

Citation Analysis of Research in Informatics Based on Co-Classification Universitas Katolik Musi Charitas

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Abstract

Science of all fields, including informatics, may grow continuously from year to year. Department of Informatics experienced a change in the naming in which it was previously Department of Informatics Engineering. Informatics Engineering is one of the departments at Sekolah Tinggi Teknik Musi (Musi Engineering Higher Education) which was established in 2004. In 2015 the department changed its name to Informatics after Musi Charitas became a university. Informatics is one of departments at Faculty of Science and Technology, Universitas Katolik Musi Charitas, Palembang. The change in the naming of the department also changed the academic title of the graduates. Earlier, the graduates got a degree as Bachelor of Engineering nowadays they get Bachelor of Computer Science. The change in name has indirectly affected the types of courses and resources used among students in their preparation of writing thesis or final projects. This study aims at determining the main and supporting literature, the language used, and the types of literature formats in the thesis of the department of informatics, Faculty of Science and Technology, Universitas Katolik Musi Charitas in 2014-2015. This is a qualitative study using bibliometric analysis based on co-classification. The objects of the study are the thesis from the department of Informatics, Faculty of Science & Technology, Universitas Katolik Musi Charitas in 2014-2015 with 332 citations. The results of the study show that the main literature used in the thesis of the department of Informatics, Faculty of Science and Technology, Universitas Katolik Musi Charitas in 2014-2015 are artificial intelligence/expert systems, programming/software engineering, computer programs/software applications, extracting data/data in computer systems, system analysis and computer design, multimedia systems/web design, and education; while other supporting literature includes general purpose application programs, nutrition, diseases of agricultural crops, computer science, business, statistical methods, programming systems, theory of probability, commerce, system of Indonesian writing, trade in agricultural products, discrete mathematics, executive management/management power, urban planning, rice fields and plantation crops, and computer graphics. The most widely used language of publications is Indonesian compared to that of English. The most widely used literature format is monograph.

Keywords: Citation Analysis, Informatics, Co-classification.

0. Introduction

Science of all fields, including informatics, may grow continuously from year to year. Kuhn, (1970) said, science can develop revolutionarily from one paradigm to another, such as the Informatics study program which underwent a change in the naming of the previous study program Informatics Engineering. The Informatics Engineering Study Program is one of the study programs at the Sekolah Tinggi Teknik Musi (Musi Engineering High School) which was opened in 2004. The competence of informatics engineering graduates is focused on 3 (three) areas of mastery, namely database technology, computer network technology and web technology using the 2003 curriculum based on Decree of the Chairman of STT Musi No. 173/p.1-STTM/Kep-1/VIII/2003 (Guidebook 2008-2009, 2008). Over time, in 2015 it changed its name to Informatics after turning into a university. This has also an

impact on the competence of Informatics graduates by eliminating mastery of computer network technology and focusing on 2 (two) areas of mastery, namely mobile technology and web technology using a new curriculum based on the Decree of the Chair of the Faculty of Science and Technology No. 294/P.1-STTM/Kep-I/VIII/2011 (Academic Guidelines, 2015).

Informatics is one of the study programs at the Faculty of Science and Technology, Universitas Katolik Misi Charitas, Palembang. The change in the naming of the study program also changed the academic title of the graduate, the title of Bachelor of Engineering changed to Bachelor of Computer Science. These changes indirectly affect the types of courses taken in each semester. In addition, it also have an impact on the literature used in the teaching and learning process even to the preparation of a thesis or final project. Every final project or thesis produced by a university can basically describe a scientific development that is currently happening. This will affect the number of citations in the literature used by students when preparing their final project or thesis. The analysis of the subject of the cited literature becomes a very important activity to do as a basis for mapping knowledge that continues to develop.

This research focuses on the citation analysis on the bibliography of the Informatics study program thesis on 2014 to 2015. The aim is to see the difference between the main and supporting literature in the Informatics study program before and after becoming a university. In addition, to find out the language and types of literature cited. This research will be useful for determining the academic policy of the Informatics study program especially on the trend of developing science trends and can also be used as a control for the focus of the competencies of graduates that have been determined. In the field of librarianship, it can also be used for collection development at the Library of Universitas Katolik Misi Charitas.

