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Understanding Institutional Repository in Higher Learning Institutions: A Systematic Literature Review and Directions for Future Research

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ABSTRACT Institutional repositories (IRs) have received considerable attention from researchers across disciplines and around the globe. They have potentially increased the public value, ranking, prestige, and visibility of researchers, and relevant universities. However, despite the important and rapid growth of research in this area, few efforts have been made to systematically review and integrate the findings from previous research studies or to examine the current state of study regarding IRs. The primary goal of this paper is to provide a better understanding and an in-depth review of the current state of study regarding IRs. This research uses a systematic literature review (SLR) and followed a protocol to properly organize the work related to institutional repositories. The data were collected from primary studies published from 2007 to 2018 from the six major databases (ScienceDirect, IEEE Explorer, Springer, ACM, Taylor and Francis, and Emerald insight). Several papers regarding IRs were reviewed, applying inclusion and exclusion criteria, and a total of 115 studies were included as the main part of this research. The results obtained from these studies indicated that the absence of knowledge of open access IRs among scholars and institutions and inadequate information and communication technology infrastructure were significant challenges behind the development of open access IRs. Meanwhile, enhanced visibility of the academic institution, increased local and global rankings, increased prestige and public value, and improved teaching, learning, and research development by the scholars of the institution were found to be the main benefits of institutional repositories. This paper also highlighted that most of the studies in this research area were focused on the "deployment, implementation, and adoption" and "benefits and challenges" of institutional repositories. The outcomes of this paper can assist future researchers by providing a roadmap of institutional repositories and highlighting guidelines for successful implementation of IRs in higher learning institutions.

INDEX TERMS Institutional repositories, systematic literature review, IRs, university.

I. INTRODUCTION

At the present stage of IT development, the number of institutional repositories (IR) has been increased by university libraries. These university libraries have gained substantial acceptance to store information in their repositories. Institutional repositories play a key role in showing this information in a better way. The users of this information like the way that the information is presented in university repositories. Several numbers of academic institutions plan to provide research data services through their IRs [1]. IRs play a key role in the visibility of the university, as they capture local content and the other researchers can access these contents globally [2]. Academic institutions use IRs to access articles and other relevant resources and information for research and learning purposes. These university repositories provide scholars with broader knowledge related to the research that is carried out by the individual or groups in the specific area of interest. Academicians download the papers from different IRs and review the literature to identify knowledge gaps [3]. The institutional repositories consist of dissertations, theses, course notes, conference proceedings, symposiums, magazines, review articles, learning objects and other forms of gray literature [4]. IRs are established for preserving and

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disseminating materials digitally, which ultimately improves an institution's visibility and reputation. Developing countries are still facing the problem and challenge to overcome these issues and due to this reason, they present their information (research outputs) as openly accessible by IRs [5]. Academic institutions such as universities have predicted IRs as an essential part of higher education, because without providing knowledge through these IRs one cannot fill the gaps and challenges of the modern day. IRs play a role and are considered as the engine of educational institutions [6]. IRs are still under development and are not yet at the level at which one can fully utilize them, although IRs have gained substantial consideration from different scholars across the globe in diverse field [7]. In spite of this, the concept of IRs and their status in universities is scattered. However, no effort has been made to review, analyze and synthesize the existing studies systematically to further provide a better understanding and clear view of the IRs for academicians and professionals. However, no attempts have been made to systematically review these studies, providing practitioners and researchers with a review of present, state-of-the-art institutional repositories. Hence, the proposed study has two primary goals. The first goal is to systematically gather, summarize, analyze and synthesize information about the accuracy and values of past studies published in the literature between 2007 and 2018. The second goal is to comprehensively report on the holistic, empirical findings from this domain's existing studies. The study was carried out systematically to deliver a rich picture and grounded proof of the current state of research addressing institutional repositories to all professionals and researchers and to recommend opportunities for future research in this field. To overcome the limitations of the existing research, a systematic review protocol was proposed to examine IRs concepts. The protocol used in this study systematically searches the articles; includes and excludes the articles according to predefined criteria; collects, analyses and synthesizes the articles; and then assesses the quality of the selected articles. We proposed three main questions and their solutions to accomplish the key objective of this study. This study will help scholars to recognize IRs, clarify the benefits and challenges of IRs, examine in detail what subjects have been described in the literature, and reveal prospective gaps in the current studies that require further research. The research questions addressed in this study are given below:

RQ1: What are the potential benefits and key challenges of IR?

RQ2: For what purposes do academics use IR in universities?

RQ3: How can IR contribute to enhancing the learning, teaching and research activities in universities? In general, this study makes a twofold contribution.

In general, this study makes a twofold contribution. First, through analyzing 115 papers from the literature, comprehensive details and understanding of the IRs domain was provided for scholars who need to learn about the topic and discover areas where more study is required. Second, by reviewing the included articles, a clear overview was presented to the scholars to inform them which parts of study are lacking and to notify them which areas need more exploration and research to identify issues. The remainder of the study is structured as follows: the concept of IRs and its background and historical development has been provided in section 2 with further details in subsections. Section 3 briefly explains the review method conducted for the proposed research work based on existing literature and systematically followed a protocol to organize research articles. Section 4 reveals the results obtained by conducting the SLR. In section 5, the results of the research questions are briefly shown. The discussion and conclusion of the paper is given in section 6.

II. BACKGROUND

This section provides a brief overview and definition of the existing IRs along with the open-access source software for IRs and summarizes the core definitions. The details are given in the following subsections.

A. INSTITUTIONAL REPOSITORIES DEFINITION

Several researchers have been worked in institutional repositories. Most of the researchers defined the IRs as a set of services, which presented by an institution for the management and distribution of different research materials digitally, which are created by the scholar or community of scholars [8]. A detailed summary of these definitions is presented in Appendix A of this paper. According to Lynch [9], ''a university- based institutional repository is a set of services that a University offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members. It is most essentially an organizational commitment to the stewardship of these digital materials, including long-term preservation where appropriate, as well as organization and access or distribution.''

B. OPEN ACCESS SOURCE SOFTWARE FOR INSTITUTIONAL REPOSITORIES

Open access software is freely available to access and use digital scholarly material that can be stored with no licensed agreement requirement. Open access to scholars means that it is available free in the repository and anyone can copy, read, download, distribute, and print open-access documents under certain license [10]. The open access repository has advantages for the author and the university. The advantage to the university is that IRs enhances the universities' visibility and ultimately increases the reputation of the university. IRs also support learning and teaching by the capability to monitor and analyze the performance of the research [11]. Several open access software packages are available to create institutional repositories. The details of some IRs are given in Figure 1 and Figure 2. According to (OpenDOAR) and (ROAR), more than 80 software packages are used

TABLE 1. Stages of a systematic review.

