

# Faceted Knowledge Organization Approach in Online Public Access Catalogue (OPAC) for Searching and Navigation: A Case Study

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*In addition to the traditional library information retrieval (IR) practices, the modern library has implemented federated search, web discovery, next-generation cataloguing, and other new tools for effective organization and discovery. Facet navigation (facet search, facet navigation, or guided navigation) is applied to many e-commerce sites and dominates the interface paradigm features. The faceted approach to knowledge organization in search and navigation functions of online catalogues helps users find their necessary information effectively and most conveniently. The application of faceted searching and navigation in library OPAC is discussed in this paper. This study aims to present an overview of OPAC's faceted techniques, which play a crucial role in information retrieval. This paper investigates the system or software used to develop the online catalogue and its status in terms of the faceted knowledge organization approach by the top engineering college libraries in Odisha ranked by NIRF. Identifying nine OPACs for this study found that ninety percent of the OPACs are faceted, and fifty percent of the library prefers Koha ILS. This paper also studied OPAC facet sequence and facet type and discussed how the facet theory is still applied to the OPAC.*

## **Introduction**

Knowledge and information organization are the most important, and better-organized knowledge makes it easier to find specific and accurate information (Rowley & Hartley, 2017). The library is involved in describing and organizing knowledge-based documents. These knowledge resources are often called information resources, and the Knowledge Resource Organization (KO), also known as the Information Organization, is often referred to as the Knowledge Organization (KO) (Anderson, 2003). An effective knowledge organization is always essential as the number of resources increases exponentially. Catalogues are lists of documents or resources in collections that can be discovered and accessed. Libraries in the digital era provide diverse information dissemination points such as online public access catalogue (OPAC), subject indexes, directories, and other search engines to explore library collections. The OPAC is a key information system for discovering and searching from library user interfaces where users can get the information or documents they want. The OPAC provides some advantages as a sophisticated tool and technology that leads users to discover information (Chase et al., 2008). OPAC has revolutionized library services by providing information access points in multiple dimensions, multidimensionality, speed, and advanced search facilities (Madhusudhan & Aggarwal, 2011).

Knowledge Organizations (KOs) refer to the organization and management of materials for collecting and using information (Hodge, 2000). Facets are an essential tool for the organization and navigation of websites, and facet interfaces help users achieve their goals. In the knowledge organization process, the faceted approach can apply to search and navigation to the digital environment of the user interface (Tunkelang, 2009a), which provides an effective system for search options (Stock, 2013). This faceted approach can also use in searching and navigating the library's OPAC to find organized information. This assesses the status of the OPAC and incorporate a faceted knowledge organization approach for searching and navigating academic libraries.

## **2. Background**

In the late 1960s and early 1970s, computer-based catalogue systems were developed to replace and extend card catalogue functions. The standard electronic catalogue of the Library of Congress system first appeared in 1970 and was centralized by the University Library Centre of Ohio (OCLC). The online catalogue provided by the University of Ohio Libraries in 1975 is one of the major projects. In the 1980s, online catalogues were specially designed to be used by the general public and integrated with local library systems and software. The development phase of online catalogues is usually described as a generation. The first generation of OPAC is available in the library's dedicated computer terminal, and the function of the card catalogue was replaced by pre-coordinated search access to authors, titles, classification numbers, or subjects. The OPACs of this generation have been used as tools for finding known articles. In the 1980s, library management systems expanded to OPAC's second generation. Search, and navigation improve the ability to search keywords with a post-coordinated search using Boolean logic. It includes other options, such as wild card systems, location specifications, or nearby search terms. OPAC of this generation focused on identifying known object searches, with the ability to perform complex searches to identify works related to the same subject. In the early 1990s, OPAC developed the third generation. New features have been added, such as the description of natural language searches and incorporation of graphical user interfaces. Using Z39.50 protocols, users can search for each library's collection using search and extraction tools and simultaneously search collections of other libraries (Wells, 2020).