1. Literature Review

According to Pritchard (in Sulityo-Basuki, 2002) the term statistical bibliography is often confused with the term "statistics" and proposed with a new term, namely bibliometrics (bibliometrics). Furthermore Glossary of Statistical Terms (2022) mentioned that bibliometrics is used to analyze books, journal articles or other types of publications. Bibliometric analysis uses numerical data and authors of scientific publications and articles as well as their citations to measure the productivity of researchers, institutions, and countries and to identify networks or collaborations both nationally and internationally as well as for mapping science and technology.

In the evaluative bibliometrics, the use of literature is calculated by topic, subject, or discipline. Topics or subjects can be interpreted as a form of grouping categories or classes using standards based on topics or subjects such as Thesaurus, LCSH, MeSH, ERIC or others, while based on classification such as DDC, UDC or other standard classes. Co-classification or co-classification is a situation where two or more documents are joined in one group because of the same classification notation. Co-classification is also used to collect the same document and shows that the bibliography quantitatively indicates the same subject as the title of the document. For classification, the UDC and/or DDC classification system can be used. The results of the co-classification analysis are presented in a graph. Co-classification using classification analysis means pairing one document with another based on the classification notation that is shared by the two paired documents. It then compares the occurrence of the classification notation that is shared by the two paired documents, then calculate the frequency of occurrence of the classification notation together in each pair of documents (Wahyuni, 2012).

The other studies related to the topic of research on bibliometric studies with the Co-classification analysis method approach include:

1. Maulana, Iswara, & Oktavilia (2016) did a study entitled "Analysis of Literature Subjects in the Dissertation of Cultural and Media Studies (KBM) UGM Graduate School Based on Co-Classification". The research material is in the form of a dissertation on the 2014-2015 Cultural and Media Studies study program.
2. Sangeetha M. (2019) did a journal article with the title "Citations analysis of LIS theses submitted to Kuvempu University and University of Mysore". The material used was 59 LIS theses.
3. Gayan & Singh (2021) did a study entitled "Citation analysis of Mathematics: a scientometric study based on PhD theses, Tripura University". The material is in the form of a thesis for the 2007-2016 mathematics study program.

The use of class-based standards in bibliometric analysis with the Co-classification approach is also carried out an analysis of the language of the literature used in order to know the highest percentage of languages used and can assist in policy making for the development of library collections. In general, in the library collections, the use of languages will be grouped, namely Indonesian, English or other languages. In addition to language, this research analysis is also carried out on the types of literature used in writing the final project or thesis, this will show the types of literature mostly used by writers or researchers and will be useful in making policies for developing library collections. According to (National Standards for Libraries no. 003/2011, 2011), library collections are all information in the form of printed works and/or recorded works in various media that have educational value, which are collected, processed, and served. The types of library collections consist of reference collections, newspapers, magazines, special collections and non-print collections from various disciplines according to the needs of the community. Based on this understanding, it can be concluded into 3 (three) types of literature, namely monographs, journals, non-print collections in the current sense of digital collections and newspapers. The definition of a monograph in (General Guidelines for Management of College Library Collections, 1999) means publications that have a unified whole, may consist of one or more volumes, or sheets that are bound together. Publications included in this category are books, research reports, theses, theses, dissertations, proceedings, and a collection of bound essays. Looking at the literature review and some of the research above, this research is different because it focuses on citation analysis from the bibliography of each thesis using 3 (three) indicators with the aim of knowing the main and supporting literature types in the Informatics study program thesis period 2 (two) year, namely 2014 to 2015. The three indicators are the subject of literature, the language of literature and the type of literature.

2. Research Methodology

This study uses a qualitative approach with co-classification-based bibliometric analysis. The object of the research is the thesis of the Informatics Study Program, Faculty of Science and Technology, Universitas Katolik Musi Charitas in 2014-2015. The source of the research objects was obtained from the repository of the Universitas Katolik Musi Charitas with the url address <http://eprints.ukmc.ac.id/view/divisions/ISPT/> and this matched with the master thesis data in the library of the Universitas Katolik Musi Charitas. The classification numbering for each literature used in the thesis bibliography is interpreted based on the classification standard using DDC (dewey decimal classification) edition 23.