	Sub-elements	Particular activities in this research
Phase 1: Planning the review	Identifying review questions	To achieve the primary goal of this research, we suggest three key questions. • What are the potential benefits and key challenges of IR? • For what purposes do academics use IR in universities? • How IR can contribute in enhancing the learning, teaching and research activities in university? Responding to these questions will help the scholar to understand institutional repositories, and give an explanation for characteristics of institutional repositories that distinguish it from the traditional repositories and detail exactly what topics have already been revealed within the literature.
	Formulating a review protocol	A comprehensive review protocol was defined in performing the systematic literature review, the review protocol process comprises of different phases, including the research questions, Search strategy, study selection process, quality assessment, data extraction, and synthesis of the extracted data. Figure 3 illustrates the review protocol for this study.
	Identifying inclusion and exclusion criteria	To make sure the selected primary studies are relevant and related to our research, the inclusion and exclusion criteria was applied. We restricted the research articles (from journals, conferences) in the English language, published period from 2007 to 2018 in online digital databases. Those articles that not clearly relate to an institutional repository domain were eliminated. Furthermore, articles were excluded that was unsuccessful to attain any of their objectives. We also eliminate study manuscript is not presented entirely in the English language. Further, research articles were not related to our research questions are removed.
Phase 2: Conducting the review	Search strategy and study selection process	As described in Figure 3, this study applied two stages manual and automatic stage. In this research following data base were used (ScienceDirect, IEEE Explorer, Springer, Google scholar, ACM Digital Library, Taylor and Francis, and Emerald insight). To undertake the automatic search, keywords were determined based on the research question of this review. The main keywords used are: "repositories", "institutional repositories", "IRs", and "institution", "university", "higher learning institution." Then Google Scholar search engine was used to go forward and find the articles that were cited in the selected primary studies.
	Select primary studies	After initial screening of the titles, a total 283 studies were discovered. After excluding the duplication, a total of 153 studies were included. The inclusion/exclusion criteria were applied to the remaining 153 studies. After reading full text of the studies, a total of 31 studies were omitted, leaving results from 122 studies. In the second phase, a manual search process was performed in order to trace if there is any study missing, in total 17 studies were found that were missed during the automatic search process. In the final stage, the quality of the articles was assessed and then 24 studies were removed. After all these inclusion and exclusion criteria a total of 115 research articles were included as primary studies for the proposed research work.
	Perform quality assessment process	The authors conducted a quality assessment of this review, as a means of evaluating the quality and accuracy of the selected primary studies. Firstly, if a study completely fulfilled a quality criterion, it was assigned a rating of 2 for that criteria. Secondly, if a study partially fulfilled a quality criterion, it was assigned a rating of 1 for that criteria. Lastly, if a study did not meet a quality criterion, it was assigned a rating of 0 for that criteria. The outcomes of the QA criteria for primary studies are presented in Appendix C.
Phase 3: Document Review	Data extraction and synthesis	In this step, this paper's researchers developed a data extraction form, and with it they accurately recorded all information from 115 studies. This process was performed by reading each study carefully, and extracting the related data using Mendely and Microsoft Excel spreadsheets. However, in this review, the following columns were considered for data extraction: study ID, to highlight each paper, paper title, relevant authors, relevant date, location of publishing (conference, journals, etc.), source, objectives of paper, citation, and country.

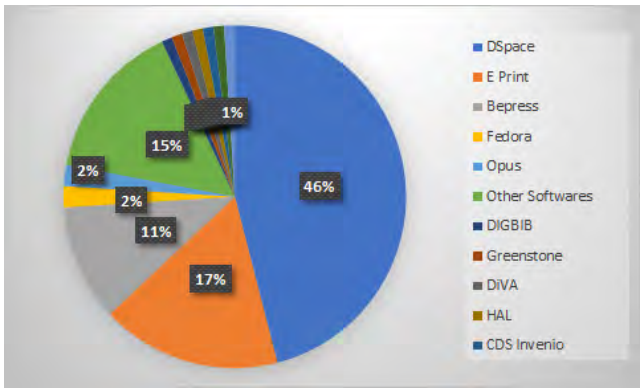


FIGURE 1. Usage of open access repository software - open access repositories (ROAR).

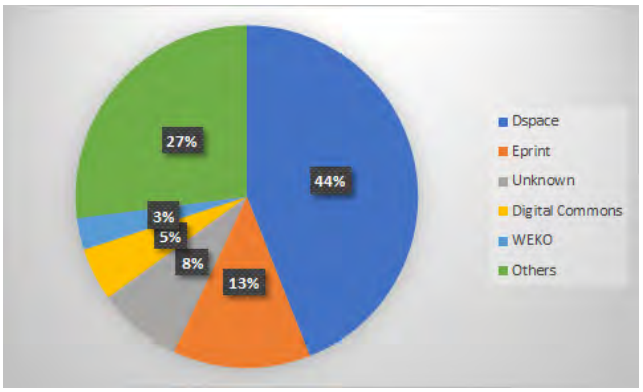


FIGURE 2. Usage of open access repository software (OpenDOAR - 17-Jul-2018).

for building digital repositories. The ROAR site indicates that 1834 repositories from 3969 registered repositories use DSpace alone. At the same time, the Open DOAR shows that 1544 repositories from 3519 registered repositories use DSpace.

III. REVIEW METHOD

Institutional repositories are a key component of academia, including universities and institutions. They play a primary role in the enhancement of the reputation of an institution. To conduct a study of the IRs concept, the SLR protocol was

TABLE 2. Inclusion and exclusion criteria.

Inclusion Criteria	Exclusion Criteria
The published paper between 2007 and May 2018.	Paper not in this selected time
Study which clearly addresses IRs topic.	Articles that did not explicitly discuss IRs are excluded from this analysis.
Study manuscript written in English.	Study manuscript is not presented entirely in the English language.
Study which directly or indirectly address the research questions	Studies were not related to our research questions.

used, and the standard and guidelines followed those of [12]. This approach searches and gathers the sources of articles, includes and excludes the articles according to predefined criteria, and analyses and synthesizes the articles published in IRs in a systematic manner. This study proposed three main questions for achieving the objectives of the study. These three questions assisted in designing the search strategies, specifically the kind of data that will be derived from the collected articles. Thus, the research questions defined in the first section were formulated for assisting with the literature review.

