



INFORMATION RETRIEVAL SYSTEM EVALUATION: A CASE STUDY AT BADAN PENGAJIAN DAN PENERAPAN TEKNOLOGI (BPPT) LIBRARY

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ABSTRAK: Di era digital saat ini, sistem alat bantu perpustakaan harus dievaluasi untuk mengetahui kepuasan dan efektivitas penggunaannya. Penelitian ini membahas evaluasi sistem temu balik informasi di Perpustakaan Badan Pengkajian dan Penerapan Teknologi (BPPT). Penelitian ini menggunakan pendekatan kualitatif dengan metode deskriptif. Data dikumpulkan melalui observasi, studi dokumen dan analisis audio visual kualitatif. Hasil penelitian menunjukkan bahwa dalam hal cakupan, sistem temu balik informasi telah mampu mencakup dan memproses banyak dan beragam koleksi dari berbagai subjek yang digunakan oleh pengguna perpustakaan. Ingat dan presisi juga tinggi dan hasil pengukuran pada jeda waktu pencarian cepat dan efektif dengan waktu rata-rata 0,48 detik. Tampilan katalog juga memudahkan pengguna perpustakaan untuk menggunakan dan mencari informasi meskipun tampak kaku. Katalog online juga telah dapat membantu mengurangi upaya pengguna perpustakaan yang berlebihan dengan tampilan yang akrab serta beberapa klasifikasi sederhana yang mengelompokkan koleksi ke dalam mata pelajaran tertentu. Studi ini memberikan praktik terbaik tentang penggunaan sistem temu balik informasi di perpustakaan pemerintah yang memiliki keunikan dalam hal jenis koleksi, subjek, koleksi itu sendiri dan pengguna perpustakaan.

Kata kunci: Sistem temu balik informasi; ingat dan presisi, katalog online; Perpustakaan Badan Pengkajian dan Penerapan Teknologi

INFORMATION RETRIEVAL SYSTEM EVALUATION: A CASE STUDY AT BADAN PENGAJIAN DAN PENERAPAN TEKNOLOGI (BPPT) LIBRARY

ABSTRACT: In the digital age, library retrieval system tools must be evaluated to find out the satisfaction and effectiveness of its use. This research discusses information retrieval system evaluation at Badan Pengkajian dan Penerapan Teknologi (BPPT) library. The study used qualitative approach with descriptive method. The data was collected through observation, document study and qualitative audio visual analysis. The results showed that in terms of coverage, its information retrieval tool has been able to cover and process numerous and varied collections from various subjects used by library users. Recall and precision were also high and measurement result on search time lag was fast and effective with resulting average time of 0.48 seconds. Catalog interface made it easy for library users to use and search information even though it seemed rigid. Online catalog has able to help reduce library users excess of effort with familiar display as well as several simple classifications categorizing collections into particular subjects. This study provides best practice on the use of information retrieval system for government libraries, in which its uniqueness in terms of collection types, subject, collection itself and library users.

Keywords: Information retrieval system; recall and precision; online catalogue; Badan Pengkajian dan Penerapan Teknologi library

1. INTRODUCTION

Evaluation is a vital issue in information retrieval system development and application in library. From evaluation, library and management can see the good and bad sides as well as to increase service quality for library users. Information retrieval system is also a basic and vital concept in both library management and discussion on teaching material in Library Science field. This activity includes indexing information source, creating controlled keywords using thesaurus, classification, placement of collection to online catalog. The development of information and communication technology gradually changes retrieval tool paradigm from catalog card to web-based online catalog to reach users' needs effectively and efficiently. Chowdury and Chowdury (2007) stated that through organizing, we generate sequence on items, or arrange items in a system to find and retrieve them when needed without great difficulty.

Badan Pengkajian dan Penerapan Teknologi (BPPT) library or Agency for the Assessment and Application of Technology library was under *Pusat Manajemen Informasi (PMI)* or The Center of Information Management. BPPT library formed to support BPPT internal activity and research focusing on technology. BPPT library used PHP: Hypertext Preprocessor application as a programming language which can be used in creating website and MySQL for its retrieval system application or Online Public Access Catalog (OPAC) can be accessed through <http://digilib.bppt.go.id/opac/> (called *Perpustakaan Digital BPPT*). The library developed its own OPAC in-house. The end-users may use to find collection in the form of book, journal, local content (book, thesis, report, article, proceeding) and audiovisual collections.