The results of data collection and processing are analyzed based on the classification list table with the highest frequency which is made per year, the classification diagrams that appear most are then taken the top 5 (five) and are assumed to be the main literature, while the other classifications are assumed to be supporting literature. In addition, there are tables and graphs listing the languages and types of literature used in the bibliography. Another analysis is carried out by describing the findings in the bibliography of the Informatics study program thesis.

3. Results

The results and discussion in this study are divided into four main topics, namely a list of theses and literature subjects, the language of the literature used, the type of literature, and the findings during the classification of the citation list.

3.1. List of Thesis and Literature Subjects

Thesis for the Informatics Study Program, Faculty of Science and Technology, Universitas Katolik Musi Charitas in 2014-2015 as many as 21 titles consisting of 14 thesis titles in 2014, and 7 (seven) thesis titles in 2015 with a total of 332 citations. The titles of the dissertations are detailed in table 1 below:

Table 1 : List of Thesis during the year 2014 To 2015

S. No.	Title of Theses	
	Year 2014	Year 2015
1	Sistem Pendukung Keputusan Penentuan Decision Support System for Determining Majors Using the Naïve Bayes Algorithm (Case Study: STT Musi Palembang)	Implementation of Graph Coloring with Welch Powell Algorithm for Scheduling Practicum Courses

S. No.	Title of Theses	
	Year 2014	Year 2015
2	Application of Quick Response Code for Business Cards on Android-Based Smartphones	Ambassador Yuzaka's Event Organizer Promotion Website Equipped with Ajax Technology Chatroom
3	Outstanding Student Decision Support System with the Simple Additive Weighting Method (Case Study: SMA Methodist-2 Palembang)	Implementation of Soundex Algorithm for Name Search in Electronic Phone Book
4	Scholarship Recipients Decision Support System with Naive Bayes Algorithm (Case Study: STT Musi Palembang)	Learning Aid for Human Circulatory System with SAVI Approach
5	Scholarship Recipients Decision Support System Using the Composite Performance Index (CPI) Method (Case Study: STT Musi Palembang)	Expert System for Diagnosing Pests and Diseases in Oil Palm Using Certainty Facto Method
6	Implementation of the Floyd-Warshall Algorithm to Determine the Closest Distance on the Trans Musi Palembang Route	Short Message Service Gateway Application System To Support Promotion At Erafone Palembang
7	Employee Incentive Determination System at PT Remco With Data Mining Techniques	Decision Support System for Lecturer and Employee Performance Evaluation Using Profile Matching Method (STT Musi Case Study)
8	Implementation of the TF-IDF Algorithm on Document Similarity Measurement.	
9	Employee and Lecturer Performance Evaluation Using the Simple Additive Weighting Method	
10	Chit Chat Cinema: Question Answering System with Cinema Movie Domain	
11	Decision Support System for Disbursement of Partnership Program Funds Using the Naïve Bayes Algorithm (Case Study: PKBL PT. Pusri Palembang)	
12	New Student Admission Decision Support System With Simple Additive Weighting Method	
13	An Expert System for Determining a Nutritious Diet for Toddlers Using Case Based Reasoning Method	
14	Web and Mobile-Based New Student Admission Application Guidance Design at SMK Bina Cipta Palembang	

Based on table 1, the list of thesis titles above provides a list of classification numbers and their frequency which is the result of processing bibliography data. In 2014 it had 228 citations and 20 classification numbers, while in 2015 it had 104 citations and 13 classification numbers. The classification numbers for 2014 and 2015 are described in detail in tables 2 and 3.

