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MOBILE BANKING ADOPTION: A BIBLIOMETRIC ANALYSIS

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ABSTRACT

The recent explosion of the use of applications in business has generated new channels of interaction and communication with customers that are modifying consumer behavior. The banking sector could not be left behind, implementing mobile banking to facilitate the relationship with customers by providing in real time the financial information of the account holder and expanding the range of services available in the branches, which is why the interest in carry out a bibliometric analysis on the mobile banking adoption studies that have been carried out and be able to identify trends and future lines of research. The data for the analysis were obtained from the Elsevier Scopus database. The search query consisted of all publications with the phrase "mobile banking adoption" and "m-banking adoption" in its title, summary or keywords. This search was made on March 6, 2018, yielding 94 documents, including 58 articles, 26 conference papers, 4 reviews, 3 conference reviews, 2 book chapters and 1 article in press, covering the period from 2005 to February 2018. It can be concluded that the

subject is in tension, there being a lot of joint publication, the publications of multiple authors represent approximately three-quarters of all publications, the Asian and European continents lead the number of publications being India and Finland the main countries.

Keywords: mobile banking, adoption, bibliometric analysis.

JEL classification: M00, M150.

RESUMEN

La reciente explosión del uso de aplicaciones en los negocios ha generado nuevos canales de interacción y comunicación con los clientes que están modificando el comportamiento del consumidor. El sector bancario no podía quedarse atrás, implementando la banca móvil para facilitar la relación con los clientes al proporcionar en tiempo real la información financiera del titular de la cuenta y ampliar la gama de servicios disponibles en las sucursales. Es por este motivo que surge el interés en realizar un análisis bibliométrico sobre los estudios de adopción de banca móvil que se han llevado a cabo y ser capaces de identificar tendencias y futuras líneas de investigación. Los datos para el análisis se obtuvieron de la base de datos Elsevier Scopus. La consulta de búsqueda consistió en todas las publicaciones con la frase "adopción de banca móvil" en su título, resumen o palabras clave. Esta búsqueda se realizó el 6 de marzo de 2018, con 94 documentos, incluidos 58 artículos, 26 documentos de conferencia, 4 revisiones, 3 revisiones de conferencia, 2 capítulos de libro y 1 artículo en prensa, que cubren el período de 2005 a febrero de 2018. Se concluyó que el tema está en tendencia, ya que hay muchas publicaciones conjuntas, las publicaciones de múltiples autores representan aproximadamente las tres cuartas partes de todas las publicaciones, los continentes asiático y europeo lideran el número de publicaciones, siendo India y Finlandia los principales países.

Palabras clave: banca móvil, adopción, análisis bibliométrico.

Códigos JEL: M00, M150.

1. INTRODUCTION

1.1. Mobile banking

The great explosion of the use of mobile devices and initiatives in electronic commerce have attracted the attention of researchers on the issue of mobile banking adoption (Tam & Oliveira, 2017). According to the International Telecommunication Union (ITU), in its report Measuring the Information Society Report 2017 - Volume 1, in 2015 there were 7.18 billion mobile phone subscriptions in the world, which represented 98.2 subscriptions per 100 inhabitants. And regarding smartphones, he mentions that according to the survey conducted by Pew Research Center, in 2015 "the global median of smartphone ownership was 43 percent. 68% in developed economies and 37% in developing and emerging economies" (p. 108).

With these data and considering that the smartphone has become one of the most significant factors that support people in their lifestyle. Many services are being offered through mobile devices that offer more channels for the interaction of companies with their customers. The banking sectors have also foreseen the essential use of this channel taking advantage of its ubiquity, confort, and interactivity; this is where the concept of mobile banking comes from.

Mobile banking can be defined as "a service or product offered by financial institutions that use portable technologies" (Tam and Oliveira, 2017, p.7).

According to the 2014 report on the state of the mobile financial services industry for the unbanked of the Global System for Mobile Communications Association (GSMA), banking services mobile phones are currently available in 61% of the countries in the developing world (85 out of 139 markets). In the last five years, mobile banking services have expanded throughout much of Africa, Asia, Latin America, Europe, and the Middle East. As of December 2014, there were 255 mobile banking services launched commercially in 89 markets, compared to 233 services launched through 83 international markets in 2013.

Given this scenario, it was considered interesting to carry out a study on the research carried out regarding the adoption of mobile banking, the main objective of this document.