In the mid-2000s, OPAC's design was influenced by a more user-friendly and complete web browser, increasing library search interface capabilities and developing a "next-generation catalogue." The sophisticated search technology distinguishes this generation's library catalogues from the previous OPACs (Breeding, 2007). The discovery tool is also called independent OPAC or the next-generation catalogue (Yang & Wagner, 2010). The implementation of discovery tools can be easier than updating existing OPAC (Yang & Hofmann, 2011). A research study supported by Koha ILS shows that OPAC is approaching the next-generation catalogue, which has the following six essential features: state-of-the-art web interface, enriched content, faceted navigation, keyword search, user contribution, and RSS feed (Yang & Wagner, 2010).

Search and navigation are two crucial functions of the information system. Searching expresses user information requirements in a system-compliant query and retrieves the system's results (Niu, 2014). If the information needed is not explicit, it isn't easy to formulate a query, and browsing can help you find the information you need (Naik & Rao, 2011). Navigation activities include scanning information elements, excluding irrelevant elements, and selecting relevant elements (Niu, 2014). Search coordinates query terms, and navigation helps you find the content you want and determine its relevance. Search is a method for finding known elements in queries, and browsing helps explain search. Some of the essential browsing and searching features in an information system are as follows (Naik & Rao, 2011):

<b>Browsing features</b>	<b>Searching features</b>
Browsing by author/creator/contributor	Simple/basic search
Browsing by the title of documents/ articles/ book	Advanced search
Browsing by date/publication date/year	Boolean search
Browsing by document type/ collection/ communities	Full-text search
Browsing by subject/subject heading/ classification	Phrase/wildcard/proximity searching

### 3. Facet Theory

Dr. S R Ranganathan coined the term facet to describe the multidimensional properties of the documents, and the Personality, Matter, Energy, Space, and Time (PMEST) are its five basic categories. Many literary works define facets differently, such as attributes, metadata, facet terms, value, and category (Wei et al., 2013). Hearst (2006) defined facet as "a set of important labels organized to reflect domain-related concepts." Faceted taxonomy is a group or class of facets describing facets, such as "types", "subjects", "titles", "publications", "languages". (Wei et al., 2013). The faceted classification was defined by Vickery (1961) as "a schedule of standard terms to be used in document subject description and notation assignment." The role of the faceted approach in the web was first noted in 1989 as a faceted approach to hypertext. In theory, D. J. Fosket proposed using facet approaches in information retrieval systems (Anila, 2015). In the early 2000s, the Facets and Facet theory became more and more attractive to web designers, information architects, and knowledge management professionals assigned to design websites and access the company's knowledge base (La Barre, 2007).

#### 3.1 Faceted Search and Navigation

The facet approach can be applied to the faceted search and navigation user interface (Tunkelang, 2009b). Faceted search and navigation are a method for using facet theory to search interfaces. It combines free, unstructured text search and facet navigation (Niu, 2014). Facet searches are pre-coordinated, and users can select facets to filter or refine the results. The narrowing option allows users to search more easily and precisely, although they do not know the syntax necessary for an accurate search (Vora, 2009). Faceted search (also known as faceted navigation) is a paradigm of interactive and progressive search refinement. Faceted search is based on facet taxonomy, allowing searchers to select facet and facet terms multiple times

and narrow search results (Wei et al., 2013). It refers to the search process of information using an integrated search and navigation system, i.e., by formulating queries and navigation.

Faceted navigation combines guided navigation and explanation searches to allow users to formulate queries by selecting pre-defined facets. It simplifies user queries from unknown to known items. The interactive navigation also allows users to gradually develop questions to see how each option in one aspect affects the options available in other factors. It offers a progressive refinement or improvement of questions and complex attributes in the search and navigation interface. This semi-structured method integrates a non-structured text with a facet-classification system's structured attribute (metadata) (Tunkelang, 2009b). Facets are created in the website interface based on features such as popularity, coverage, and utility (Tunkelang, 2020).

