A Service Support for Selection of E-Journal Subscription: An Evidence-Based Practice

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The selection of an e-journal title is one of the challenging tasks for librarians in the process of collection development. As libraries receive a limited budget, librarians need to be careful and carry out thorough analysis based on the evidence-based approaches in selecting which e-journal to be subscribed. One of the different ways to analyse user demand for e-journals is to analyse access denied reports or known as turn-away reports from publishers. This study reports on how a support service was developed to select a new e-journal subscription for the National University of Malaysia (UKM) Library based on the COUNTER Journal Report (JR2). From this report, the number of access denied to full-text articles from four main commercial online databases; Science Direct, Springer Nature, Wiley Online Library, and Taylor & Francis were analysed. The Pareto Principle method was used to analyse e-journal titles that received high demand from library users. Profiling the journal's coverage in Scopus, Web of Science (WoS), and Journal Citation Reports (JCR) as well as mapping their subject and publisher's price was carried out. The results showed that from a total of 7,474 e-journal titles, 1,495 (20%) e-journal titles that received 132,008 (68%) number of access denied were selected for further analysis. This evidence service can help the Journal Unit, UKM Library in a selection of new e-journal titles based on library users' needs and assist the library management to make better decisions for e-journal subscriptions.

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Keywords: E-journal selection; User's need; Access denied; Pareto principle; Evidence-based approach.

INTRODUCTION

Collection development is one of the most important processes in libraries and information centres. It comprises a range of activities related to the policies and procedures of selection, acquisition and evaluation of library collection. According to Evan and Saponaro (2012), collection development is composed of six major elements; community analysis, selection policies, selection, acquisition, de-selection, and evaluation. Collection development covers a wide range of activities that include the development of collection development policy (CDP), tools and aids for selection, weeding out of resources, cooperative collection development, evaluation of library collection, and resource-sharing opportunities (Singh and Mahajan, 2017).

Among the activities in collection development, the selection is the heart of the collection process. Reitz, (2014) defines selection as the process of deciding which materials should be added to a library collection. Selection decisions are usually made based on the reviews and standard collection development tools by librarians. In academic libraries, faculty members are also involved in the selection decision process, particularly in their disciplines. Patrons could also recommend titles to be purchased by the library.

The criteria used by librarians in the selection process include subject coverage, level of specialization, currency, language, format, relevancy, quality of the materials, price, and cost-effectiveness. The selection criteria usually would reflect the library's mission and information needs of users but are also influenced by budgetary constraints and qualitative evaluation in the form of reviews, recommended lists, and other selection tools (Reitz, 2014).

Problem Statement

UKM Library was established simultaneously with the National University of Malaysia (UKM) in 1970 with the mission is committed to being an advanced university library that connects the information network with clients to fulfill the requirements of learning, teaching and research. The UKM Library has more than 3.7 million collections which include printed books & journals, e-journals, e-books, e-theses, and media collections. In 2017, UKM library provided 35,903 e-journal titles through the subscription from 55 databases such as Science Direct, EBSCOhost, Emerald, JSTOR, ProQuest, Sage Journals, Wiley Interscience, and

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others. The number of usages recorded for that year was 421,489 searches and 670,672 full texts downloaded both within and outside campus (UKM Library Yearly Statistic, 2017).

Based on the UKM Library Yearly Report (2017), libraries in UKM spent more than 50% of their annual budget on e-resources subscriptions. They are the most expensive resources and take up much of the library expenditure. As the libraries work within a limited budget, the library management must ensure the expenditure is spent wisely to fulfil users' needs and also provide high-quality e-journal collection for the users. Vasishta (2012) stated that e-journals must be systematically managed to support the key mission of the library and university since these resources require huge financial investments.

The selection of e-journals subscriptions has always been a challenging and time-consuming process for librarians. As pointed out by Kirkwood (2000), the selection process becomes the first obstacle in developing the e-journal collection. The Journal Unit is responsible to manage e-journal subscriptions which involve selection for cancellation or renewal and selection for the new title of the e-journal. For cancellation or renewal, librarians will analyse usage statistics and also analyse the cost per usage as evidence. Meanwhile, for new selections, librarians received a recommendation of e-journal titles from academic members or from publisher catalogues. However, with the budget constraint, the decision on the new selection is very important to ensure the new subscription is based on user demand and meets the user's needs. Therefore, the library needs more evidence and justification in the selection. Since the title is not subscribed by the library yet, the full-text usage reports and cost per user could not be collected to provide evidence for the selection.