Table 2 : List of Informatics Study Program Citation Classifications: 2014

Number	Classification of Number	Frequency
1	006.3	87
2	005.1	40
3	005.3	24
4	005.7	22
5	004.2	19
6	006.7	6
7	005.5	5
8	612.3	5
9	378	3
10	004	3
11	650	2
12	001.4	2
13	005.4	2
14	519.2	2
15	381	1
16	411	1
17	381.4	1
18	511.1	1
19	658.4	1
20	711.1	1

Table 3 : List of Informatics Study Program Citation Classifications : 2015

Number	Classification of Number	Frequency
1	006.3	36
2	005.1	27
3	006.7	9
4	004.2	7
5	378	6
6	005.3	6
7	005.7	4
8	511.1	3
9	632.3	2
10	381	1
11	633	1
12	004	1
13	006.6	1

Tables 2 and 3 above show that the bibliography for 2014-2015 has the same classification number with the highest frequency, namely 006.3 (artificial intelligence). The similarity is because in 2014 to 2015 there is a tendency for the same topic or object of research to be about artificial intelligence, such as making applications. Furthermore, the top 5 (five) ranking classification numbers for each year are considered as the main literature then the other classification numbers are considered as supporting literature.

The classification numbers included in the top 5 (five) thesis in 2014 in sequence, namely 006.3 (artificial intelligence), 005.1 (programming), 005.3 (programs), 005.7 (data in computer systems), and 004.2 (system analysis and computer design). For the 2015 thesis, the classification numbers included in the top 5 (five) rankings are 006.3 (artificial intelligence), 005.1 (programming), 006.7 (multimedia systems), 004.2 (computer analysis and design systems), and 378 (Education). In summary, the main literature in the 2014 to 2015 thesis can be seen in Figures 1 and 2.

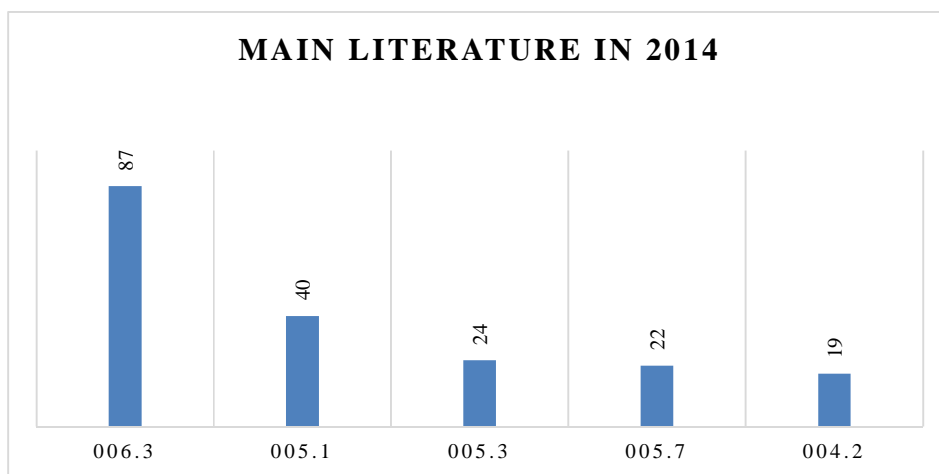


Fig. 1 : Main Literature on Thesis : 2014

Figure 1 shows that the main literature in the 2014 Informatics study program thesis which has the highest number is the subject of artificial intelligence (006.3), while the main literature with the smallest number is the subject of computer analysis and design systems (004.2). The subject of artificial intelligence with the highest number can be considered as a trend of citing/quoted literature subjects during 2014.