#### 4. Faceted Search and Navigation in Online Public Access Catalogue (OPAC)

The faceted search and navigation approach has been increasingly popular among users to find the item of interest on commercial websites for many years (Breeding, 2007). In early 2006, the library adopted a faceted approach to search and navigation and gained popularity. This faceted approach to the OPAC has been adopted by ILS suppliers and software developers such as AquaBrowser, Primo, Smart Library System, Endeca, Encore, and others, and the OPAC user interface has also been built and created in an open-source environment by ILS such as Evergreen, Koha, and VuFind (Niu, 2014). As shown in Figs. 1 and 2, Koha's search engine supports faceted searches, and logical operators can be built on the advanced search page.



Figure 1: Koha faceted search interface embedded with another interface

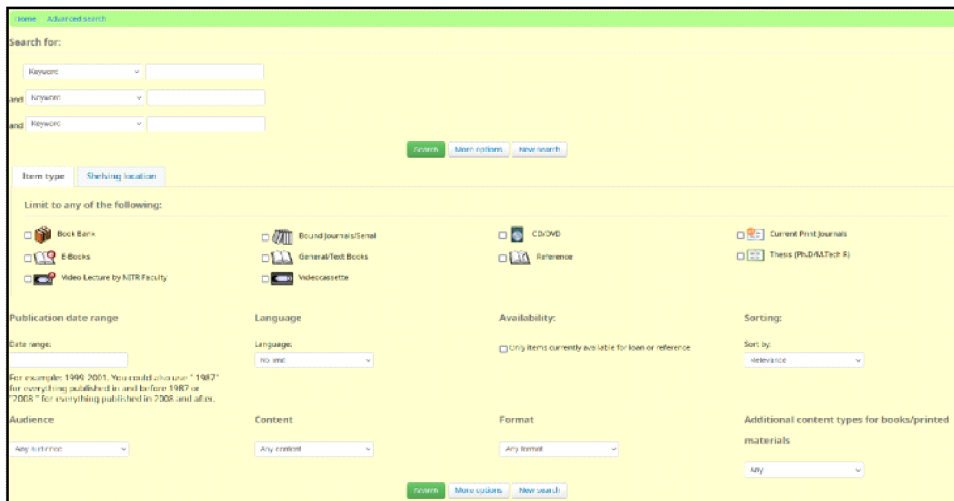


Figure 2: OPAC of Central Library NIT Rourkela

The term “facet” in OPAC does not refer to traditional faceted classification theory. However, it is similar to applying the classification principles in a simplified manner by using the classified bibliographic entities, as clustering methods are used in a commercial website. The source of the attributes in the bibliographic information system is a structure catalogue record such as MARC 21 or Dublin Core to create the flat taxonomical attribute. Facets, like commercial websites, are based on popularity, coverage, and utility; however, in OPAC, facet selection is based on the user’s subsequent choices in searching for information (Nahotko, 2021). The facet-based OPAC has a variety of facet types for bibliographical items with the same or similar or different names, but the same or similar content; some of the most popular are Authorship (Author) (Personal Author) (Corporate Author); Location (Library/Institution) (Collection/Shelf) (Mix); Genre/Literary Form; Availability; Geographical Subjects (Named Places); Audience; Accessibility; Series; Call Number Groups; Temporal Subjects; Tag; Literary Form/Genre. The array of sub-facets in the main facets sequence is alphabetical, in order of magnitude, and chronological or combined (Hall, 2011).

Keyword phrase	Title
Subject	Title phrase
Subject phrase	Series title
Subject and broader terms	Call number
Subject and narrower terms	Author
Subject and related terms	Author phrase
Title	Corporate name
Title phrase	Conference name
Series title	Conference name phrase
Call number	Personal name
Author	Personal name phrase
Author phrase	Notes/Comments
Corporate name	Curriculum
Conference name	Publisher
Conference name phrase	Publisher location
Personal name	Standard number
Personal name phrase	ISBN
Notes/Comments	ISSN
Curriculum	Barcode
	Accession No.

**Figure 3: Bibliographic Facets**

## 5. Objectives of the Study

This study aims to identify facet-based OPACs and understand the knowledge organization approach in facet-based OPACs. This study primarily aims to discourse the following in the context of academic libraries of Odisha, focusing on the top-ranked engineering colleges.