Web-based OPAC can be defined as a list of document representation from collections owned by a library (catalog) using database in storing and organizing the data and using web address integrated with main institution (for special library) which can be accessed through online. The benefit of this new catalog type is that it can reach users in a wider scope because it extends the range of time and place, thus users can access the catalog without visiting library and digital contents are available.

BPPT Library needs an information retrieval system as a means to facilitate library users in fulfilling their information needs. To measure the extent of the performance and effectiveness of information retrieval system at BPPT Library, it is necessary to evaluate the system. Information retrieval system evaluation in varied contexts and themes has been conducted in previous researches. One of researches in retrieval tool evaluation is conducted by Somaira Nabi and S. M. Shafi in 2017. This research examined recall and precision evaluation of 5 (five) online catalogs in several universities in India using 30 selected queries related to concept in economics. Another research conducted by Violeta et al. (2013) discussed the effect of retrieval system at *Perpustakaan Daerah Kabupaten Jepara*. In this research, retrieval system being used, namely through Online Public Access Catalog (OPAC) positively influenced collection use at library. Another research by Saufa and Wahyu (2017) studied information retrieval system on KOHA library management application using 6 (six) criteria of information retrieval system from Cleverdon, namely coverage, time lag, recall, precision, form presentation and user effort at Universitas Muhammadiyah Surakarta (UMS) library. The difference in this research is that researchers identify how information retrieval system works and the influence of information retrieval system on library users at BPPT library, as governmental special library focusing on technology using evaluation and study on OPAC web based on 6 (six) criteria of information retrieval system by Cleverdon (1966).

Lancaster (1979) stated that the term recall refers to a measurement in which a particular item is found or the extent of desired collection retrieval occurs. Meanwhile, Chowdury (2004) argued that basic purpose of an information retrieval system is not only to find the relevant item (which in this case is represented by the term recall) but also to set aside irrelevant item. It can be concluded the basic difference of both terms is that recall refers to the ability of the system to find all of the relevant collections (or collection representation in catalog) with request from

library users, meanwhile precision refers to the ability of the system to find very relevant items also to set aside irrelevant items at the same time.

This study did not measure recall scale because searching through library online catalog in search box has to use keywords which are fragments of collection title. This could result in quite high recall scale because generally from 14 (fourteen) query samples, the desired collection which is searched using a fragment of collection title as keyword is generally relevant with keyword/query. The query can be defined as keyword entered by library users in a search engine, search column or online catalog as a means of finding **the** information they needed, for example, query '*teknologi penerbangan Indonesia*' or aviation technology in Indonesia, to search for technology being used and the latest one of Indonesian aviation. Therefore, in relation to this phenomenon, researchers are interested to see the relation between this phenomenon with its precision rate by measuring the precision scale using selected queries. In addition, researchers also evaluate information retrieval system at BPPT Library using 6 (six) other criteria identified by Cleverdon (1966) consisting of Coverage, Time lag, Recall, Precision, Form presentation, and user effort. This research aims to figure out the extent of information retrieval system function and its influence on library users' performance at BPPT.

2. PREVIOUS FINDINGS

According to Sulisty-Basuki (1992), information retrieval itself is an activity aiming to provide or supply information for users as an answer for a request or based on users' needs. Baeza-Yates, Ribeiro, & Berthier (2011) stated that information retrieval is an area of computer science which basically focuses on providing ease of access for users to information they want, such as those related to representation, storage, access and information source organization such as documents, web pages, online catalogs, structured and semi-structured records and multimedia objects.

According to Taylor (2004), basic tool in information retrieval is bibliography which includes pathfinder, catalog (OPAC), index, finding aids, registers (main control tool for collection in the museum), search engine and directory. OPAC web or web-based OPAC (WebPAC) in Harold's Librarian Glossary and Reference Book (2000: 771) is defined as: "A library OPAC made available to users via a web browser. WebPAC is the catalog of library or information center made available to users online and generally providing a variety of additional facilities such as loans information, online reservations, and library news."