2. DATA AND METHODS

The data for this article was obtained from the Elsevier Scopus database. The search query consisted of all publications with the phrase "mobile banking adoption" and "m-banking adoption" in its title, summary or keywords.

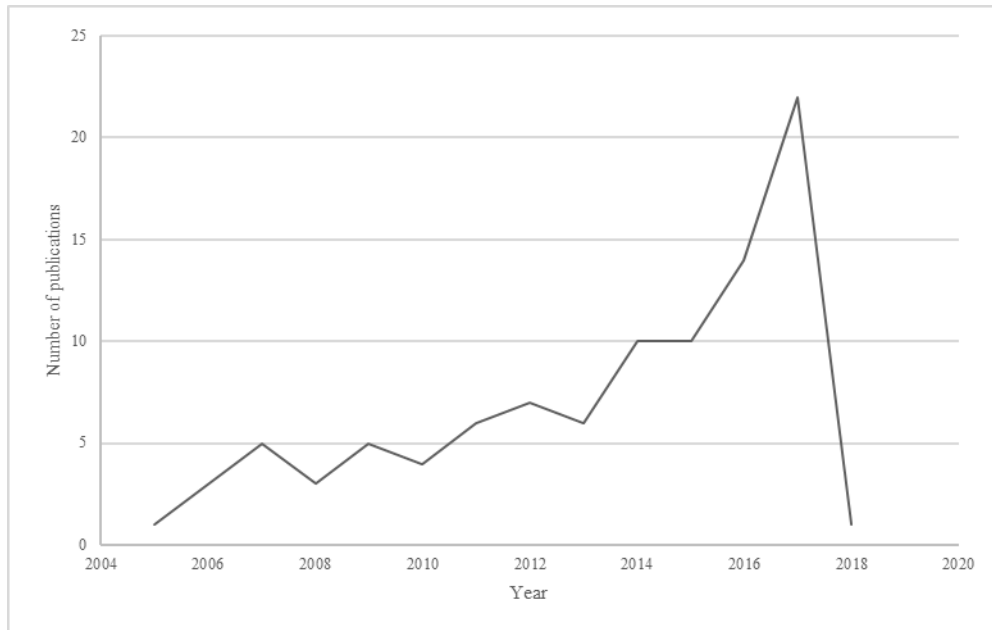
This search, made on March 6, 2018, yielded 94 documents, including 58 articles, 26 conference papers, 4 reviews, 3 conference reviews, 2 book chapters and 1 article in press, covering the period from 2005 to February 2018.

The registration of each publication included, among other entries, name (s) of the author, year of publication, the title of the publication, title of the source, keywords (author and index), summary and references cited. This information was extracted to obtain quantifiable data on authors, references and topics (Tijssen, 1992; Verbeek, Hirschall and van der Aalst, 2002) exporting everything in CVS format to Microsoft Excel for statistical analysis and the VOSviewer program was used for the visual representation of relationships between authors, countries, co-citations, and terms (van Eck and Waltman, 2010).

3. RESULTS AND DISCUSSION

3.1. Publication output and growth trend

According to the results obtained, the issue of the adoption of mobile banking has a growing trend. Well, from 2005 when the first document is reported, to date the publications are increasing (Figure 1). The years in which the greatest number of documents are presented are 2014 (n = 10), 2015 (n = 10), 2016 (n = 14) and 2017 (n = 22).

Figure 1. Number mobile banking adoption publications by year

3.2. Authors and their cooperation

The analysis allowed to identify 159 authors that have published about mobile banking adoption, of which 86.79% ($n = 138/159$) have published a single document, 8.8% ($n = 14/159$) two documents, 3.7% ($n = 6/159$) three documents and only one author nine documents.

The author with the largest number of publications on the subject is Laukkanen, T. ($n = 9$), followed by Cruz P., Karjaluoto H., Kivijärvi M., Laukkanen P., Oliveira T. and Sinkkonen S. with three documents each one. Similarly, the author with the highest average number of citations per year of publication is Shaikh ($n = 46$) with only two documents published and only one as the first author. Then follows Laukkanen T. ($n = 43.3$), and Kivijärvi ($n = 39$), Laukkanen P. ($n = 39$) and Sinkkonen ($n = 39$) (Table 1).