- ❖ To identify the faceted OPAC and the system or software used;
- ❖ To evaluate the search and navigation approach of the online catalogue;
- ❖ To examine the facet type, metadata, facet sequence, and navigational interactivity.

## 6. Methodology

**Sample:** This study surveyed the top-ranked engineering colleges in Odisha, which were ranked by the National Institutional Ranking Framework (NIRF), Ministry of Education, GOI for the year 2021 (<https://www.nirfindia.org/2021/EngineeringRanking.html>). The list of nine institutions was obtained after refining from the “India Rankings 2021: Engineering” segment for Odisha state.

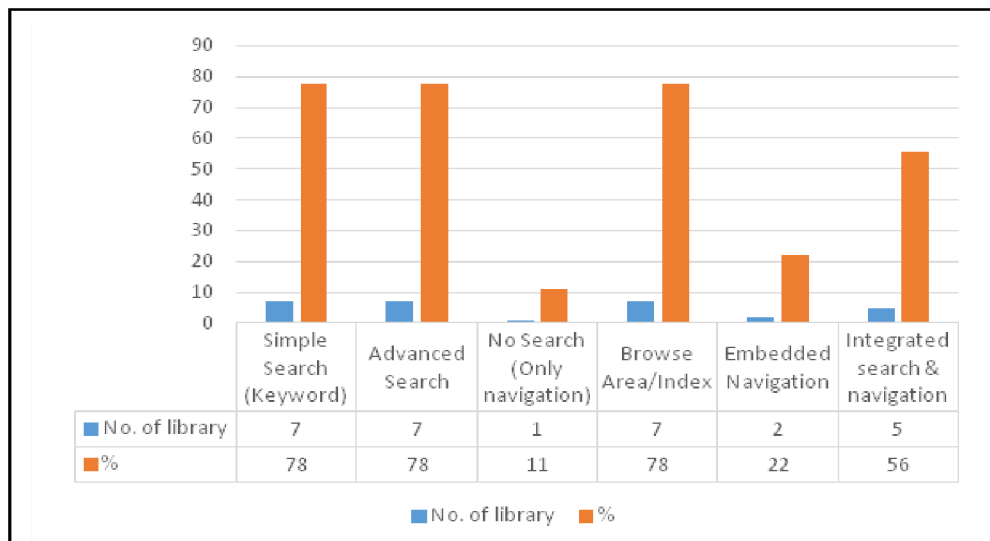
**Data Collection:** The study focused on academic libraries offering facet-based online catalogues for accessing resources. The study included methods of surveying to collect data from sample libraries. A method of data collection was establishing the schedule questionnaire and interviewing the librarian. Data collection was conducted in April 2022 and visited the concerned libraries’ websites. Libraries that provide facet-based OPACs recorded various information, such as the library systems used (commercially or openly), the name of the software, the type of facets, the search and navigation approach, the filtering options, the order of facets, and the standards used in the description of resources.

## 7. Finding and Discussion

Most libraries use an integrated library system (ILS) to manage their resources, resources description and design the OPAC for information retrieval and access. The study examined OPACs for library information systems, as shown in Table 1. A majority of libraries build OPAC with Koha ILS software, followed by commercial Libsys and open-source Hibiscus. It is interesting to observe that one library has developed its own system to design OPAC. Since OPAC facets are primarily related to information solutions that are intended by information architecture (Houser,2009), this study observed that 90 % of the library had faceted OPAC.

**Table 1: Library System/software used in the library**

Sr.	Name of the Insitute	Software	Commercial Support	Open-Source Solution	Faceted OPAC
1	National Institute of Technology Rourkela	Koha		P	P
2	Indian Institute of Technology Bhubaneswar	Koha		P	P
3	Siksha 'O' Anusandhan, Bhubaneswar	Libsys	P		P
4	Kalinga Institute of Industrial Technology, Bhubaneswar	Libsys	P		P
5	C.V. Raman Global University, Bhubaneswar	Libsys	P		P
6	Veer Surendra Sai University of Technology, Burla	Koha		P	P
7	Silicon Institute of Technology (SIT), Bhubaneswar	Locally developed	P		P
8	Centurion University of Technology and Management, Paralakhemundi	Koha	P		P
9	International Institute of Information Technology Bhubaneswar	Hibiscus		P	