Instead of current practices, there is another way to explore the demand of the users by using features of COUNTER JR2 (Access Denied to Full-Text Articles by Month, Journal and Category). Access denied reports identify journal titles that library users had requested through the databases but cannot access the full-text article due to the library not subscribing to the contents. This unsuccessful full-text access is also known as turn-away. However, UKM Library does not use this access denied usage reports for their selection. The lack of using access denied reports, had stimulated this study to fill the gap to utilize this feature as evidence in the selection of e-journal titles. The significance of the data is that it would specifically be based on the library user's needs.

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Therefore, this study aims to provide evidence service to support the selection of new e-journal titles using COUNTER JR2. The focus of this study is to analyse e-journal titles that received high demand usage from the users by investigating the quality of the journals, subject and price. This evidence service may assist the Journal Unit to select new e-journal titles based on the user's need. It can also assist the library management to make better decisions based on complete and comprehensive evidence.

LITERATURE REVIEWS

Kumar, Gaur and Singh (2019) stated that e-journals can change the orientation of research and academics of any institution. In another study, Flora Ifeoma Okogwu and Ekere (2018) mentioned the criterion used by the libraries under their study to evaluate their resources includes cost-effectiveness. While Kaur and Rupesh (2017) stated that it is quite difficult and not easy to select e-resources including e-journals in a library collection. Librarians need to follow some criteria for the selection where e-journals should be acquired according to the university's needs. The criteria include; authenticity-related with accurate facts, appropriateness, scope related to users' satisfaction, access to the resources should be easy and fast, flexibility, selection aid and cost of the resources. In another study, Kirkwood (2000) mentioned e-journals as a new and old challenge to academic librarians. The four primary concerns by this author are; selection, organisation, evaluation and usage of e-journals. He notes that the significant factors involved in the selection of e-journals are quality, relevancy, cost, accessibility, language, consistency, and stability. In addition, three criteria must be considered in evaluating resources namely; relevance, quality, and timeliness of the materials. These criteria must be stated in the collection development policy and used as a guide for the selection (Gessesse, 2000).

Evidence-based Approach on E-journal Selection

Previous studies have shown that evidence-based approaches were used for the selection of e-journal titles (Nash and McElfresh, 2016; Demoville and Wood, 2016; Williamson, Fernandez and Dixon, 2014; Murphy, 2012; Carey, Elfstrand and Hijleh, 2006; Hahn and Faulkner, 2002). The study by Nash and McElfresh (2016) reported an extensible method of evaluating and cancelling e-journals during a budget shortfall in The Health Sciences Library and Informatics Center (HSLIC) used evidence with calculated cost per use for cancellation of e-journal subscriptions. For remaining titles, evidence was gathered from an online survey, Inter Library Loan

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(ILL) requests, and COUNTER JR2 turn-away reports. While the study by Demoville and Wood (2016) showed California Polytechnic State University Robert E. Kennedy Library's project combined COUNTER JR2 Access Denied usage reports, print circulation data, holdings information to identify low print circulation, and in-demand journals for online access. This project allowed the library to convert thousands of turn-away data that were previously not available through the library's electronic collections into successful users' article requests.

The study by Williamson, Fernandez and Dixon (2014) reported that economic downtown in the United States forced many librarians to carry out journal cancellation projects. The availability of supporting evidence such as journal use data, impact factors, and cost information, has increased the efficiency of collecting information about the value of the journals. Murphy (2012) also described how a journal review project applied an evidence-based approach to select and evaluate journals for cancellation or retention. Journal metrics and user evaluations were used in the decision-making process. Based on the data, journals that have equitable coverage, the most used and valued journals will be retained.

Due to budget constraints, the University of Wisconsin-Eau Claire cancelled the journal subscription by reducing approximately 15% ($50,000) of the expenditure. For this journal cancellation project, Carey, Elfstrand and Hijleh (2006) used an evidence-based approach for gaining the faculty member's acceptance. Information about each journal such as price, use data and, price peruse was collected. The study by Hahn and Faulkner (2002) explored the usefulness of e-journal usage statistics. With a tight budget, librarians at the University of Maryland needed to regularly evaluate the current collections and potential purchases to sustain value to meet the library's mission. The literature review shows that evidence-based approaches mostly deal with journal cancellations rather than for selecting new or potential journals. Thus, this research fills the gap as utilized COUNTER JR2 access denied usage reports as evidence in the selection of new e-journal titles.

Pareto Principle as a Selection Method

The Pareto principle originated from Vilfredo Pareto, an economist in Italy. He made a popular observation that 20 percent of the population owned 80 percent of the land in Italy. Pareto principle is known as Pareto distribution or 80/20 rules (Nisonger, 2008). The Pareto theory is based on the idea that roughly 80 percent of the effects come from 20 percent of the causes (Schopfel and Claire,

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2012). The Pareto principle was used as a selection method because this is a statistical technique in decision-making used for the selection of the small proportion of work that produces a large proportion of the results (Britten, 1990).