To respond to the defined research questions in section 1, this study used a systematic review protocol as used by Kitchenham and Charters [12]. Kitchenham and Charters [12] conveyed that the aim of conducting an SLR is a broad review of the included studies in a particular area to recognize the gaps in existing research with the purpose of further investigation and to offer profound understanding of the new phenomenon. According to the guidelines of Kitchenham and Charters [12], a systematic literature review process consists of three major parts which are necessary for a formal research process: (1) planning; (2) conducting; and (3) documentation. Each part consists of particular activities, including: ''Developing a review protocol''; ''Identifying the criteria for inclusion and exclusion''; ''Searching for strategies and studying the selection procedure''; ''Performing a quality assessment process''; and ''Carrying out the data extraction and synthesis''. Table 1 presents a summary of the main activities conducted in each stage. The following subsections describe each activity in further detail. The proposed IR can be extended to add features such as a researcher profile system to communicate the IR, exhibit, archives, library catalog, and so on, which will enhance the researcher to communicate with the IR in an easy and efficient way. Each step has been explained in turn in the following sections:

A. REVIEW PROTOCOL

All the systematic reviews followed in research started with the significant task of describing the predefined protocol as well as the method(s) for reviewing and specifying the research questions to be undertaken [13]. Apart from this, researcher bias will be reduced by a predefined review protocol [12]. Several stages are included in the review protocol process, which contains the following: (i) search strategy; (ii) research questions; (iii) study selection strategy; (iv) quality assessment; and (v) data extraction and synthesis [12]. The review protocol for this study is demonstrated in Figure 3.

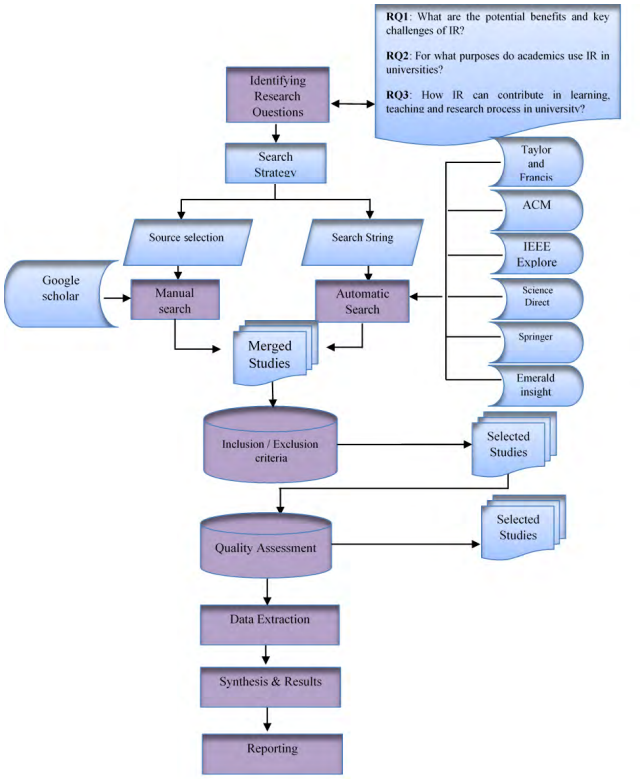


FIGURE 3. Proposed Review Protocol.

B. INCLUSION AND EXCLUSION CRITERIA

The purpose of applying inclusion and exclusion criteria is to make sure that all chosen primary studies in the systematic literature review are the most appropriate and are relevant to the study to answer the research questions in an SLR. We restricted the research articles (from journals, conferences) written in the English language and published from 2007 to 2018 in online digital databases. The reason for selecting this time is an accompaniment of previous efforts [13] to provide a deep understanding of IRs and more in-depth and systematic conclusions of recent relevant materials for future research and direction. Those articles that do not clearly relate to an institutional repository domain were eliminated. Furthermore, articles were excluded that were unsuccessful in attaining any of their objectives. We also eliminated study manuscripts not presented entirely in the English language. Further, research articles that were not related to our research questions were removed. Table 2 displays a summary of these criteria. Note that a study must not satisfy any criteria of the exclusion and must satisfy all criteria of the inclusion.

C. SEARCH STRATEGY

The search strategy includes the automatic and manual searches as shown in Figure 3. As per the guidelines presented by Kitchenham and Charters [12], the search mechanism was implemented for the initial search of this study. Based on the guidelines at the initial stage, the publication sources were queried for the required search terms. These online repositories include the following:

- ScienceDirect (https://www.sciencedirect.com/)
- IEEE Explorer (https://ieeexplore.ieee.org)
- Springer (https://www.springer.com/gp)
- Google scholar (https://scholar.google.com/)
- ACM Digital Library (https://www.acm.org/)
- Taylor and Francis Online (http://www.tandfonline.com/)
- Emerald insight (https://www.emeraldinsight.com/)

The above repositories were selected because of their relevance to the topic, high impact journals and conference proceedings regarding the IRs field. For the automatic search stage, the keywords were highlighted based on the stated research question defined in section 1. These keywords include: ''repositories'', ''institutional repositories'', ''IRs'', ''institution'', ''university'', and ''higher learning institution.'' Then, the second stage (manual) was implemented based on a manual reference search. The backward-forward search approach [14], [15] was conducted to indicate study citations. The Google Scholar search engine was utilized to determine cited studies in the chosen initial studies. Moreover, based on Webster and Watson's [14] recommendations, the manual phase was implemented to ensure that the systematic research is complete and comprehensive. The Mendeley reference management tool was then utilized for management and sorting to preserve relevant search results and omit replicated articles.

D. STUDY SELECTION PROCESS

This phase of the systematic literature review protocol shows the method for selecting and recognizing the studies that are very relevant to the defined research questions. Based on the initial search term, 283 studies were found through automatic searches. These studies were reviewed by the authors carefully, and the duplicated studies were removed through the Mendeley reference manager. After removing the duplicates, a total of 153 studies were included. After that, the papers were included based on the predefined inclusion and exclusion criteria for the abstract and conclusion of each article. Based on Kitchenham and Charters [12] view point, a total of 31 studies were excluded due to irrelevance and being obviously not related to the subject of this study. In the second phase, a manual search process was performed in order to trace if there are any missing studies. In total, 17 studies were found that were missed during the automatic search process, so these studies were added to the included studies. In the final stage, the quality of the articles was assessed and 24 studies were removed. After these inclusion and exclusion criteria were applied, a total of 115 research articles were included as primary studies for the proposed research work. The details of the included studies are given in Appendix B as supplementary materials.