The main function of information retrieval system according to Lancaster (1979) and Kent (1971) are as the following:

- a) To identify information source relevant with interest of user target
- b) To analyze content from information source (document)
- c) To display content of source having been analyzed using a method in accordance with query match inputted by user
- d) To analyze user query and display it in a form suitable with database
- e) To match relevant search statement, and
- f) To make a necessary adjustment in the system based on response from user.

Evaluation activity can be useful for the sustainability of an organization. Through evaluation, an organization can find out the advantages and disadvantages of a program for organization sustainability. Lancaster (1979) stated that we can evaluate an information retrieval system by considering three issues as the following:

- a) How well a system achieves its goal, which one, how well a system satisfies users' requests
- b) How efficient a system in achieving its goal, and
- c) Does the system justify its existence?

In evaluating information retrieval system, there are special criteria to measure system performance. In 1966, Cleverdon identified 6 (six) criteria to evaluate an information retrieval

system; 1) coverage, 2) time lag, 3) recall, 4) precision, 5) form presentation and 6) user effort, as explained below.

1) Coverage

Coverage can be defined as the scope of an information retrieval system for relevant content owned by a library. Coverage can be observed from information completeness, accuracy and information suitability and the presentation provided by information search tool (Saufa dan Wahyu, 2017). Coverage can be an important key in information search activity because this is the first impression of library service.

2) Time lag

Time lag can be an important issue in information search. Time lag is average time pause required by a system in processing a query into data representation which can be used by library users to obtain information. This time lag can be the measurement of a retrieval system quality although it is a less dominant factor if compared with coverage, recall, and precision. Time lag can be affected by varied factors, such as internet network quality at a particular time and collection scope for a given query.

3) Form presentation

Form presentation can be defined as the forefront display of Web-OPAC as retrieval tool helping library users to obtain the desired information. This display can be a factor influencing information retrieval system quality and information search. A good form presentation can include tools simplicity of the tools used and not convoluted in connecting library users with the collection they want. In addition, help feature provided as well as feature options can be important factors in the forefront display of an information retrieval system. The display can also be made interesting and flexible as well as it is important to create bibliography display and collection clearly and complete.

4) User effort

User effort is a concept in which how intensive a user's effort in accessing and using library Web-OPAC. This concept is related to the previous concept -form presentation- because it can be related to help feature and forefront display as well as link used. A retrieval system can be considered working well when library users can use it easily. The ease is not only felt by a user who is accustomed in using the internet but also a user who is yet accustomed in using the internet (Saufa dan Wahyu, 2017).

5) Recall and precision

Lancaster (1979) stated that the term recall refers to a measurement in which a particular item is found or the extent of desired collection retrieval occurs. Meanwhile, Chowdury (2004) argued that basic purpose of an information retrieval system is not only to find the relevant item (which in this case is represented by the term recall) but also to set aside irrelevant item. It can be concluded that basic difference of both terms is that recall refers to the ability of the system to find all relevant collections (or collection representation in catalog) with request from library users, meanwhile precision refers to the ability of the system to find very relevant item with request from library users by setting aside irrelevant item.

Researchers used general formulation in measuring precision stated by Chowdury (2004) in his book *Introduction to Modern Information Retrieval*, as follows:

$$\text{Precision} = (\text{Number of relevant items retrieved} : \text{Total number of items retrieved}) * 100$$

In measuring precision, the amount of found relevant item is represented as a (hits). In the measurement of precision, the amount of relevant item (a) is divided by the amount of a with the amount of irrelevant item, represented with b (noise). Besides that, Lancaster (1979) suggested a 2x2 matrix to represent the concept above.