Table 1. Top-3 Number of publications by author

Author name	Country of author	Number of publications	Average citations per publications	Number of publications as first autor
Laukkanen, T.	Finland	9	43.3	8
Cruz, P.	Portugal	3	34	1
Karjaluoto, H.	Finland	3	32	0
Kivijärvi, M.	Finland	3	39	0
Laukkanen, P.	Finland	3	39	0
Oliveira, T.	Portugal	3	25	1
Sinkkonen, S.	Finland	3	39	0
Bevan-Dye, A.	South Africa	2	0	2
Chawla, D.	India	2	0	2
De Klerk, N.	South Africa	2	0	0

Govindaraju, R.	Indonesia	2	0	0
Joshi, H.	India	2	0	0
Rahim, M.	Australia	2	0.5	0
Seyal, A.H.	Brunei	2	0.5	2
Shaikh, A.A.	Finland	2	46	1
Sitorus, H.M.	Indonesia	2	0	2
Sudirman, I.	Indonesia	2	0	0
Tam, C.	Portugal	2	2	2
Turner, R.	Australia	2	0.5	0
Van Deventer, M.	South Africa	2	0	2
Wiratmadja, I.I.	Indonesia	2	0	0

* Equally productive authors have the same ranking number.

3.3. Journals publishing on mobile banking adoption

67 different sources were identified in which it has been published on the subject. 79.1% (n=53/67) of them have only one publication record, 11.9% (n = 8/67) two publications and 8.9% (n = 5/67) more than three documents.

The journal with the highest number of publications is the International Journal of Bank Marketing (n = 9) followed by the Journal of Internet Banking and Commerce (n = 4) (Table 2).

Table 2. Top-4 most active journals publishing on mobile banking adoption

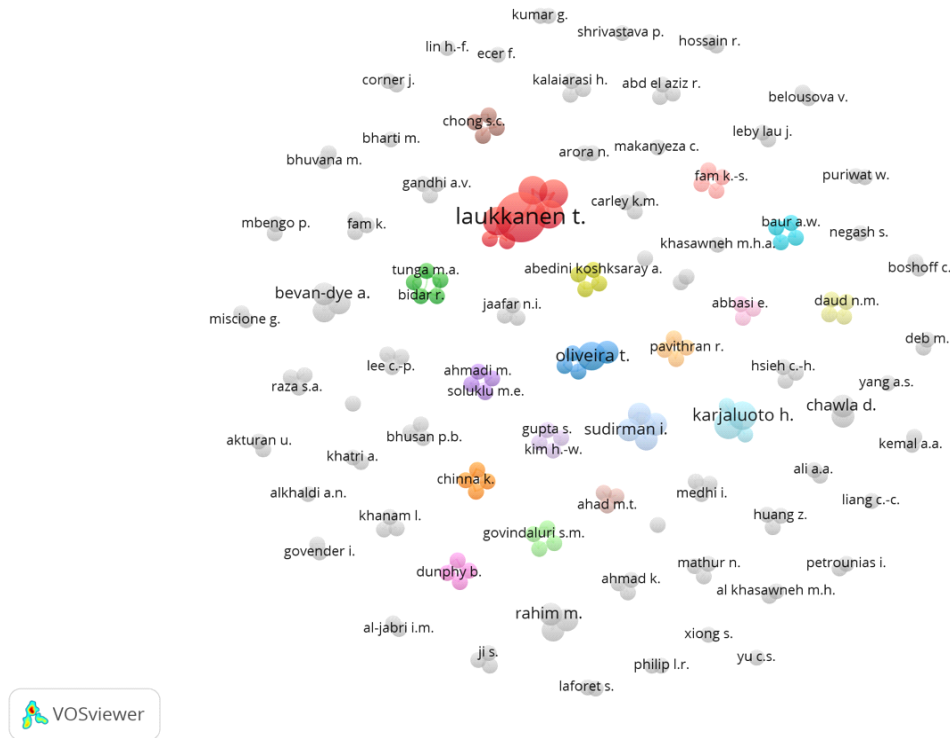
Source title	Number of publications	CiteScore 2016	SJR 2016	SNIP 2016	Subject área
International Journal Of Bank Marketing	9	2.43	0.67	1.459	Business, Management and Accounting: Marketing
Journal Of Internet Banking And Commerce	4	0.52	0.161	0.585	Business, Management and Accounting: Marketing Economics, Econometrics and Finance: Finance Computer science: Computer Science Applications Computer Science: Computer Networks and Communications
2nd International Symposium On Electronic Commerce And Security Isecs 2009	3	NA	NA	NA	NA
International Journal Of Mobile Communications	3	1.81	0.57	1.005	Engineering: Electrical and Electronic Engineering Computer Science: Computer Networks and Communications Computer Science: Computer Science Applications
Marketing Intelligence And Planning	3	1.55	0.488	0.946	Business, Management and Accounting: Marketing
Proceedings Of The Annual Hawaii International Conference On System Sciences	3	NA	NA	NA	NA
Banks And Bank Systems	2	0.13	0.151	0.174	Economics, Econometrics and Finance: Finance
International Journal Of Business Information Systems	2	1.19	0.266	0.675	Decision Science: Information Systems and Management Business, Management and Accounting: Management of Technology and Innovation Business, Management and Accounting: Management Information Systems
International Journal Of Information Management	2	5.68	1.252	2.828	Social Sciences: Library and Information Sciences Computer Science: Information Systems Computer Science: Computer Networks and Communications
Journal Of Electronic Commerce In Organizations	2	0.49	0.148	0.447	Business, Management and Accounting: Strategy and Management Business, Management and Accounting: Marketing Computer Science: Information Systems Computer Science: Computer Networks and Communications
Journal Of Islamic Marketing	2	1.98	0.415	1.112	Business, Management and Accounting: Marketing
Proceedings Of The 12th International Conference On Industrial Engineering Icie 2016	2	NA	NA	NA	NA
Proceedings Of The International Conference On Electronic Business Iceb	2	NA	NA	NA	NA
Telematics And Informatics	2	3.56	1.194	1.843	Social Sciences: Law Social Sciences: Communication Engineering: Electrical and Electronic Engineering Computer Sciences: Computer Networks and Communications