The Pareto principle can be applied in diverse disciplines including Library and Information Science. It is well accepted and applied in various research works from librarians' perspectives. For instance, in library practices, 20 percent of the journals (frequently downloaded journals) contribute 80 percent of downloads (Zhu and Xiang, 2016). Another study by Emrani, Moradi-Salari and Jamali (2010) explained the analysis of COUNTER-compliant usage report of Elsevier Science Direct journals by Iranian National Consortium for the period of 2004–2009. The results showed that the journal usage followed the Pareto principle. Meanwhile, a study by Schopfel & Claire (2012) studied the subscriptions to e-journals and usage statistics by using the Pareto principle to explore the relationship among the clients and turnover. The findings from the study showed that the usage statistics were partly shaped by Anderson's long tail effect which is the 80/20 rule moved to 80/30 or even more. Therefore, analysis using the Pareto principle in the usage of access denied distribution can show the demand of the users to the journals. The finding can be applied by the librarians to support the decision for acquiring a new e-journal based on the needs of users.

Objective of the Study

This study aims to provide evidence service to support a selection of new e-journal titles to be considered by UKM Library for a subscription. The objective of this study is to provide data analysis to support evidence-based practice for new e-journal titles selection.

METHODOLOGY

This study used a quantitative approach based on secondary sources from COUNTER Code of Practice usage report and Pareto Principle was applied as a selection method to achieve the research objective. Counting Online Usage of NeTworked Electronic Resources (COUNTER) serves librarians, vendors, and others by facilitating the recording and exchanging of online usage statistics that are consistent, credible and compatible (Shepherd, 2012). COUNTER JR2 (Access Denied to Full-Text Articles by Month, Journal and Category) provided by a publisher is one of the usage reports that can be accessed from the COUNTER Code of Practice. This statistic shows the number of users who were not successful to download full-text

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articles because the library did not subscribe to the journal contents. The number of access denied in COUNTER JR2 indicates the demand for these e-journals.

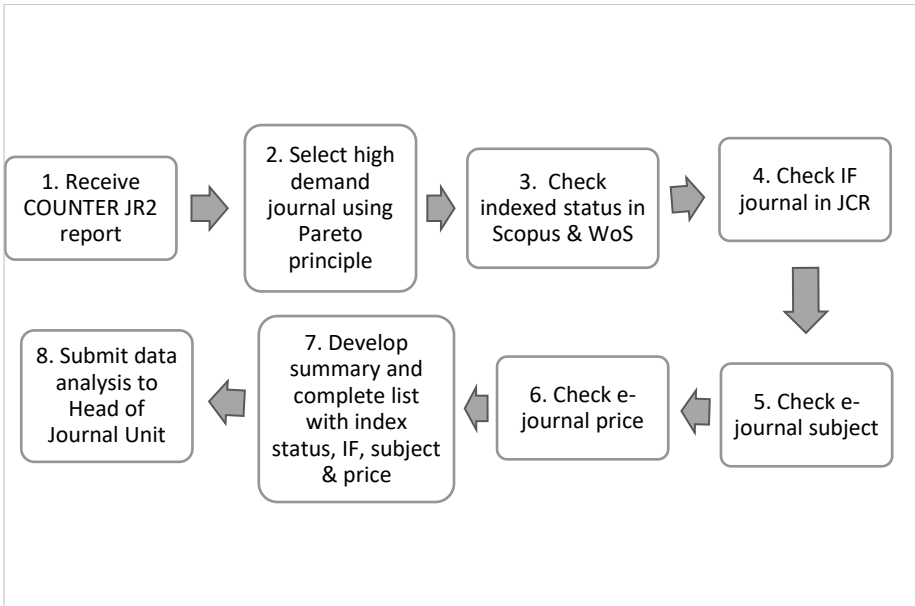

Figure 1. Workflow of the Evidence Service

This study analysed UKM Library COUNTER JR2 from January until December 2017 for Science Direct, Springer Nature, Wiley Online Library and Taylor & Francis databases. These four databases were chosen because these were the main databases subscribed to by library. The above Figure 1 indicates the 8 steps that were carried out in data gathering and analysis using COUNTER JR2 as data evidence service to Journal Unit, UKM library.

1. Serial librarian downloaded COUNTER JR2 (Access Denied to Full-Text Articles by Month, Journal and Category) from January to December 2017 using Science Direct, Springer Nature, Wiley Online Library and Taylor & Francis subscriber account in Microsoft Excel file. This file could also be obtained from the vendor or publisher.
2. The selection criteria for e-journals were based on Pareto Principle or the 80/20 rule. 20% of e-journal titles that received high access denied were chosen from each database with the idea that it represents 80% of a number of accesses were denied. Steps in Pareto Principle were followed. Using Science Direct as an example, the calculation is as follows:

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- Sort e-journal titles from highest to lowest number of access denied
- Calculate the cumulative number of access denied
- Calculate the cumulative percentage
- Calculate 20% of e-journal titles that received higher demand (20/100) x 2553=511
- Plot a line at journal number 511 (x-axis) and run parallel to the cumulative percentage (y-axis).

