A Bibliometric and Visualized Analysis of Mobile Banking Research Using VOSviewer

Melly Susanti*, Heru Kreshna Reza2
Bengkulu University

Corresponding Author: Melly Susanti maksio7.unib@gmail.com

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ABSTRACT

Mobile banking as an innovative delivery channel for financial services, especially in developing countries. Mobile banking is the latest technological innovation, to streamline bank operations. Biometrics is an emerging technology in the era of the internet and mobile communications. The purpose of this study was to determine the development of research related to mobile banking. Bibliometrics is effective in providing datasets that can be used to improve the quality of research. By using Bibliometrics and publication trends in the Scopus database, the data is processed using VOSViewer software to view network visualizations, density visualizations and overlay visualizations.
INTRODUCTION

Mobile Banking is a service provided by a bank or other financial institution that allows its customers to conduct financial transactions remotely. Ho et al., Usman et al., Liu et al., Boden et al., Li-Ya Yan., et al (2020), Jouda dan Verkijika (2018), Alalwan et al., Mun et al., (2017), Denheying & Sammon, A.-C. Teo et al., Luarn & Lin, Dahlberg et al., (2015), Tan et al., Kang, Thakur & Srivastava, dan Miriti (2014) dalam penelitian mereka memperkenalkan teknologi seluler sebagai metode pembayaran serta niat konsumen didalam mengadopsi pembayaran menggunakan seluler. Data protection in mobile banking relies on passwords and biometric properties such as fingerprints (Santos et al., 2020). Thusi & Maduku, (2020) analyzed the relationship between acceptance and use of mobile banking applications from a sample of millennial retail banking customers in Africa. There are four main factors that influence the adoption of cellular payments, namely: Government support and sponsorship, easy-to-use technology infrastructure, QR Code instead of NFC technology, ease of use, convenience, and security of the Mpay application (Kennedyd et al., 2020). Mobile banking adoption is experiencing tremendous growth in developing countries. Intention to use banking is influenced by perceived benefits and perceived satisfaction (C.C & Prathap, 2020). There are differences between South Korea and Vietnam in terms of intention to use mobile banking services (Van Nguyen & Nguyen, 2020).

THEORETICAL REVIEW

Barry & Creti (2020) analyzed the use of PAYG (pay-as-you-go) on 10,120 consumers living in Benin (Sub-Saharan Africa), they found that consumers had a high probability of signing up for a PAYG contract. PAYG is a flexible loan that allows payment of fees via mobile banking. Mobile Banking users should find ways to protect their transaction data. Individual privacy with data security is critical in the information age, especially given the increased risk of data breaches and exploitation (Donohue et al., 2020). Biometrics is an emerging technology in the era of internet and mobile communication (Gayathri et al., 2020). Bibliometric studies can provide relevant evaluations and assessments of the social and scientific relevance of a particular discipline or field of research (López-Muñoz et al., 2014). There are many bibliometric studies on research output performance in Specific Countries such as in China (Xu & Ye, 2003), Nurgia (Xie et al., 2020) and Taiwan (López-Muñoz et al., 2014). Bibliometrics is used to identify patterns of scientific publications (ezama-Nicolás, R., 2018), especially scientific publications controlled by Elsevier, Wiley, Taylor & Francis, Springer Nature, and Sage. Yeung et al., (2017) using the bibliometric method stated that brain imaging and the term brain connectivity have relatively high citation scores in neuroscience studies published from 2006 to 2015. While Wagner et al., (2019) tested both novelty and conventionality, international collaborations failed to produce more new articles. The purpose of this study was to determine the development of research related to consumer behavior using mobile banking. Using Bibliometrics and publication trends in the Scopus database, processed using VOSViewer software. Bibliometrics is effective in providing datasets that
can be used to improve the quality of research. Bibliometric analysis is used to look for trends and patterns (Heersmink et al., 2011).