**Figure: 4 Search and navigation system**

**Searching and navigation:** The current study examines the two main components of a website, the search, and navigation system, in accordance with La Barre’s guidelines (2006). Navigation features enable users to move from page to page easily, and faceted navigation allows users to customize their queries using pre-defined guidance. Similarly, users asked for information they needed in search systems, whereas in faceted searches, system pre-defined queries are created to help users. The integrated system allows users to search and navigate through a single interface. The system can also be embedded into another interface (La Barre, 2006). Figure 4 shows that search and browse are the most common functions in all libraries. It is remarkable that more than half of OPAC also has integrated features. However, two libraries prefer to be embedded with other platforms. It is surprising that one library only provides static OPAC navigation.



**Figure 5: Navigation Menu, Standard and Facet Sequence**

**Navigational menu:** When the navigation menus were presented (Fig 5), the menu’s horizontal position appeared on all OPAC’s faces, and half of the observations found footer menus followed by vertical menus. Five OPAC also used the dropdown menu system because the library prefers the format of customizing the software that focuses on users.

**Metadata:** Faceted catalogues and faceted navigation affect the practice and rules of catalogue and the better use of metadata (Barbara,2012). In this study, as shown in Fig. 5, all faceted OPACs use the MARC standard for resource descriptions, and interestingly only one library uses both MARC and AACR-II standards.

**Facet Type:** Figure 6 shows most popular facet types, and most of the facets used were similar in all online library catalogues, such as Titles, Subjects, Publishers, Locations, Date/Year, Organizations, Keywords, Format or Material Type, Content-Type, Call Number or Class Number, Authorship, Availability, Location. However, Series titles, Source, and Language-based facets are not standard. Tag-based facets were used by some libraries in their catalogue, whereas the target audience is mentioned only by one library.

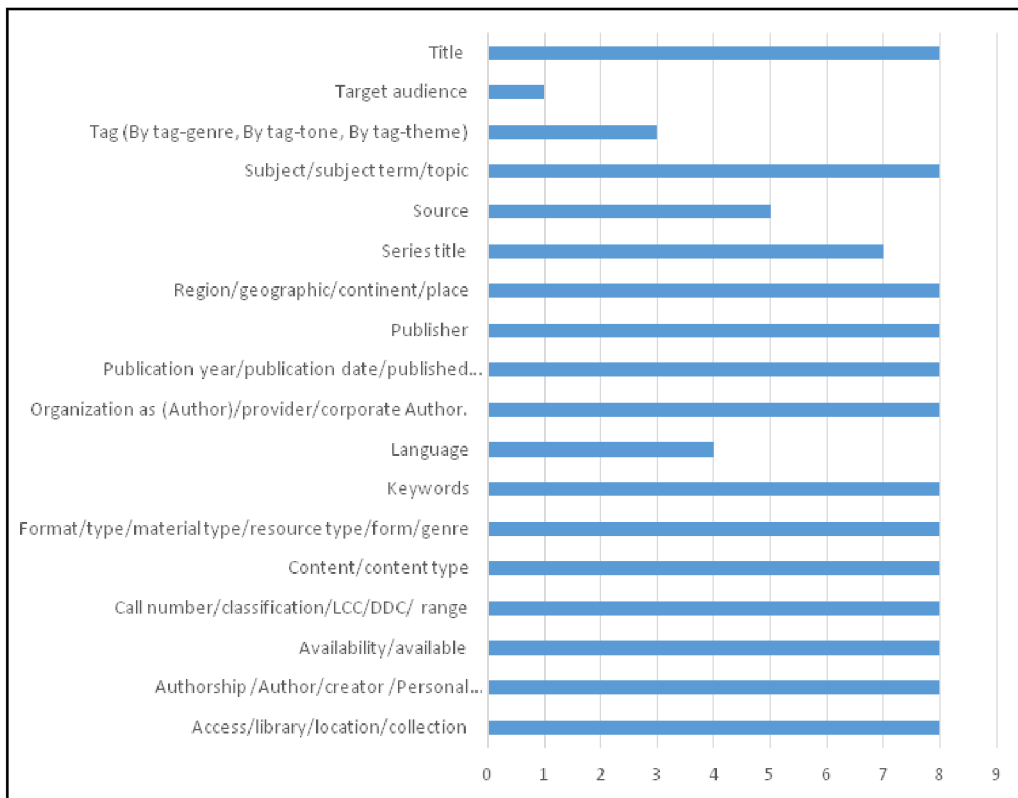
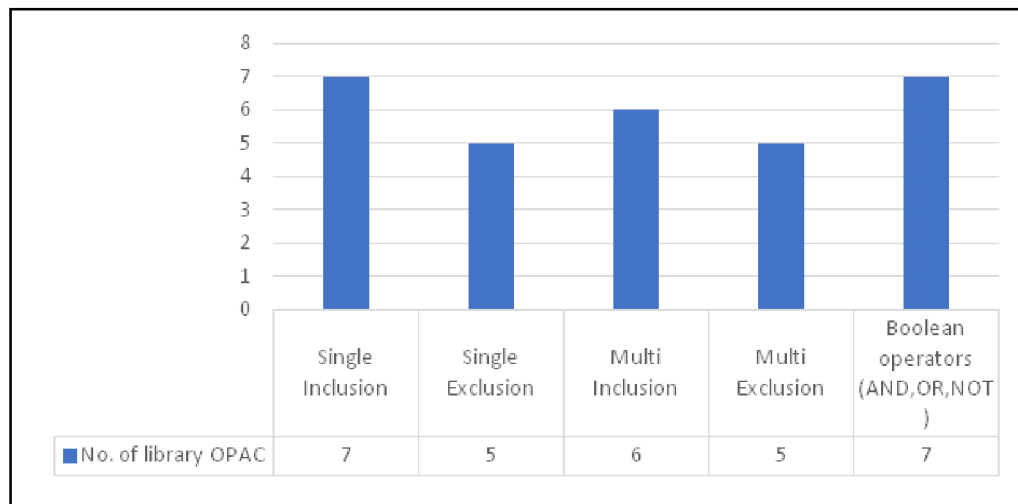


