El-06-2015-0086

Wu, K. C. and Chen, H. C. (2016). Children use second-and third-dimensional digital library interfaces. *Library Hi Tech, 34*(1), 21-35. https://doi.org/10.1108/Lht-07-2015-0078

Xie, I. and Stevenson, J. (2014). Social media application in digital libraries. *Online Information Review, 38*(4), 502-523. https://doi.org/10.1108/Oir-11-2013-0261

Zerehsaz, M. (2017). Analysing the relationship between information-seeking and help-seeking behaviours in a digital library. *Electronic Library, 35*(5), 882-898. https://doi.org/10.1108/El-05-2016-0103

Zha, X. Zhang, J. & Yan, Y. (2015). Comparing digital libraries in the web and mobile contexts from the perspective of the digital divide. *Journal of Librarianship and Information Science, 47*(4), 330-340. https://doi.org/10.1177/0961000614532677