* Equally active journals have the same ranking number.

The pattern of cooperation between authors can be seen in Figure 2. All the authors were considered for its creation, generating a total of 75 different clusters. The

groups that appear in color means that they have more authors and therefore joint publications than the rest. The red group is the largest group formed by Cruz, Kivijärvi, Laukkanen P., Laukkanen T., Muñoz-Gallego and Sinkkonen. The other groups that stand out are those headed by Karjaluoto (blue-green low) and Oliveira (strong blue).

Figure 2. Authors cooperation network in mobile banking adoption research



3.4. Geographical and institutional distribution and cooperation

Each publication was assigned to a country or territory, and to an institution according to the address (s) provided by the author (s) as they appear in the Scopus database. There were only four publications with no identified allocation place. Therefore, 95.7% ($n = 90/94$) of the publications are assigned to a specific place and as for institutions, 100% has its allocation.

3.4.1 Countries and territories

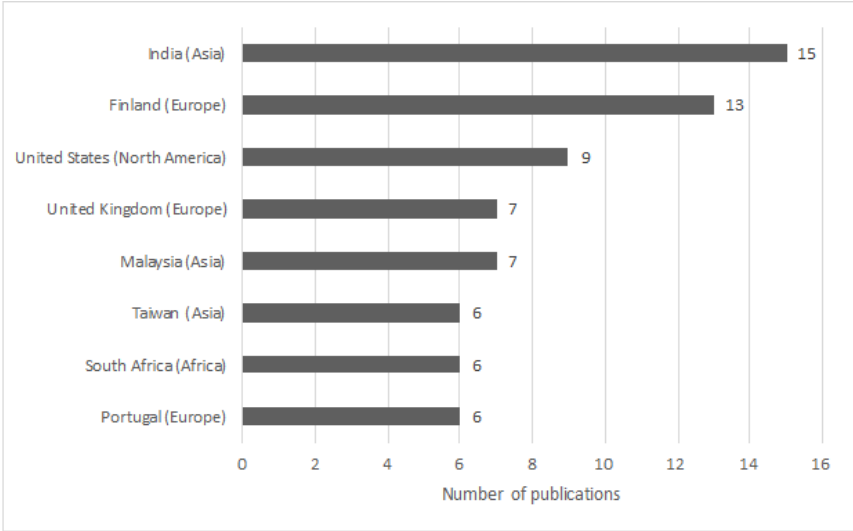
The publications are distributed in 34 countries, 44.11% ($n = 15$) are from Asia, 35.29% ($n = 12$) are from Europe, 8.82% ($n = 3$) from Africa, 5.88% ($n = 2$) from Oceania and 5.88% ($n = 2$) are from North America. Figure 3 shows the worldwide distribution of publications on the subject.

The countries with the highest number of publications are India ($n = 15$), Finland ($n = 13$), United States ($n = 9$), United Kingdom ($n = 7$), Malaysia ($n = 7$), Taiwan ($n = 6$), South Africa ($n = 6$) and Portugal ($n = 6$) (Figure 4).