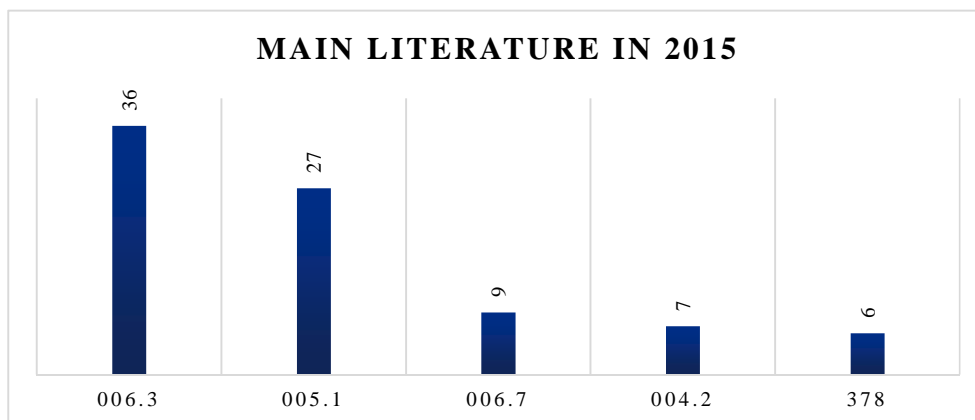


Fig. 2 : Main Literature on Thesis : 2015

Figure 2 shows that the main literature of the Informatics study program thesis in 2015 which has the highest number is the subject of artificial intelligence (006.3), while the main literature with the smallest number is the subject of higher education (378). The subject of artificial intelligence with the highest number can be considered as the trend of the subject literature cited/quoted during 2015.

3.2. The language used as literature

The language used as literature in the thesis of the Informatics Study Program, Faculty of Science and Technology, Universitas Katolik Musi Charitas in 2014 to 2015 as a whole is more likely to use literature in Indonesian. The details are shown in table 4.

Table 4 : List of languages used in 2014 To 2015

Year	Indonesian	English	Total
2014	183	45	228
2015	92	12	104

Table 4 above shows that in 2014 there were 2 (two) language groups used as literature. The literature group in Indonesian is 80.3% of the total literature, while that in English is 19.7% of the total literature. Furthermore, in 2015 there were also 2 (two) language groups used as literature. The literature group in Indonesian is represented by 88.5% of the total literature, while that in English is 11.5%.

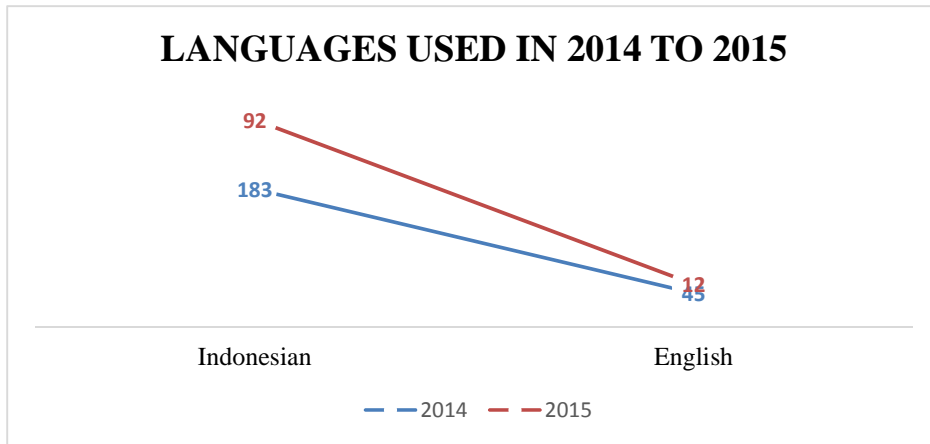


Figure 3: The language used in 2014 To 2015

Figure 3 above shows a decrease in the use of English literature in 2015. The difference between the use of Indonesian and English in 2014 was 60.5%, while in 2015 it was 76.9%. So it can be said that there is a decrease in the use of English literature by 16.4%. The decline in the use of this type of literary language is assumed because the subjects that become literature are seen from the types of subjects from 2014 to 2015. In 2014, the subject focused more on programs and data in computer systems. Where as in 2015 the subject focused more on systems, multimedia and education. Another assumption is that the use of literary language is also caused by thesis topics.

3.4. Literature Type

The type of literature as a bibliography used in the thesis of the Informatics Study Program, Faculty of Science and Technology, Universitas Katolik Musi Charitas in 2014 and 2015 as a whole is divided into 3 (three) categories, namely monographs, journals, and others in detail as shown in table 5.