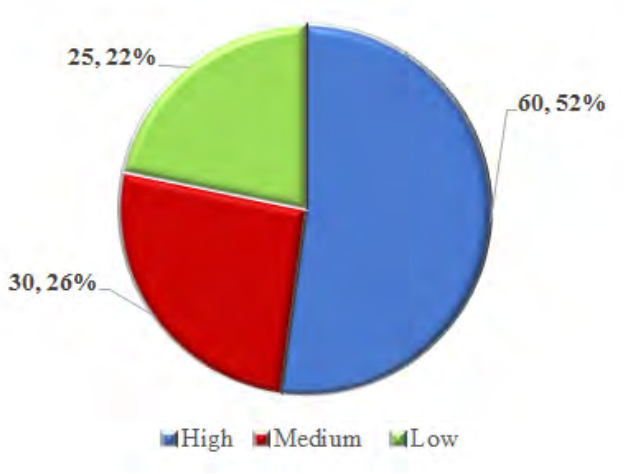


FIGURE 4. Distribution of studies after QA.

E. QUALITY ASSESSMENT

For the evaluation of quality of the primary studies, the quality assessment (QA) was applied, which is considered critical for the assessment of included articles [12]. The general aim of QA is decision making for the generic quality of the included articles. The QA protocol was followed based on the questions and checklist of the factors that needed to be used for each paper [12], [16]. In the proposed study, four QA criteria were developed, given below.

QA1: Was the research title for this paper interrelated to IRs?

QA2: Is there a sufficient description of research methodology in the included study?

QA3: Was the explanation of the context in which the research was performed adequate?

QA4. Are the objectives clear in the primary study?

Each of the selected articles was assessed based on the above mentioned QA criteria and was scored as high, medium, and low quality. The QA protocol of Nidhra *et al.* [17] was followed and the articles were scored as 2 for satisfy criteria, 1 for the articles that satisfy the criteria partially, and 0 for the articles that do not satisfy the criteria. The papers that scored more than or equal to 6 were considered as a high scorer and more relevant; the papers with score 5 were considered as medium level relevant; and the papers with a score less than 4 were considered as low relevance. After applying the above criteria, it was found that 24 studies did not fulfill the criteria; therefore, these studies were excluded. A total of 115 studies were considered as the primary materials of the proposed research work. Figure 4 shows the quality assessment criteria of the included papers, most of which have the highest score. The outcomes of the QA criteria for primary studies are presented in Appendix C.

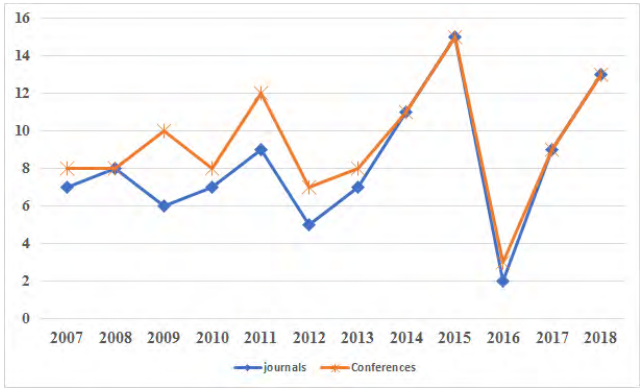


FIGURE 5. Primary studies distribution per publication source.

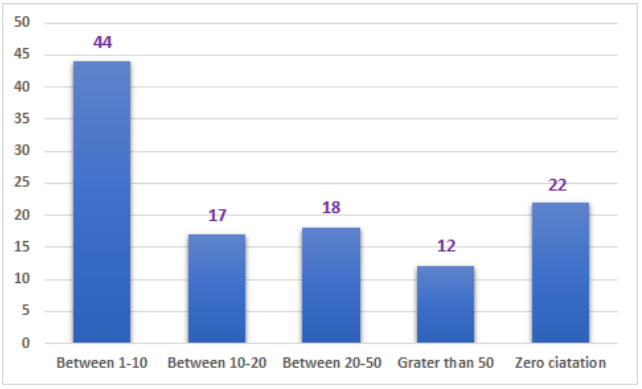


FIGURE 6. Citation count.

IV. DATA EXTRACTION AND SYNTHESIS

The data extraction and synthesis took place by studying each of the 115 papers and extracting relevant data via Mendeley and MS Excel spreadsheets. The overall goal of this stage was to design data extraction forms to accurately record data from the initial research [12]. The columns for this form were: study ID, to highlight each paper, paper title, relevant authors, relevant date, location of publishing (conference, journals, etc.), source, objectives of paper, citation, and country. The mentioned items were chosen in accordance with the main research questions. Finally, the results from the data extraction for the 115 papers were obtained from the form presented in Table 3.

A. PUBLICATION SOURCE OVERVIEW

After applying inclusion and exclusion criteria along with quality assessment for each paper, 115 studies related to research on IRs have been selected as a primary source. As demonstrated in Figure 5, since the bulk of the articles were published and available in reliable and impact factor journals as well as leading conferences on information systems, the importance of this review increases. As depicted in Figure 5, the primary study results revealed that most of the articles were published in 93 journal articles, whereas 13 articles were published in conference papers. As presented in the graph below, the number of publications gradually increased from 2012 to 2015. Most of the publications were recorded in 2015 with 15 studies. The distribution of published papers revealed that the number of articles on IRs increase by year.

B. CITATION STATUS

The citation rates for the included studies are quite good, which shows the high quality and impact of the studies. The citation rates of the included studies are shown in Figure 6. The number of citations were taken from Google Scholar. The presented data in this figure are not for evaluation of the included studies; it merely provides an indication of citation rates. As revealed in Figure 6, almost 12 selected articles were cited by other sources more than 50 times. As shown in Table 4 below, 18 articles were cited between 20-50 times. Moreover, 44 papers were cited less than 10 times and

FIGURE 7. Primary studies distribution over the years.

22 papers were not cited. However, since some of the articles were published in 2016 and 2018, and it is not anticipated that in this short time they might have achieved a high number of citations. Table 4 shows the most cited studies on IRs.

C. TEMPORAL VIEW

As seen in Figure 7, the primary study distribution was between 2007 and 2018. Of 115 included studies, the years 2007, 2008 and 2010 had 24 published studies. 2009 had 10 published studies, while 2011 had 12 published studies. As demonstrated in Figure 7, the studies on IRs quickly increased from 2012 to 2015. Therefore, it is clear that scholars' interests for research in this area were growing, principally from 2010. However, 2016 had only 2 articles published. The years 2017 and 2018 had 22 articles published. This is possibly not unexpected because the IRs concept only started in the last two decades [37].

D. COVERAGE OF RESEARCH REGIONS

In this study, 21 different countries published primary studies. As presented in Figure 8, the highest number of publications was from Africa with 35 articles; followed by America, with 28 articles; Asia, with 26 articles; Europe, with 11 articles; and finally, Oceania, with 6 articles. The results of this analysis specify that most of the research publications have focused on IRs and meet the inclusion criteria of this study, and the

TABLE 3. Data extraction of primary studies.