3. Scopus Journal Titles List from https://www.elsevier.com/solutions/scopus/how-scopus-works/content in a Microsoft Excel file was downloaded and was used to investigate the Scopus indexation. By using a formula in Microsoft Excel file, ISSN of e-journals that received high demand was matched with the ISSN in Scopus Title List. ISSN was used as it is a unique and mandatory character for each journal.
4. Impact factor from Journal Citation Report (JCR) was downloaded in Microsoft Excel file from Clarivate Analytics web and was used to investigate the impact factor and quartile (ranking) of e-journal titles which that received high demand. For this study, the impact factor including the journal's quartile (ranking) version 2017 was used as it was the latest version published in JCR. ISSN of e-journals that received high demand was matched with ISSN in the JCR impact factor list. E-journal titles with impact factor indicated that these titles were indexed in Web of Science (WoS). The remaining e-journal titles that do not have impact factor were searched in WoS databases using ISSN to identify the indexed status.
5. Scopus Journal Titles List from Scopus page in Microsoft Excel file was used again to investigate the subjects for e-journal titles that received high demand. For this study, subjects were identified based on Scopus subjects who had more than 20 sub-subjects under the four main subjects. The ISSN of e-journals that received high demand was matched with ISSN in Scopus Title List to identify the subjects.
6. Journal price list from each publisher was accessed and downloaded to identify the price of the individual journals that received high demand. ISSN or e-journal titles were matched with ISSN or e-journal titles in the journal price list.
7. The master list file and summary of the analysis for e-journal titles that received high demand for each database using a Microsoft Excel file were

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developed. It contained information on Scopus and Web of Science indexation status, impact factor and journal quartile, Scopus subjects and price of the journal.

8. Data analysis on e-journal titles that received high demand from library users were submitted to the Head of Journal Unit and the Head of Information Resource Development Division for subscription evaluation and further consideration.

FINDINGS

The following were results from the analysis of COUNTER JR2 (Access Denied to Full-Text Articles by Month, Journal and Category) from January to December 2017 for Science Direct, Springer Nature, Taylor & Francis and Wiley Online Library databases. The results were based on the objective**.** Below is the list of data analysis that has been used as evidence service to support evidence-based practice for new e-journal titles selection.

a) A Number of E-journal Titles and Access Denied of Four Electronic Databases

Number of e-journal titles and access denied received by Science Direct, Springer Nature, Wiley Online Library, and Taylor & Francis were presented in Table 1. The total number of e-journal titles was 7,474 and the total of access denied was 195,091.

Table 1

Number of E-journal Titles and Access Denied Received

Databases	No. of Journal Title	Percentage (%)	No. of Access Denied	Percentage (%)
Science Direct	2,553	34.2	118,779	60.9
Springer Nature	1,759	23.5	29,086	14.9
Wiley Online Library	1,626	21.8	35,903	18.4
Taylor &Francis	1,536	20.6	11,323	5.8
Total	7,474	100.0	195,091	100.0

Science Direct database had the highest number of e-journal titles that received access denied at 2,553 titles (34.2%), followed by Springer at 1,759 titles (23.5%), Wiley Online Library at 1,626 titles (21.8%) and Taylor & Francis at 1,536 titles (20.6%). For the number of access denied, Science Direct also received the highest at 118,779 accesses denied (60.9%) which is in line with the largest number

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of e-journal titles received by this database. It was followed by Wiley Online Library at 35,903 access denied (18.4%), Springer at 29,086 (14.9%) and Taylor & Francis at 11,323 (5.8%).

b) Selected E-journal Titles that Received Higher Demand According to the Pareto Principle Method

The Pareto Principle (80/20) was used as a method of selecting journal titles with high demand. The results showed that when cumulated, 20% of high demand journals (left side) do not sum up to 80% of the access denied as stated by the Pareto principle. The results were close to Anderson's long tail distribution such as for Science Direct in Figure 2.