Figure 6: Facet type



**Facet incorporation:** When the user starts the search by entering a query in the search system, the result can be narrowed down by faceted navigation in the interface. The result can be narrowed down by establishing a relationship between metadata (facet types). Single or multi-tier inclusion or exclusion allow integration of the several filters to search results, and similarly, the Boolean operator (AND, OR, NOT) also operate (Stanis<sup>3</sup>awSkórka, 2014). In this present study, as shown in Fig. 7, it has been observed that all of the OPAC support the single inclusion as well as Boolean Operators, but the single exclusion and multi-inclusion and exclusion vary due to the diversity in platform and customization.



**Figure 7: Facet interactivity for filter**

**Facet Sequence:** Figure- 5 shows the order or array of facets or sub-facets of the library online catalogues under study. All library catalogues support alphabetical, enumerative, hierarchy, and chronological sequences, which depend upon the facet elements.

## 8. Conclusion

Traditionally, libraries and information systems are designed to support users' searches and retrieval for information, but a few of them provide authentic browsing experiences. Facet and facet approaches help people find the website's content through facet navigation. The library OPAC also has the same advantages. In OPAC, the facet approach provides users with excellent search experiences from unknown to unknown. It helps the information seeker discover necessary information without feeling lost and enabled. In this study, 90% of OPACs were found to be faceted, and the Koha ILS software was preferred to the Libsys by the libraries of the top engineering colleges in Odisha. Although OPAC has been designed with commercial and open-source standard software, interestingly, some have been developed locally. The types of facets used in libraries are focused on users, and all-important facet types are available in resource description metadata. Almost all libraries have a search and navigation interface, including a simple search and advanced

search features and browsing areas. Still, only two libraries have integrated the search interface into another interface. However, a few libraries still have a static OPAC configuration. The research and discussion help us understand how to apply the classic facet theory of knowledge organization in library applications, mainly used by the OPAC, which will help libraries with their IR policies and practice.

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