Table 5: List of Literature Types during 2014 To 2015

Year	Monograph	Journal	Other	Total
2014	175	45	8	228
2015	86	16	2	104

Table 5 above shows the type of literature used as a bibliography in 2014 and 2015 more in the monograph and other categories (Internet). The percentage of each category of types of literature sequentially in 2014, namely the monograph category of 76.8%, the journal category of 19.7%, and other categories of 3.5% then in 2015 the percentage of the monograph category was 82.7% , journal category by 15.4%, and other categories (Internet) by 1.9%. Overall, it can be seen that from 2014 to 2015 the type of literature in the monograph category has increased, while the journal and other categories (Internet) have decreased. The following is a graph of the type of literature used in the thesis bibliography shown in Figure 4.

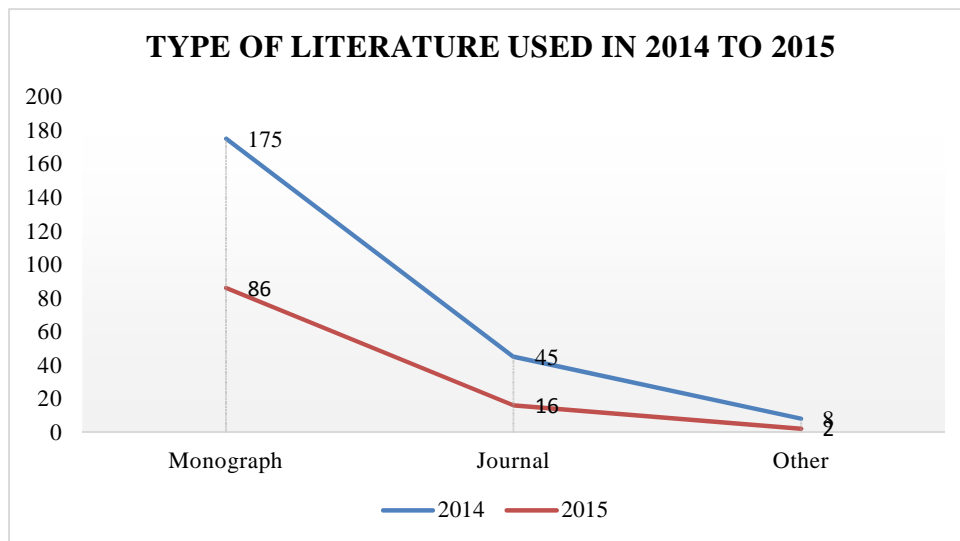
**Fig. 4 : Types of Literature used in 2014 To 2015**

Figure 4 above shows a decrease in the use of literature in the journal and other categories (Internet) compared to the monograph category. In 2014, the difference between the use of monograph and journal types of literature was 57.01%, while in 2015 the difference was 66.3%. There was an increase of 9.29% meaning that the type of literature used in the thesis was mostly monographs or it could be said that books, theses, proceedings were used as references, then the titles of the books used were mostly the books in the Library of Universitas Katolik Musi Charitas. In 2014, the difference between the use of literature in the journal category and other categories (Internet) was 16.2%, while in 2015 the difference in use was 13.5%. The decrease that occurred by 2.7% indicates that the use of the types of literature available in electronic form is less desirable than the type of printed literature.

4. Finding

The findings obtained from the results of processing the thesis data of the Informatics Study Program, Faculty of Science and Technology, Universitas Katolik Musi Charitas in 2014-2015, are related to the writing of a bibliography where almost every thesis has an inconsistent bibliography writing style, it is not clear in writing types. Literature, and sources of reference between theses with one another have in common.

5. Conclusion

The analysis of the literature subject cited in the thesis of the Informatics Study Program, Faculty of Science and Technology, Universitas Katolik Musi Charitas in 2014-2015 shows that the main literature to support the preparation of the thesis includes the subject of artificial intelligence, programming, programs, data in computer systems, system analysis and computer design, multimedia systems, and education while the breadth of the

supporting literature covers subjects on special-purpose application programs, nutrition, agricultural crop disease, computer science, business, statistical methods, programming systems, probability theory, commerce, writing systems of Indonesian language, trade in agricultural products, discrete mathematics, management functions and powers, procedures and social aspects of urban art and gardening, rice fields and plantation crops, and computer graphics. For the type of literature used the most is the monograph category such as books, final assignments, theses, papers, and proceedings compared to the journal categories, both printed and electronic and other categories. The most widely used literary language is Indonesian language literature.

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