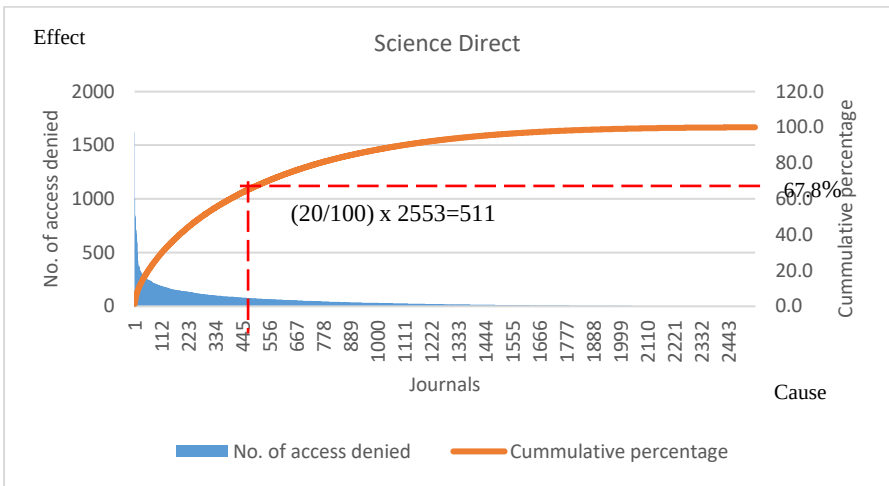

Figure 2. Pareto Graph for Science Direct

The number of 20% of e-journal titles that received the highest and cumulative access denied and cumulative percentage were presented in Table 2. From the total of 7,474 e-journal titles, 1,495 (20%) e-journal titles that received high access denied were selected for further analysis. The total cumulative access denied for 20% of e-journal titles was 132,008 which provided 67.7% of the total access denied percentage.

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Table 2

Twenty Percent of E-journal Titles that Received the Highest Access Denied

Databases	No. of e-Journal Title	No. of Access Denied	20% of the Highest Access Denied Journals	Cumulative Access Denied	Cumulative Percentage (%)
Science Direct	2,553	118,779	511	80,569	67.8
Springer Nature	1,759	29,086	352	20,274	69.7
Wiley Online Library	1,626	35,903	325	24,051	67.0
Taylor &Francis	1,536	11,323	307	7,114	62.8
Total	7,474	195,091	1,495	132,008	67.7

C) Indexed Status for Journal Titles that Received Higher Demand

Scopus Indexed Status

The results of the Scopus indexed status were presented in Table 3. Overall, from 1,495 e-journal titles, 1,483 (99.2%) titles that received high demand were indexed in Scopus and only 12 (0.8%) e-journal titles were not. Analysis for each database showed that 511 (100%) of Science Direct e-journal titles, 349 (99.1%) Springer e-journal titles, 320 (98.5%) Wiley Online Library titles and 303 (98.7%) Taylor & Francis e-journal titles were indexed in Scopus.

Table 3

Scopus Indexed Status

Databases	20% no. of e-journal titles	Scopus Indexed	Percentage (%)	Not Indexed	Percentage (%)
Science Direct	511	511	100.0	0	0.0
Springer Link	352	349	99.1	3	0.9
Wiley Online Library	325	320	98.5	5	1.5
Taylor & Francis	307	303	98.7	4	1.3
Total	1,495	1,483	99.2	12	0.8

Web of Science Indexed Status

The results of the analysis for the status of the Web of Science indexed can be seen in Table 4. Overall, 1,458 (97.5%) e-journal titles that received high demand

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were indexed in Web of Science and 37 (2.5%) e-journal titles were not. Analysis for each database showed that 505 (98.8%) Science Direct e-journal titles, 348 (98.9%) Springer e-journal titles, 319 (98.2%) Wiley Online Library titles and 286 (93.2%) Taylor & Francis e-journal titles were indexed in Web of Science.

Table 4

Web of Science (WoS) Indexed Status

Databases	20% no. of e-journal titles	WoS Indexed	Percentage (%)	Not Indexed	Percentage (%)
Science Direct	511	505	98.8	6	1.2
Springer Link	352	348	98.9	4	1.1
Wiley Online Library	325	319	98.2	6	1.8
Taylor & Francis	307	286	93.2	21	6.8
Total	1,495	1,458	97.5	37	2.5

d) Impact Factor and Quartile Journals For Journal Titles That Received Higher Demand

Journal impact factor

The value of impact factor (IF) and quartile (Q) were based on Journal Citation Report (JCR) from Clarivate Analytics web 2017 (the latest version for JCR). E-journal titles indexed in Web of Science were mapped for their impact factor value. Table 5 shows that from 1,458 e-journal titles indexed in Web of Science, 1,366 (93.7%) titles had impact factor while 92 (6.3%) e-journal titles do not.