Table 1. Lancaster's 2x2 matrix on recall and precision scale measurement

	Relevant	Irrelevant	Total
Retrieved	a (hits)	b (noise)	a+b
Not retrieved	c (misses)	d (rejected)	c+d
Total	a+c	b+d	a+b+c+d

(The amount of relevant item, because of one thing and another cannot be found by the system, represented with c (misses). Meanwhile, d represents the amount of document which is not found by the system because it is not relevant with a given query). Based on matrix above, Chowdury (2004) stated that precision ratio in this case can be measured with:

$$P = [a/(a+b)] \times 100$$

3. RESEARCH METHODOLOGY

This research used the qualitative approach with descriptive method. According to Gorman and Clayton (2005), qualitative research is an investigation process which takes data from context of an event in the effort to describe the event, to determine the process in which the event takes place and perspective from the parties involved in the event using induction in obtaining possible explanation from the observed phenomenon. The study uses general formulation of precision measurement proposed by Chowdury (2004) in his book *Introduction to Modern Information Retrieval* as well as 2x2 matrix by Lancaster (1979) related to this measurement to ease the process.

The data was collected through observation, qualitative audiovisual analysis, interview and document study. Creswell (2016) expressed that qualitative audiovisual material could be in the form of a photograph, videotape, art object, computer software, audio recording, and film. The researcher analyzed information retrieval tool performance using self-developed software, Web-based OPAC facilities based on 6 (six) evaluation criteria by Cleverdon, including measurement of Recall and Precision ratio figure. By using recall and precision scale on information retrieval tool, it is expected that it provides description on service quality provided by the system. Observation, document study, and audiovisual analysis were used to obtain data for information retrieval system evaluation at BPPT Library, meanwhile, an interview was used to obtain additional data about the influence of information retrieval system on library users. In system evaluation, the researcher used 6 (six) information retrieval system evaluation criteria identified by Cleverdon in 1966, namely 1) coverage, 2) time lag, 3) recall, 4) precision, 5) form presentation, and 6) user effort. Data was then analyzed, presented and to be described in the conclusion.

4. RESULTS AND FINDINGS ANALYSIS

Based on Decree of BPPT Director Number 170/Kp/KA/BPPT/IV/2006, BPPT Library was under Center of Data, Information and Standardization whose task was to perform library management as well as to function as:

- a) Library material acquisition and cataloging as deposit center of research, assessment and engineering results
- b) Development of information system and library automation and
- c) Library material presentation and library service performance

In the beginning of 2016, BPPT Library was under Centre of Information Management. As a special library, based on Act No. 43 Year 2007, special library provides library materials in accordance with library users' need. Therefore, information retrieval system is important for BPPT Library because numerous BPPT collections require a well collection management, categorization, and cataloging from the acquisition process until they are presented and used by library users.

BPPT Library provided OPAC (Online Public Access Catalog) to ease library users in searching collection. BPPT Library's OPAC could be accessed online through <http://digilib.bppt.go.id/opac/>. It was in-house developed using PHP application: Hypertext

Preprocessor as programming language which can be used in creating website and MySQL for retrieval system application on OPAC Web which they used.

To find out how effective and the performance of its information retrieval system, it is necessary to conduct an evaluation. This evaluation can be the best way to get feedback for improvement steps in the future. The study used 6 (six) information retrieval system evaluation criteria. In addition, researchers also interviewed 3 (three) informants who have engaged with its BPPT information retrieval system.

a) Coverage

Coverage can be observed from information completeness, accuracy and information suitability and the presentation provided by information search tool (Saufa dan Wahyu, 2017). BPPT Library was able to cover many and varied collection types on the related subject in the collection database to be utilized by users. This was also supported with clear classification using classification scheme National Technical Information Services (NTIS) and complete collection bibliography entry up to abstract. In addition, users were given various choices of other references which can be used through the menu available in its online catalog. BPPT Library information retrieval system has been able to provide complete, varied and functional information but still required some more attention and improvement in several aspects, such as adding simple classification on the left navigation as to ease users in selecting information based on chosen subjects, improvement in input and cataloging system related to collection availability in accordance with catalogue and collection bibliographic data, creating search feature not limited to collection title, and improvement in its OPAC information retrieval tool application.