Extracted data Study	Description
Study ID	Unique identification number which used for each article
Authors and Date of Publications	The information from authors followed by the year that paper was published (2007âĂŞ2018)
Study Title	The summarized main idea of each article which emerged in the searching stage
Study Objectives	The specific goal of each article
Country	A region that study is identified
Citation	The number of times paper has been sited, which is obtained from Google Scholar
Source	Examples of source are: conference proceedings, journal, and book chapter

TABLE 4. Key challenges faced when using IRS.

References	Key challenges
[11]- [5]	Poor ICT infrastructure
[11]- [5]- [18]- [10]- [19]- [20]	Absence of institutional repositories policies
[21]- [5]- [22]- [23]- [10]- [24]- [25]	Lack of awareness of publishing in institutional and General skills and staff shortages
[22]	Lack of institutional knowledge management strategies
[21]- [26]- [27]	Irregular power supply
[19]- [22]- [28]- [29]- [30]	Absence of a dedicated copyright
[22]- [28]	Plagiarism problems and quality questions
[23]- [31]	Difficulties in Generating Content
[23]- [31]	Lack of Incentives
[23]- [21]- [31]- [32]- [19]	Cost
[2]	Tracking of publications
[31]	Sustaining support and commitment
[33]	Management failure or incompetence
[34]	Political situation
[35]	Intellectual property right
[11]	Lack of man power training
[27]- [23]- [36]	Low internet bandwidth; Technical problem
[22]- [35]	Open access
[35]- [5]	Inadequate information and communication technology infrastructure

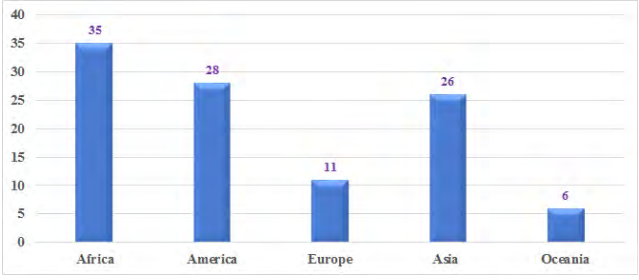


FIGURE 8. Distribution of papers by regions.

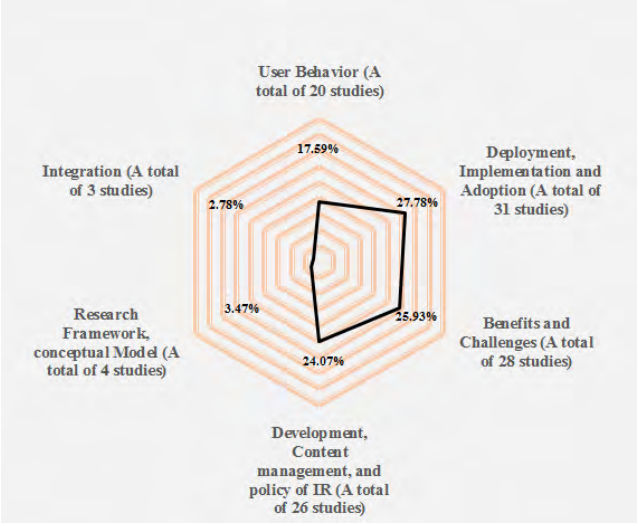


FIGURE 9. Institutional repositories-topic categories.

majority of them have been published in Africa, America and Asia, as shown below.

E. RESEARCH TOPIC CATEGORIES

Based on the identified primary studies, the outline of research topic categories is presented in Figure 9. As shown in Figure 8, the research topic is divided into six categories. The first category is named deployment, implementation and adoption, which involved the highest number of articles reviewed, almost 31 papers, or 27.78% of the included studies. The substantial number of research papers on this topic were mostly examined, to illustrate the factors that could influence the adoption of IRs and investigate the implementation and deployment of IRs in universities to recognize best practices in the technical infrastructure, administration, and access to repository collections. The second category of the

research topic is dedicated to the benefits and challenges category, with 28 studies or 25.93% of the total number of publications. The main focuses of this category are challenges and opportunities that impact the establishment of the IRs. The topics of development, content management, and policy are considered as a third category of research, comprising 26 research publications, or 24% of the total studies in this systematic review. User behavior is the fourth category of research classification, which is highlighted by 20 publications, or 17.59% of the total number of articles. The focus of this category is to identify how user acceptance, satisfaction, and motivation impact IRs to evaluate the ease of use, usefulness, and level of understanding of the repository's functions. Research frameworks and conceptual models are fifth category of this research, which includes 4, or 3.47% of the total number of publications, and the final category is dedicated to integration, with only 3 studies performed.

V. RESEARCH QUESTION RESULTS

The following subsections briefly show the results of the defined research questions.

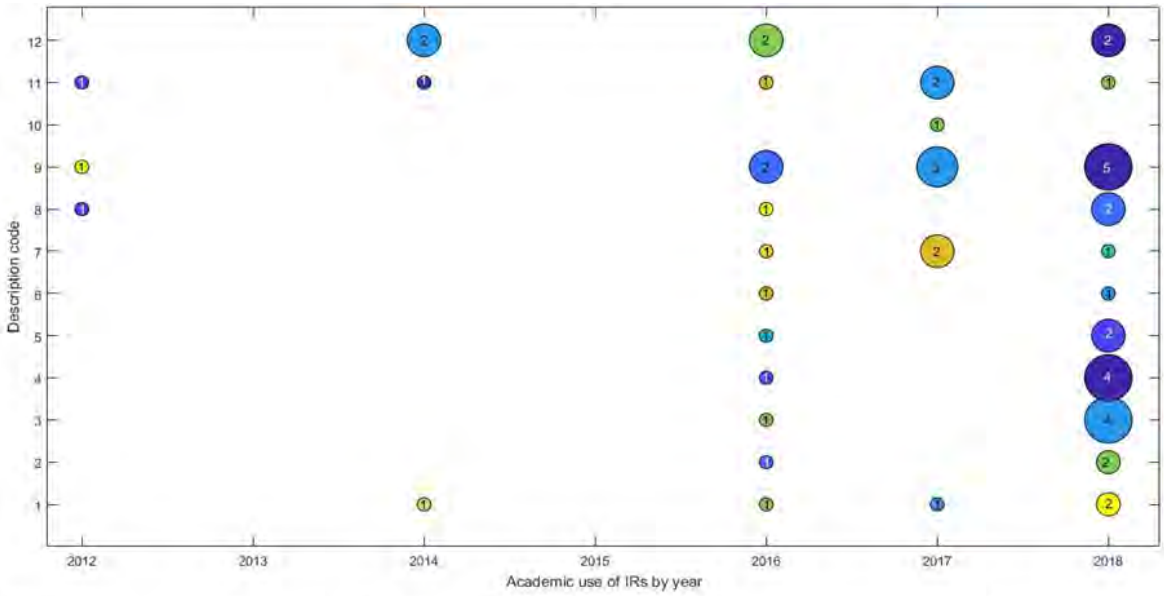
A. WHAT ARE THE KEY CHALLENGES AND POTENTIAL BENEFITS OF IR? (RQ1)