Table 5

E-Journal with Impact Factor (IF) Value

Databases	WOS Index (no. of journal)	With IF	Percentage (%)	Without IF	Percentage (%)
Science Direct	505	492	97.4	13	2.6
Springer Nature	348	342	98.3	6	1.7
Wiley Online Library	319	299	93.7	20	6.3
Taylor & Francis	286	233	81.5	53	18.5
Total	1,458	1,366	93.7	92	6.3

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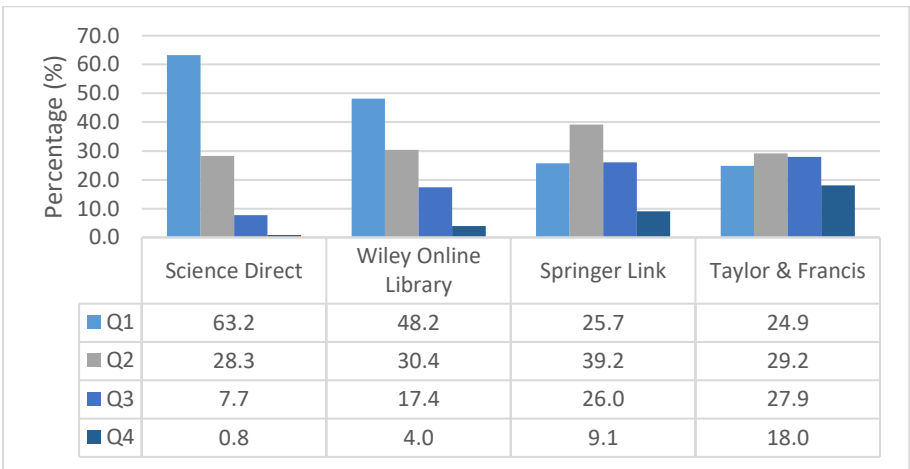
Springer Nature indicated the highest percentage of e-journal titles which had an impact factor (98.3%), followed by Science Direct (97.4%), Wiley Online Library (93.7%), and the lowest percentage by Taylor & Francis (81.5%).

Journal Quartile

From the total of 1,366 e-journal titles with impact factor, 601 (44%) e-journal titles were from Q1 followed by 432 (31.6%) from Q2, 244 (17.9%) from Q3 and 69 (6.5%) from Q4. The results found Science Direct had the highest percentage of e-journal titles with 311 Q1 e-journal titles (63.2%). Databases with the lowest percentage of Q1 were Taylor and Francis with 58 (24.9%) titles. For Q2, Springer Nature showed the highest percentage of e-journal titles 134 (39.2%) and the lowest percentage of Q2 from Science Direct with 139 (28.3%) titles. For Q3, Taylor & Francis showed the highest percentage of Q3 with 65 (27.9%) while Science Direct had only 38 (7.7%) of e-journal titles from Q3. For the Q4 tier, Taylor & Francis showed the highest percentage with 42 (18.0%) and Science Direct showed the lowest percentage with only 4 (0.8%) for Q4. The percentage of e-journal titles by quartile and databases were illustrated in Figure 3.



	Science Direct	Wiley Online Library	Springer Link	Taylor & Francis
Q1	63.2	48.2	25.7	24.9
Q2	28.3	30.4	39.2	29.2
Q3	7.7	17.4	26.0	27.9
Q4	0.8	4.0	9.1	18.0

Figure 3. Percentage of E-Journal Titles by Quartile and Databases

e) Subjects For Journal Titles that Received Higher Demand

Subjects for e-journal titles that had received high demand were analysed based on Scopus's subjects. There were four subjects for the top level and 26 subjects for the second level. The subjects for 1,495 e-journal titles that received

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high demand can be seen in Table 6. From the analysis, an e-journal title may have more than one subject. Results for the top five subjects showed 32.1% of e-journal titles were in Medicine, 20.9% in Social Sciences, 12.4% in Biochemistry, Genetics and Molecular Biology, 11.4% in Engineering and 10.0% of e-journal titles in Agricultural and Biological Sciences.

Analysis for each database showed that for the Science Direct database, e-journal titles that received high demand were in Medicine (31.5%), Engineering (17.0%), Material Science (14.3%), Biochemistry, Genetics and Molecular Biology (13.5%) and Chemistry (11.9%). In the Springer's database, the highest percentage (45.2%) of journal titles were in the subjects of Medicine, followed by Biochemistry, Genetics and Molecular Biology (18.5%), Social Sciences (12.5%), Engineering (11.1%) and Agricultural and Biological Sciences (10.5%). For Wiley databases, e-journal titles which received high demand were in Medicine with the highest percentage (29.5%), followed by e-journals in Social Science subjects (18.5%), Agricultural and Biological Sciences (13.8%), Biochemistry, Genetics and Molecular Biology (11.7%) and Business, Management and Accounting (11.4%). While for Taylor & Francis database, the highest percentage (51.5%) of journal titles which received the highest demand was in the subjects of Social Sciences, followed by Medicine (20.8%), Arts and Humanities (12.7%), 10.7% in Business, Management and Accounting and Environmental Science respectively.