Figure 1. BPPT Library Online Catalogue Interface (<http://digilib.bppt.go.id/opac/>)

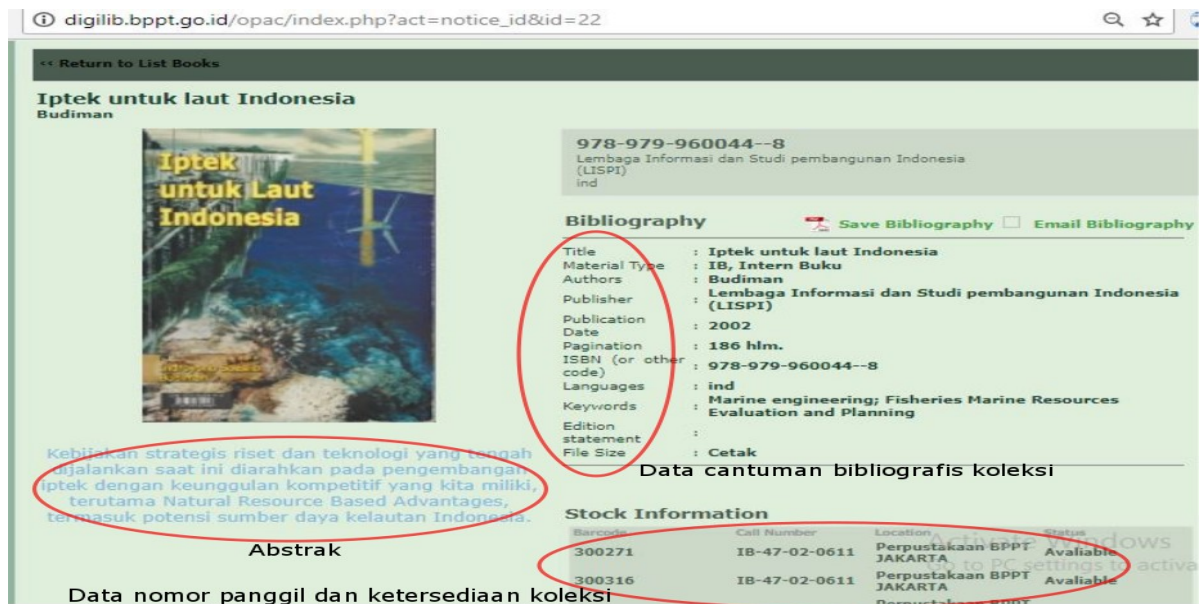


Figure 2. BPPT Library Online Catalogue Search Result

(<http://digilib.bppt.go.id/opac/>)

b) Recall and Precision

BPPT Library uses the main heading system, in which the use of keyword in a search should be a fragment of collection title as to be retrieved and affected information retrieval system. Recall of BPPT online catalog could find information based on a keyword with high enough scale based on observation using 14 (fourteen) selected queries.

Through this search system (keyword and title), the online catalog could find relevant collections rather well because from 14 (fourteen) query samples searched into the system, the desired collection which is searched using a fragment of collection title as keyword is generally relevant with keyword/query.

Based on research result on 14 (fourteen) selected queries, precision scale measurement was described in the table below:

Table 2. Precision Scale Measurement Result

No	Keyword	A	Found	b	$Precision = \frac{a}{(a+b)} \times 100$	Status
1	Communication	57	72	15	0,79	High Precision/effective High Precision/effective
2	Physics	59	66	7	0,89	Precision tinggi/efektif
3	Math	0	13	13	0	Low Precision/ineffective
4	Submarine	3	3	0	1	High Precision/effective
5	Sugar Industry	23	25	2	0,92	High Precision/effective
6	Post-Harvest Technology	45	45	0	1	High Precision/effective
7	Innovation	16	17	1	0,94	High Precision/effective
8	Industrial Policy	3	3	0	1	High Precision/effective
9	Food Technology Functional Position	5	5	0	1	High Precision/effective
10	Holder Data	4	4	0	1	High Precision/effective
11	Technology Roles	14	14	0	1	High Precision/effective

12	Waste Management Pollution (environment)	Water 41	43	2	0,95	High Precision/effective
13	Pollution Control (environment)	11	11	0	1	High Precision/effective
14		21	22	1	0,95	High Precision/effective
Average					0.875	High Precision/effective