Research question one shows the key challenges and potential benefits to the institutional repositories. The selected papers for this research question reveal that these papers are the evidence of the appeal of IRs to academic libraries from many perspectives. IRs have a number of challenges, such as logistics in creating, operating and preserving an IR. According to Johnson Adetunji Adeyemi *et al.* [5], numerous challenges have been traced, which influence the development of IRs in the institutions; for instance, lack of awareness of open access IRs, insufficient communication and information technology infrastructure, copyright issues, insufficient encouragement for open access, technological obsolescence and deterioration of media. In the same manner, Vardakosta and Kapidakis [32] mentioned that the key issues for institutional libraries are ''collections'', ''institutional repositories'', and ''collaboration'', with further issues with major emphasis in the strategic directions of universities, while ''data management'' and ''open access'' are listed as ''additional areas of emphasis.'' Apart from this, Christian [38] indicates in his study the challenges and issues for open access development of institutional repositories in academic and research institutions. The results obtained from these studies indicated that the absence of knowledge of open access IRs among scholars and institutions, inadequate information and communication technology infrastructure are all key challenges behind the development of open access IRs. Some of the key challenges for using IRs for institutions are summarized in Table 4. Some of the key challenges for using IRs for institutions are summarizes in Table 4.

IRs make visible the research output of the institution, and scholars can benefit from IRs and further enhance the reputation of the institution [4]. These benefits agree with the study presented by Dhanavandan and Tamizhchelvan [39], who mentioned that IRs can benefit the scholar by enhancing their research work and increasing the impact of research work for easy access to research work, increase viewing and citation and self-archiving. Similarly, Abdullah [40] explained that three groups of institutions can benefit from IRs, including academic institutions, individual authors, and librarians. According to Anenene *et al.* [4], IRs can enhance the visibility of the academic institution, increase their ranking locally and globally, increase their prestige and public value, improve their teaching and learning and develop the research of the scholars of the institution. For the individual scholar, the IRs provide a centralized repository of different research work in the form of journals, conferences, books and magazines; they increase the distribution and impact of the scholar's research; and publisher's expenses and permissions obstacles will be overcome by using IRs [41]. Considering all these potential benefits, it will be more valuable to overcome the challenges confronted by institutions for open access repositories implementation. Table 5 summarizes the potential benefits for institutions of using IRs.

B. FOR WHAT PURPOSES DO ACADEMICS USE IR IN UNIVERSITIES? (RQ2)

To answer this research question, the primary selected articles disclose that IRs are implemented by institutions for archiving published articles, to enhance collaboration with other scholars, contribute to enhancing the visibility of the institution locally and globally, and increase the web ranking of the academic institution. Ukwoma and Dike [3] highlighted that the principal mission of all academic institutions is research dissemination. IRs aid academic institutions to distribute the output of the research to the universal research society, improve community expansion and unlock new situations for cooperation in research nationally and internationally. Likewise, Okumu [51] also revealed explanations for IRs to comprise, increase visibility of the institution and improve influence on research productivity, modification in the academic publication paradigm and enhancement of inner relationship and collaboration within the academic institution. Moreover, Nagra [33] indicates that IRs enable the archiving of academic activities and institutional study, which allows the university to discover and make available the existing and prior projects of the institution at a centralized place. IRs can also increase scholarship value via cooperation and sharing, and this fundamentally makes the foundation for research dissemination, teaching and sharing in academic institutions as a new idea. In addition, by using IRs, the institution is able to disseminate knowledge and spread research outcomes to the worldwide research society. It enables a new environment for research cooperation and improves community outreach nationally and globally [51]. As depicted by Anunobi and Okoye [52], IRs are considered a method of decreasing the cost of academic publication and increasing the visibility of academic research. In addition, the study by Christian [38] revealed that many researchers publish with the aims to



Description Code	Description	Description Code	Description
1	To collect, organize, and preserve digital versions of the institution's scholarship	7	Teaching and sharing in academic institutions
2	Demonstrating institutional commitment to open access principles	8	Improves community outreach nationally and globally
3	Enhance collaboration and communication by other scholars inside and beyond institutions	9	Dissemination of research and knowledge
4	Contribute to enhance visibility of institution locally and globally	10	Improvement in researcher's occupation
5	Efficiency	11	Impact on reputation
6	Increase web ranking of the academic institution	12	Archiving of academic activities and institutional study

FIGURE 10. Academic use of IRs by year.

improve their occupations, to cooperate with their colleagues and to acquire prestige from their tasks. This indicates that for several purposes, IRs could be applied, including to publish scholarly research work, posit current information, or download resources from the Web, depending on the scholars' interests. Table 8 summarizes research studies done for the purposes of academic use of IRs in the university.

Figure 10 is a graphical representation of the use of institutional repositories in universities. According to this figure, the total number of selected studies shows that dissemination of research and knowledge by institutional repositories is considered as a most important factor for scholars to choose IRs. This is line with the study by Callicott *et al.* [31], who stated that "open knowledge dissemination as a core component of a university's identity." As shown in Figure 10, self-archiving of academic activities in institutional repositories are considered as a second important driver for universities to deposit in institutional repositories. This is consistent with the results of the study by Wirba Singeh *et al.* [44], stating that 65.3% of academic researchers agree to deposit their academic activities and institutional study in institutional repositories. The following drivers, namely, impact on reputation and to collect, organize, and preserve digital versions of the institution's scholarship, are considered as other reasons for universities to contribute to institutional repositories.

C. HOW IR CAN CONTRIBUTE IN ENHANCING THE LEARNING, TEACHING AND RESEARCH ACTIVITIES IN UNIVERSITY? (RQ3)

"The intellectual work of academics is the core business of Higher Education (HE) institutions. Much of this work is documented in research papers, and in materials used for teaching and learning [47]." In the university, knowledge is widely shaped, produced, and shared in the activities of scholarly learning, teaching, study and community service [45]. The IRs are the base of development of research communications between the scholars from different institutions and their collaboration from academic perspectives in teaching as well as in learning [31]. IRs play a significant role in changing and fostering institutions. Ceballos and Ramírez Montoya [58] highlighted the idea that if scholars have more academic tools and institutional repositories support, they will improve their academic levels as well as attain a modern method of learning. Callicott *et al.* [31] showed that the key role of IRs is "opening up entire new forms of scholarly communication that will

TABLE 5. Potential benefits of using IRs.