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Table 6
Journal's Subject

No.	Top level	Subject	Science Direct		Springer Nature		Wiley Online Library		Taylor & Francis		Total	
				Percentage (%)		Percentage (%)		Percentage (%)		Percentage (%)		Percentage (%)
1	Health Sciences	Medicine	161	31.5	159	45.2	96	29.5	64	20.8	480	32.1
2	Social Sciences	Social Sciences	51	10.0	44	12.5	60	18.5	157	51.1	312	20.9
3	Life Sciences	Biochemistry, Genetics and Molecular Biology	69	13.5	65	18.5	38	11.7	13	4.2	185	12.4
4	Physical Sciences	Engineering	87	17.0	39	11.1	21	6.5	24	7.8	171	11.4
5	Life Sciences	Agricultural and Biological Sciences	46	9.0	37	10.5	45	13.8	21	6.8	149	10.0
6	Physical Sciences	Materials Science	73	14.3	30	8.5	30	9.2	11	3.6	144	9.6
7	Physical Sciences	Chemistry	61	11.9	33	9.4	31	9.5	15	4.9	140	9.4
8	Physical Sciences	Environmental Science	45	8.8	32	9.1	26	8.0	33	10.7	136	9.1
9	Social Sciences	Business, Management and Accounting	41	8.0	10	2.8	37	11.4	33	10.7	121	8.1
10	Social Sciences	Psychology	33	6.5	20	5.7	35	10.8	30	9.8	118	7.9
11	Physical Sciences	Computer Science	42	8.2	30	8.5	11	3.4	11	3.6	94	6.3
12	Physical Sciences	Physics and Astronomy	52	10.2	20	5.7	9	2.8	7	2.3	88	5.9
13	Physical Sciences	Chemical Engineering	46	9.0	15	4.3	17	5.2	9	2.9	87	5.8
14	Social Sciences	Economics, Econometrics and Finance	29	5.7	6	1.7	21	6.5	19	6.2	75	5.0
15	Life Sciences	Pharmacology, Toxicology and Pharmaceutics	31	6.1	20	5.7	12	3.7	11	3.6	74	4.9
16	Social Sciences	Arts and Humanities	4	0.8	7	2.0	16	4.9	39	12.7	66	4.4
17	Life Sciences	Immunology and Microbiology	19	3.7	20	5.7	8	2.5	4	1.3	51	3.4
18	Physical Sciences	Earth and Planetary Sciences	14	2.7	15	4.3	9	2.8	4	1.3	42	2.8
19	Health Sciences	Health Professions	9	1.8	7	2.0	7	2.2	17	5.5	40	2.7
20	Physical Sciences	Mathematics	12	2.3	10	2.8	7	2.2	8	2.6	37	2.5
21	Life Sciences	Neuroscience	13	2.5	9	2.6	8	2.5	5	1.6	35	2.3
22	Social Sciences	Decision Sciences	14	2.7	3	0.9	6	1.8	11	3.6	34	2.3
23	Physical Sciences	Energy	16	3.1	2	0.6	11	3.4	5	1.6	34	2.3
24	Health Sciences	Nursing	10	2.0	5	1.4	8	2.5	10	3.3	33	2.2
25	Health Sciences	Dentistry	12	2.3	2	0.6	12	3.7	2	0.7	28	1.9
26	Health Sciences	Veterinary	2	0.4	2	0.6	2	0.6	0	0.0	6	0.4

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f) The Price of the Journal Titles that Received Higher Demand

The subscription price for each journal title that received high-demand was checked based on the 2018 price list for an institution in US Dollars. Not all journal prices were available. Prices not available were checked individually via publishers' websites. However, Springer Nature and Science Direct website did not provide price information for the individual titles. Table 7 showed the price for 1,398 (93.5%) e-journal titles were available while the balance 97 (6.5%) e-journal titles of price information cannot be obtained through the list of Microsoft Excel files and publishers' websites. Some of the issues during the process of identifying subscription price for the individual journal are as follows:

- Price is not available for some journals because the price will be based on the overall demand as well as the size and type of the subscribing institution.
- Price is not available due to the journal title no longer being available for purchase from the publishers' webpage or no longer published or distributed by the publisher.