Based on the table above, precision average measurement on 14 (fourteen) selected query samples was in high and effective category, except for math query, in accordance with 2x2 matrix by Lancaster (1979). This has occurred because keyword inputted by users into online catalog had to be a fragment of collection title so as to be retrieved. Meanwhile, 'math' keyword in the title was not like the others (13 queries) because the existence of the word 'math' in title did not mean that the collection was about math. Examples of collection titles included 'pembuatan model secara matematika', 'validasi model secara eksperimen untuk sebuah Bead String Reactor', 'Model matematika batere (laporan intern)', and 'tinjauan metoda elemen hingga linier dari segi matematika'. As the precision concept, library should add search feature through subject and other headings thus it would not depend only on the title itself. This can open more choices for users, find more relevant information and open the way for relevant information which can not be found through the main heading system as what happened to 'math' query search. In addition, high precision findings also indicated that BPPT Library information retrieval system was well functioned in accordance with its main function as information retrieval system according to Lancaster (1979) and Kent (1971) concerning recall and precision.

c) Time Lag

Time lag is average time pause required by a system in processing a query into data representation which can be used by library users to obtain information. Evaluation on timelag can be one of quality measurements of a retrieval system. Time lag data is obtained with the help of one of BPPT staff in Serpong responsible for BPPT Library online catalogue system management. This data could only be obtained from inside the system. This data was obtained by creating private website in BPPT Library internal network. From the process, time lag result for 14 (fourteen) selected queries was described in the following table.

Table 3. Time Lag Result Measurement

No.	Selected queries	Time lag
1	Communication	Approximately 238 results (0.67 seconds)
2	Physics	Approximately 193 results (0.52 seconds)
3	Math	Approximately 85 results (0.59 seconds)
4	Submarine	Approximately 45 results (0.54 seconds)
5	Sugar Industry	Approximately 101 results (0.14 seconds)
6	Post-Harvest	Approximately 69 results (0.55 seconds)
7	Technology Innovation	Approximately 249 results (0.61 seconds)
8	Industrial Policy	Approximately 385 results (0.16 seconds)
9	Food Technology	Approximately 393 results (0.63 seconds)
10	Functional Position Holder Data	Approximately 5 results (0.5 seconds)
11	Technology Roles	Approximately 351 results (0.66 seconds)
12	Waste Water Management	Approximately 866 results (0.27 seconds)
13	Pollution (environment)	Approximately 158 results (0.12 seconds)
14	Pollution Control (environment)	Approximately 39 results (0.71 seconds)
Average		0.48 seconds

Based on table above, time lag of 14 (fourteen) selected queries was fast and effective because search time lag did not reach 1 (one) second. Data concerning searched information

could be displayed within short time thus that making information retrieval process faster as well. This can be seen from time lag average of 14 (fourteen) selected queries, 0.48 seconds. Based on the analysis, the number of findings of a particular query did not influence time lag of given query. This can be seen from query example 'sugar industry' and 'pollution control' in the table above. 'sugar industry' had approximately 101 results with time lag 0.14 seconds to find those results, meanwhile 'pollution control' had approximately 39 results but with a longer time lag, 0.71 seconds. Query with numerous amount of information retrievals did not mean that time lag to find the collection data required longer time and vice versa. It can be concluded that time lag measurement and results were categorized fine and fast, thus it was able to increase information retrieval quality.

d) Form Presentation

BPPT Library online catalog display could easily be utilized by library users to find document representation or the document itself (digital). Simple function use of online catalog was understood, even those who never experienced BPPT Library online catalog. This can ease library users in searching for information fast and effectively. However, from the display aspect, BPPT Library OPAC was rather rigid and less modern. In addition, its display of bibliographic entry still had many shortcomings on collection information availability, especially its collection call number and match between collection availability on bookshelves.

e) User Effort

Based on research in user efforts to understanding and using BPPT Library OPAC, this catalog could help library users in searching and helping reduce library users excess of effort. This was supported by features location and function which were made simple and familiar at the forefront display. In addition, its online catalog also provided advance search feature so that library users might search through provided options. In the left navigation, there were several classifications related to technology as a shortcut for library users to choose particular subjects. However, library should add other subjects in those classifications because there were only 4 (four) technology classifications.