References	Potential Benefits
[42]- [43]- [33]	It showcases institution's intellectual quality
[42]- [19]- [4]	Enhances the reputation, visibility and prestige of an organization
[42]- [2]- [44]	Preserves and disseminates the collective capital of one's constituents
[42]- [45]- [19]	Provides a single consolidated integrated system
[10]- [46]- [11]	Helps in centralization and storage of all types of institutional output
[10]- [47]	Supports for learning and teaching
[10]- [48]	Enables to keep track of and analyze research performance
[10]- [48]	Breaks down publisher's costs and permissions barrier
[10]- [49]- [50]	Help institutions organize their research output and preserve it long term
[21]-	Expansion of the range of knowledge that can be shared
[21]	Leverage of existing investment in information and content management systems
[21]	Develop current academic communications in flexible way
[4]	Increases the ranking of an institution both at local and international level
[4]- [3]	Self-archiving and increase citation
[49]	Give the work of the institution and individual researcher more exposure

TABLE 6. The purposes of academic use of IRs.

References	Description
[53]- [22]- [31]- [54]- [27]	To collect, organize, and preserve digital versions of the institution's scholarship
[22]- [54]- [35]	Demonstrating institutional commitment to open access principles
[4]- [54]- [31]- [51]	Enhance collaboration and communication by other scholars inside and beyond institutions
[55]- [22]- [51]	Contribute to enhance visibility of institution locally and globally
[27]- [1]	Efficiency
[43]- [55]	Increase web ranking of the academic institution
[22]- [6]- [27]- [56]	Teaching and sharing in academic institutions
[54]- [22]- [1]	Improves community outreach nationally and globally
[54]- [55]- [45]- [57]	Dissemination of research and knowledge
[1]- [58]- [51]- [2]- [45]	Impact on reputation
[22]- [54]- [27]- [4]- [53]	Archiving of academic activities and institutional study

need to be legitimized and nurtured with guarantees of both short- and long-term accessibility." The IRs are seen by the practitioners and researchers from the diverse perspective of the materials collected for improving teaching, learning and research at the institution and their future [37]. The IRs preserve the institutions repository to locate the available information regarding different projects stored at the repository and then can improve the quality of learning, teaching and others through collaboration and sharing of information [26]. Studies on enhancing the teaching learning process by using digital repositories conducted by Patel and Patel [55] and Dhanavandan and Tamizhchelvan [39] asserted that providing access to learning and teaching materials across institutions will definitely enhance the learning and teaching quality for the higher education institutions, since students and teachers can easily gain plenty of teaching and learning materials which are obtainable throughout the institutions. In addition, they could develop themselves appropriately. The authors also considered that learning and teaching materials have to be shared throughout the institutions for improving the quality of teaching and learning activities within the institutions as teachers and students can improve their understanding of any particular subjects. They are able to widen their knowledge having much information on any area that is subject. Table 7 and Figure 11 represent how IRs contribute to enhance the learning, teaching and research activities in universities. It has been observed in previous literature that the main objective of IRs is to increase the accessibility of scholarly output. This result is consistent with [6], which highlighted that scholarly output should be accessible across institutions to effectively structure individual and group knowledge. As shown in Figure 11, freely available course materials are considered as a second objective for universities to choose IRs. To attract scholars and for more efficient

TABLE 7. Enhancing the learning, teaching and research activities by use of IRs.

References	Description
[6]- [24]- [60]- [61]	Freely available course materials
[46]- [31]- [2]- [54]- [62]- [1]	Increasing accessibility to scholarly output
[6]- [56]- [63]- [2]	Availability of information resources
[11]- [6]- [64]- [56]- [2]	Enabling access teaching and learning material
[11]- [6]- [2]	Available training information

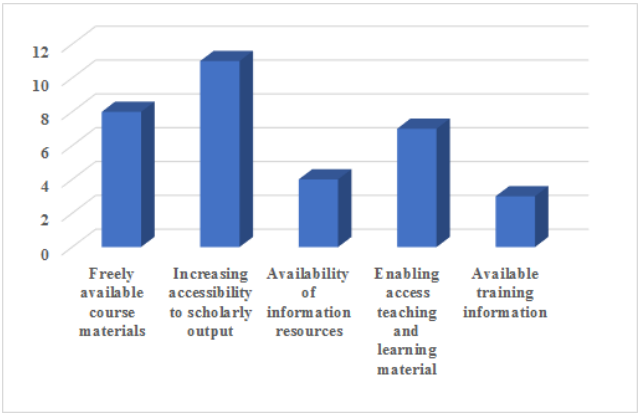


FIGURE 11. Enhancing learning and teaching activities by IRs.

accreditation, institutions need to make course materials freely available. Enabling access to teaching and learning material is considered as a third important objective for the university to deposit in IRs. For improving the quality of learning and teaching activities and better understanding of the subject in universities, the learning and teaching materials need to be shared by scholars. This is in line with the study of Dhanavandan and Tamizhchelvan [39], which showed that by access to available learning and teaching materials, teachers and students across the institutions can broaden their knowledge and develop themselves.

VI. DISCUSSION AND CONCLUSIONS

The proposed research work is an attempt towards a comprehensive report on Institutional repositories in the field of institutions. This study was conducted based on the SLR method and presents an overall view of studies of institutional repositories written from 2007-2018. After performing several systematic methods, 115 primary studies were identified that focus on institutional repositories. The remaining articles were removed from the review as they did not reach the quality level and did not achieve the inclusion criteria. The results of the data analysis of the chosen primary studies present a comprehensive and clear overview of the existing studies showing that institutional repositories are considered focal points in higher learning institutions. Moreover, the results of the review study show that the included primary studies are categorized in six research topics of studies that were relevant to institutional repositories. These included ''deployments, implementation and adoption'', ''user behavior'', ''benefits and challenges'', ''development, content management, and policy of IR'', ''research framework, conceptual model'' and ''integration''. The outcome of this study reveals that many studies have focused on ''deployment, implementation and adoption'' of institutional repositories, followed by ''benefits and challenges'', which have received sufficient research attention in compare to other categories. The results of the reviewed paper on benefits, and potential obstacles to setting up an institutional repository showed that there are several benefits of IRs for individuals and institutions. Based on the review of the previous studies, these are to enhance visibility of the academic institution, increase the ranking locally and globally, increase their prestige and public value, improve teaching and learning and develop research by the scholars of the institution, which were all considered to be the main benefits of IRs that universities as higher institutions can derive from IR. With the noticeable numerous advantages of IRs, universities and other educational institutions all around the globe are adopting IR as a way of linking the gap among scholars, authors, researchers output and the different users of information in addition to retaining their wealth of knowledge. Therefore, the developments of the institutional repositories benefit the entire university, not only the researchers who contribute. To a successful IR, overcoming and understanding the existing issues and challenges is crucial. Thus, the results of the proposed study highlighted that absence of knowledge of open access IRs among scholars and institutions, and inadequate information and communication technology infrastructure were significant issues and challenges behind the development of open access IRs at academic and research institutions. As IRs continue to evolve and rapidly increase, this systematic review is considered a potential basis for scholars to assist in identifying new study opportunities. In addition, the generalizable outcomes of this SLR will benefit researchers and practitioners in recognizing from where they should begin in further study and direction for institutional repositories. The proposed method can be extended in the future by adding digital asset management tools for university libraries to facilitate digital activities and that can be used to facilitate the university's faculty learning, teaching and research activities.