Table 7

The Price Availability of the Journal Titles that Received Higher Demand

Databases Name	Price Available	Percentage (%)	Price not Available	Percentage (%)	Total
Science Direct	495	96.9	16	3.1	511
Wiley Online Journal	311	95.7	14	4.3	325
Springer Link	296	84.1	56	15.9	352
Taylor and Francis	296	96.4	11	3.6	307
Total	1,398	93.5	97	6.5	1,495

DISCUSSION

The results of the analysis can indicate which databases received high demand from users based on the access denied usage report as an evidence-based approach. As mentioned by Evan and Saponaro (2012), community analysis is one of the collections development elements. This result can be used by the library management to make subscription decisions and develop e-journal collection based on the user's demand. By using Pareto Principle as a selection method, the result showed that 20% e-journal titles that received high demand for each database did

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not provide 80%. Although the effects did not contribute to 80% as estimated by the Pareto principle theory, this result was close to Anderson's long tail effect which is similar to the study by Schopfel & Claire (2012). The result can be applied by the serial librarians to support the decision for acquiring new e-journals for a subscription.

Most of the journals that received high demand were indexed in Scopus, Web of Science and have an impact factor. This indicates that users request journals that have quality and a good reputation. The quality of e-journals is one of the significant criteria that should be considered in the selection and evaluation of library collection (Kaur and Rupesh, 2017; Kaur and Walia 2016; Gessesse, 2000). The library needs to consider the selection of these journals for subscription to provide quality resources for their users. From the results, a small percentage of e-journal titles that do not have impact factor are journals that were newly indexed or indexed in the Emerging Sources Citation Index (ESCI) as a subset of Web of Science Core Collection. A Previous study by Williamson, Fernandez and Dixon (2014) and Murphy (2012) also used journal information such as journal impact factors as supporting evidence in the journal selection project. However, the project was focused on journal cancellation rather than using the journal metrics for the selection of new e-journal titles.

Subject or scope related to the library users' satisfaction is one of the criteria in the selection of e-journals and the e-journals should be acquired according to the university's need (Kaur and Rupesh, 2017). From the subject analysis, serials librarians can find out which subject received high demand. So that, they can focus to make selecting new titles based on those subjects or maybe can decide to subscribe based on the subject package. Analysis of the journal's subject is the significance for the library because it also directly indicates the needs of the faculty. It can help the library to allocate a budget for each faculty and subscribe to e-journals according to the faculty's needs.

The price for e-journal titles that received high demand was checked based on the latest price list for institutions downloaded from the publisher's website. The price or cost of the materials is the significant factor involved in e-journal selection (Kaur and Walia, 2016; Kirkwood, 2000). The price information can help the library to decide which journal should be selected for a new subscription. It also can help to make a comparison whether of an individual title or package is worth the allocation received.

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As mentioned before, literature for the evidence-based approach is mostly related to selection for journal cancellation or renewal based on cost and usage statistics. However, this research can support literature by using an evidence-based approach on Counter JR2 accessed denied report for selection new e-journal titles for subscriptions.

CONCLUSION

In conclusion, the service provided to Journal Unit, UKM Library is a service to support evidence-based practices in the selection of new e-journal titles by analysing COUNTER JR2, access denied usage reports in four databases including Science Direct, Springer Nature, Wiley Online Library and Taylor & Francis. This service provided information on e-journal titles that received higher demand based on a number of access denied. Pareto principle or rule 80/20 was used as a method for selection to e-journal titles. This data analysis service looked beyond the quality of e-journal titles by including information on indexation status in Scopus and Web of Science. Moreover, information on impact factor value and quartile according to Journal Citation Report (JCR) was identified to indicate the reputation of the journals. Information on e-journal's subject as well as information on individual price from publisher's price list also provided which all the information can be used as criteria for the selection.

This information can be used by Journal Unit, UKM Library in selecting new e-journals to be considered for a new subscription. It also can help library management to make better decisions based on comprehensive evidence in order to provide high-quality e-journal collection for the users even with a limited budget. Instead of using traditional ways for the selection of new e-journal titles, other libraries also can apply this evidence-based approach using COUNTER JR2 as data sources and the Pareto principle method for selection and decision making for their e-journal collection.

The limitation of this study includes manual calculation based on Microsoft Excel that requires a lot of time and repeated processes. It is recommended to develop a computerized system so that librarians can analyse more access denied usage data and more database titles. Further study also can be done using different journal metrics such as SCImago Journal Ranking. In order to have a periodical, consistent and standard report on highly demanding journals, it is suggested that the library management arrange special training for dedicated librarians and provide comprehensive manual and documentation.

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Appendix

List of Abbreviations and Key Term

Abbreviations and key term	Description
CDP	Collection Development Policy
COUNTER	Counting Online Usage of NeTworked Electronic Resources
COUNTER JR2	Access Denied to Full-Text Articles by Month, Journal and Category
IF	Impact Factor
ILL	Inter Library Loan
JCR	Journal Citation Report
Journal Quartile	Journal quartile is the quotient of a journal's rank in category
UKM	Universiti Kebangsaan Malaysia
WoS	Web of Science

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