METHODOLOGY

The method used in this research is to take data from Scopus through the publish or perish tool. Data is only 200 Scopus indexed documents that can be retrieved, this is due to storage limitations. All documents are taken from the most complete database on Scopus (Ondrej Klapka & Faculty, 2018). The research was conducted online, searching for data on October 5, 2022 using the keyword mobile banking. The data period used is 2012 to 2016. Then the articles are downloaded in *.ris format, then processed using Mendeley Desktop software to facilitate data analysis. Furthermore, VOSviewer was used for the bibliometric map (van Eck et al., 2013). VOSviewer can create publication maps, or network-based journal/co-citation maps (Hudha et al., 2020). The frequency of less relevant keywords can be eliminated. VOSviewer software can also be used to perform data mining, mapping (Xie et al., 2020).

RESULTS AND DISCUSSIONS

Visualizing Topic Areas Using VOSviewer

The magician shows the relationship between one topic and another, the relationship between topics can be seen in table 1.

| Clusters | Color | Keyword |
|----------|-------|---------|
| 1        | Red   | 44      |
| 2        | Green | 39      |
| 3        | Dark blue | 36 |
| 4        | Light green | 35 |
| 5        | Purple | 30      |
| 6        | Light blue | 19     |
| 7        | Orange | 14      |

| Total    | 217   |

Visualization of the network formed 7 clusters, as in table 1 and figure 1. The largest cluster is in red. Red shows the most used keywords in mobile banking research.
Figure 1. Items each Cluster (A), Visualization Topic Area Using VOSviewer Using Network Visualization (B.1), Relationship between Clusters on the Keyword Banking (B.2)
Figure 1 shows the relationship between clusters in each of the researched topic areas. The keyword "Banking" (Green) corresponds to the keywords System (Red), Adoption (Dark Blue), Mobile Device (Purple) and so on. There is a close relationship between spherical circles. Figure 2 is Trends every year. lighter colors indicate that the topic was recently researched. On the map the yellow balls indicate the research topic that has just been studied (Figure 2.B).

Figure 2. Keywords Related to Banking (A), Visualization Topic Area Using VOSviewer Using Overaly Visualization (B)
From Figure 1-3 it can be seen that the keywords that often appear are "Banking and Systems". This is seen in the 2 largest balls, because the bigger the ball size, the more these keywords are used for research. We can search for topics that are still little done (figure 3). This new topic search can be seen on topics that are in a concentrated area, the darker the color of the ball, the less researched the topic is. The theoretical contribution of this research is the mapping of research related to mobile payments. Furthermore, the availability of information in each topic area can be searched by entering more specific keywords. Other research such as Added Value and Ease of Using Quick Responses Qris Indonesian Standard (QRIS), (Susanti & Kresnha Reza, 2022). Business using the internet network is important and sustainable (Kresnha Reza & Susanti, 2022).

**Topic Analysis in each Cluster**

In addition to bibliometric analysis we can analyze; author, journal, country of study, language used, and topics in each cluster. Specifically for Topics in Each Clusters are shown in Figures tables 1 and 2.
| Cluster 1          | Cluster 2                     | Cluster 3                              |
|-------------------|-------------------------------|----------------------------------------|
| academic          | actual usage                  | adoption intention                     |
| access            | additional research           | adoption rate                          |
| account           | banking                       | awareness                               |
| africa            | compatibility                 | banking adoption                        |
| app               | consumers attitude            | behavioral intention                    |
| application       | continuance intention         | behavioural intention                   |
| article           | decision maker                | consumer intention                      |
| attack            | empirical data                | effort expectancy                       |
| authentication    | empirical finding             | empirical evidence                      |
| basis             | empirical investigation       | financial cost                         |
| device            | important precedent           | financial inclusion                     |
| example           | individual performance        | habit                                   |
| financial service | information quality           | hedonic motivation                      |
| financial transaction | initial trust               | important factor                        |
| form              | investigation                 | light                                   |
| inclusion         | iran                          | m banking adoption intention            |
| input             | main factor                   | marketing strategy                      |
| kenya             | managerial implication        | mobile banking adoption intention       |
| life              | mobile banking acceptance     | multi group analysis                    |
| literature review | moderating effect             | online                                  |
| mobile payment    | new insight                   | pakistan                                |
| mobile payment service | payment                  | performance expectancy                   |
| mobile phone      | payment service               | previous study                          |
| money             | perceived usefulness          | price value                             |
| motivation        | personal innovativeness       | proposed model                          |
| online banking    | research model                | review                                  |
| part              | service quality               | significant difference                  |
| password          | significant effect            | social influence                        |
| problem           | significant impact            | student                                 |
| reality           | square                        | taiwan                                  |
| recommendation    | structural assurance          | unified theory                          |
| set               | structural equation           | university student                      |
| smartphone        | system quality                | utaut                                   |
| sms               | task                          | utaut model                             |
| subject           | task technology               | utaut2                                  |
| system            | task technology fit           | variance                                |
| tablet            | ttf                           |                                        |
| time              | turn                          |                                        |
| today             | ubiquity                      |                                        |
| usability         |                               |                                        |
| way               |                               |                                        |
| work              |                               |                                        |
| world             |                               |                                        |
| year              |                               |                                        |
Table 2. Topics in Cluster 4, 5, 6, and 7