Besides, the prominent issue of information retrieval system at BPPT Library was the search result display in the form of bibliography entry and collection availability related to data input steps in cataloging division could affect search result, level of ease and library users satisfaction in utilizing the system.

f) The Influence of Information Retrieval System to BPPT Library Users

Data was obtained by viewing varied aspects based on library users' experiences, such as general experience in using online catalog, ease of use, recall and precision concept, collection, display, online catalog influence on library users, online catalog system feature, etc. It was collected by interviewing three library users from varied backgrounds, retired lecturers, BPPT Centre of Information Technology and Communication staff and students who were working on their final assignment.

In fact, it was yet ideal for library and library users, i.e. online catalog system is used as a priority and main choice in searching for information. From three informants, only one gave a positive answer related to the influence of the information retrieval system on library users. This informant tended to search for many information sources to increase his knowledge, especially in social, political and economics subject. In his opinion, the library helped him in achieving his goal and the library books were adequate. An informant working in BPPT admitted that he has never used online catalog and preferred to choose the Google search engine in fulfilling his information needs, meanwhile, another informant once used online catalog to search information, but the result was less than he expected because he did not find physical collection based on the data he found on the catalog. This can be interpreted that online catalog system was yet influential on its users because much internal staff still tended to use international journal directly from Google.

In order to give better service, it is necessary to pay more attention to varied issues related to information retrieval system. Based on the interview, BPPT library's OPAC:

- needs to add link feature of related collection when opening search result display of a collection, thus library users can obtain more references related to the subject they search.
- needs to perform socialization of its OPAC to working units and library users.
- increases the implementation of its OPAC, such as BPPT Knowledge Management System so as to accommodate all journals published by BPPT to be used as research materials or reference in working, although the author of the journal is already retired. This can ease library users in obtaining information without any difficulties of contacting the author directly.
- in terms of display, it should be renewed to be more flexible, modern and still able to bear BPPT identity as parent institution without lessening utility from its functional aspect as an information retrieval system.
- weeding is necessary to match data on catalogue with physical collections on the library shelves, create a more neat system and increase library service quality.
- needs to add more collections and the latest collections related to varied subjects both on technology and other than technology.

Based on research, it can be concluded that BPPT Library could fulfill its basic function in helping library users to find information through its OPAC. Online catalog was also easy to use and could cover many collections with complete bibliographic entry data as well as other BPPT reference features which can be used by library users. However, there are several important points mentioned above to be considered so as to increase service quality and its influence on library users.

5. CONCLUSION

The study used 6 (six) evaluation criteria by Cleverdon and influence of information retrieval system on library users. In the context of coverage, information retrieval system was able to cover and process many and varied collections from varied subjects used by library users. The system was also able to display search result quite complete with abstract as document representation in online catalog display. Generally, the OPAC has provided and processed information extensively, accordingly, completely, but it requires attention and improvement on varied aspects in terms of simple classification on the left part of online catalog, improvement in input and cataloging system related to collection availability in accordance with catalog and collection bibliographic data, creating search feature not limited to collection title and improvement in information retrieval tool application development.

Recall and precision scale of library online catalog system was quite high. Search time lag measurement result of library online catalog was fast and effective with time average of 0.48 seconds. OPAC display was simple and emphasized to be more functional. However, it made it rigid and less modern as well as there were many shortcomings in terms of collection information availability, especially call number information and collection availability match on catalog and shelves.

From user effort aspect, online catalog has helped reducing library users excess of effort in utilizing catalog with familiar features and display as well as simple classification categorizing collections into particular subjects. However, these subjects need to be extended to not only 4 (four) available subjects and catalog prominent issue of collection availability information match between catalog and shelves as well as search result information completeness could put library users into difficulties in utilizing online catalog service. In addition, the library needs to add 'help' feature or feature which can help library users on online catalog when facing trouble, thus they can receive an answer as soon as possible. The library should also increase its service by adding link feature of related collection when opening search result display of a collection, thus library users can obtain more references related to the subject they search.

From other aspects, it is found that many users still tended to use other information sources instead of BPPT Library OPAC, such as Google and international journal, there was even an informant who has yet used this online catalog.

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