APPENDIX A
INSTITUTIONAL REPOSITORY DEFINITION

TABLE 8. Institutional repository definition.

Definition	Author
Set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members.	[9]
Institutional repository is a digital archive of the intellectual product created by the faculty, research staff, and students of an institution and accessible to end users both within and outside the institution.	[65]
IRs are defined as the "digital collections capturing and preserving the intellectual output of a single or multi-university community."	[66]
According to Barton and Walker of MIT Libraries "Institutional Repositories designed to manage, host preserve and enable distribution of the scholarly output of an institution"	[10]
Institutional Repository is: "an online locus for collecting, preserving, and disseminating in digital form the intellectual output of an institution, particularly a research institution.	[67]
A repository is a networked system that provides services pertaining to a collection of digital objects. Example repositories include: institutional repositories, publisher's repositories, data-set repositories, learning object repositories, cultural heritage repositories, etc.	[68]
An IR is defined as a digital archive for the sharing and preservation of intellectual works (e.g., article preprints and post prints, data sets, theses and dissertations, learning objects, technical reports, etc.) that is available for public use.	[53]
An institutional repository is a means to ensure that the published work of scholars is available to the academic community.	[69]
Generally, an institutional repository is an electronic system that captures, disseminates and preserves intellectual results of a group of universities or a single university.	[5]
A digital archive of an intellectual product created by the staff and students of an individual institution so as to make it available and accessible by the end users within the institution in e-form.	[70]
An institutional repository is the collective intellectual output of an institution recorded in a form that can be preserved and exploited	[58]

APPENDIX B
PRIMARY STUDIES REFERENCES

TABLE 9. Primary studies references.

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APPENDIX C
QUALITY ASSESSMENT CRITERION

TABLE 10. **Quality assessment criterion.**

QAF = "Quality Assessment Factors"					
S_ID	**QA1**	**QA2**	**QA3**	**QA4**	**Score**
S1	2	1	1	1	5
S2	2	2	1	1	6
S3	2	1	2	1	6
S4	2	1	1	1	5
S5	2	1	1	1	5
S6	2	1	1	2	6
S7	2	2	1	1	6
S8	2	2	2	1	7

TABLE 10. *(Continued.)* **Quality assessment criterion.**

QAF = "Quality Assessment Factors"					
S_ID	**QA1**	**QA2**	**QA3**	**QA4**	**Score**
S9	2	1	1	1	5
S10	2	0	1	1	4
S11	1	1	1	1	4
S12	2	1	1	1	5
S13	2	1	1	1	5
S14	2	1	1	2	6
S15	2	0	1	1	4
S16	2	1	2	2	7
S17	2	0	1	1	4
S18	2	1	1	1	5
S19	1	1	1	1	4
S20	2	1	1	1	5
S21	2	0	1	1	4
S22	1	1	1	1	4
S23	2	1	1	1	5
S24	2	1	1	1	5
S25	2	1	1	1	5
S26	2	1	1	2	6
S27	2	2	1	2	7
S28	2	2	1	1	6
S29	2	1	1	1	5
S30	1	1	1	1	4
S31	2	1	1	1	5
S32	2	2	1	1	6
S33	1	1	1	1	4
S34	1	1	1	1	4
S35	2	0	1	1	4
S36	1	1	1	1	4
S37	2	0	1	1	4
S38	2	2	1	2	7
S39	2	1	1	1	5
S40	2	0	1	1	4
S41	1	2	2	1	6
S42	2	1	1	2	6
S43	2	2	1	2	7
S44	2	2	1	1	6
S45	2	2	1	2	7
S46	2	1	1	1	5
S47	2	1	1	1	5
S48	1	1	1	1	4
S49	2	2	1	1	6
S50	2	1	1	2	6
S51	2	2	1	1	6
S52	2	2	1	1	6
S53	2	1	1	1	5
S54	2	1	1	1	5
S55	2	1	1	1	5
S56	1	2	1	1	5
S57	2	2	1	1	6
S58	2	2	1	1	6
S59	1	1	2	2	6
S60	2	2	1	2	7

TABLE 10. *(Continued.)* **Quality assessment criterion.**

S_ID	QA1	QA2	QA3	QA4	Score
S61	2	1	1	1	5
S62	2	2	1	2	7
S63	1	1	1	1	4
S64	2	2	2	2	8
S65	2	1	1	1	5
S66	2	2	1	1	6
S67	2	0	1	2	5
S68	1	1	1	1	4
S69	2	2	2	1	7
S70	2	1	1	1	5
S71	2	2	1	2	7
S72	2	0	1	1	4
S73	2	1	2	1	6
S74	2	1	1	1	5
S75	2	2	1	1	6
S76	2	2	1	1	6
S77	2	2	1	2	7
S78	1	1	1	1	4
S79	2	1	1	1	5
S80	2	1	1	2	6
S81	1	2	2	2	7
S82	2	2	1	2	7
S83	1	1	1	1	4
S84	2	0	1	1	4
S85	1	1	1	1	4
S86	2	1	1	1	5
S87	2	1	1	1	6
S88	2	2	1	1	6
S89	2	1	2	1	6
S90	2	1	1	1	5
S91	2	2	1	2	7
S92	2	1	1	1	5
S93	2	2	1	1	6
S94	2	0	1	1	4
S95	2	2	2	2	8
S96	2	2	2	1	7
S97	2	2	2	1	7
S98	2	2	2	2	8
S99	2	2	1	1	6
S100	1	1	1	1	4
S101	2	0	1	1	4
S102	2	2	1	1	6
S103	2	2	2	2	8
S104	2	1	1	1	5
S105	2	2	1	1	6
S106	2	2	2	2	8
S107	2	1	2	1	6
S108	2	2	1	1	6
S109	2	2	1	1	6
S110	2	2	2	1	7
S111	2	2	1	1	6
S112	2	2	2	1	7
S113	2	1	2	1	6
S114	2	2	1	1	6
S115	2	2	2	2	8

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