| Cluster 4          | Cluster 5          | Cluster 6          | Cluster 7          |
|--------------------|--------------------|--------------------|--------------------|
| attribute          | ability            | activity           | banking institution|
| barrier            | advantage          | business           | combination        |
| commitment         | area               | communication      | commitment         |
| consumer adoption  | case study         | communication      | technology         |
| consumers adoption | cent               | comparison         | confirmatory factor analysis |
| consumers intention| challenge          | concept            | customer satisfaction|
| e banking          | education          | developed country  | extent             |
| earlier study      | finance            | development        | income             |
| effectiveness      | future             | e commerce         | mobile banking app |
| electronic banking | germany            | field              | mobile service     |
| element            | implementation     | internet           | moderating role    |
| future study       | improvement        | m commerce         | mouth              |
| Image              | infrastructure     | market             | survey data        |
| important role     | interest           | mobile technology  | total              |
| Information        | key factor         | new technology     |                   |
| internet banking   | mobile application | recent year        |                   |
| kind               | mobile device      | requirement        |                   |
| malaysia           | mobile user        | similarity         |                   |
| million            | number             | transaction        |                   |
| mobile banking     | opportunity        |                   |                   |
| technology         |                   |                   |                   |
| nature             | organization       |                   |                   |
| non user           | outcome            |                   |                   |
| practice           | performance        |                   |                   |
| preference         | platform           |                   |                   |
| present study      | question           |                   |                   |
| resistance         | saudi arabia       |                   |                   |
| respect            | sector             |                   |                   |
| scale              | technology acceptance |               |                   |
| significance       | uptake             |                   |                   |
| society            | whole population   |                   |                   |
| speed              | state              |                   |                   |
| state              | success            |                   |                   |
| tradition          | users satisfaction |                   |                   |

Table 3. Number of Documents in each Cluster

| Tahun | Clusters 1 | Clusters 2 | Clusters 3 | Clusters 4 | Clusters 5 | Clusters 6 | Clusters 7 |
|-------|------------|------------|------------|------------|------------|------------|------------|
| 2009  | 2          | 0          | 1          | 1          | 0          | 0          | 0          |
| 2010  | 1          | 1          | 0          | 3          | 3          | 0          | 2          |
| 2011  | 7          | 2          | 1          | 5          | 0          | 2          | 0          |
| 2012  | 13         | 3          | 2          | 9          | 12         | 6          | 0          |
| 2013  | 7          | 5          | 3          | 5          | 5          | 6          | 2          |
| 2014  | 7          | 8          | 3          | 6          | 2          | 7          | 2          |
| 2015  | 6          | 11         | 13         | 4          | 6          | 0          | 3          |
| 2016  | 0          | 5          | 0          | 1          | 2          | 0          | 2          |
| 2017  | 1          | 3          | 5          | 0          | 1          | 1          | 1          |
| 2018  | 0          | 1          | 5          | 0          | 0          | 0          | 1          |

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Publications with the largest mobile banking topic in cluster 1 in 2012 and cluster 3 in 2015. The highest number of publications was in 2012 as many as 45 documents, 2015 as many as 43 documents.

CONCLUSIONS AND RECOMMENDATIONS

Mobile banking is recognized as an innovative delivery channel for financial services, especially in developing countries where access to banking services is still low. The mobile payment keyword was analyzed through VOSviewer, and found 7 clusters (Red, Green, Dark blue, Light green, Purple, Light blue, Orange). The results of mapping publications with the most mobile payment topics in 2012 and 2015. This can be used as information for further researchers, with the topic of mobile banking.

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