Figure 3. The mobile banking adoption publications distributed by country or territory

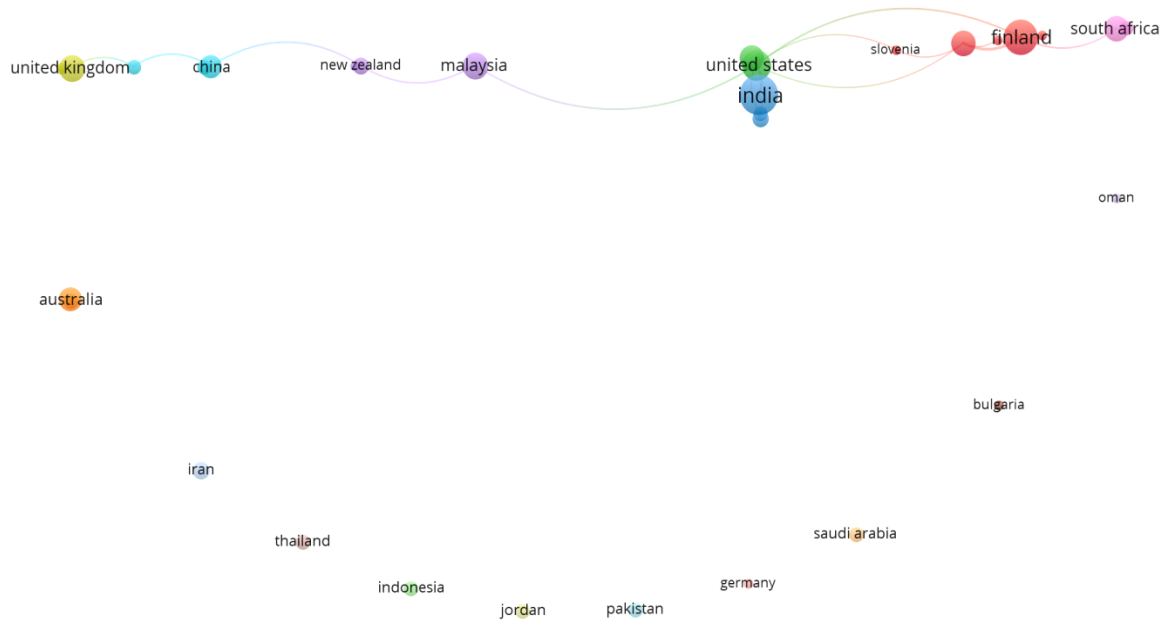


Figure 4. Top-5 of most productive countries or territories publishing on mobile banking adoption research



The network of cooperation or co-authorship between countries can be seen in figure 5. All countries were used. The size of the circles represents the number of publications, the thickness of the lines represents the strength of their collaborations and the countries that are not connected means that they have not published together with others.

Figure 5. Cooperation network between countries and territories in mobile banking adoption research



3.4.2 Institutions

The results show 115 different affiliation institutions of the authors. 87.8% (n = 101/115) have only one registered publication on mobile banking adoption. 9.5% (n = 11/115) two publications, two institutions three documents and one has nine documents assigned. The table shows the most productive institutions on the subject of study, being the Ita-Suomen Yliopisto, Finland the most productive, followed by Universidade Nova de Lisboa, Portugal, and Jyvaskylan Yliopisto, Finland.

Table 3. Top-3 of most productive institutions publishing on mobile banking adoption

AFFILIATION	Country	Number of publications
Ita-Suomen yliopisto	Finland	9
Universidade Nova de Lisboa	Portugal	3
Jyvaskylan Yliopisto	Finland	3
Brunei Institute of Technology	Brunéi	2
Victoria University of Wellington	New Zeland	2
University of KwaZulu-Natal	South Africa	2
Monash University	Australia	2
National Taiwan Ocean University	Taiwan	2
University of Malaya	Malaysia	2
North-West University	South Africa	2
Princess Sumaya University	Jordan	2
International Management Institute, India	India	2
NOVA Information Management School	Portugal	2
Universitas Katolik Parahyangan	Indonesia	2

* Equally productive institutions have the same ranking number.

3.5. Cited analysis

The analysis of citations gives the number of times a publication has been cited by other publications in Scopus. For the 94 publications, 2847 references were used.

In total, the 94 documents have been used 1617 times as references in other publications. The average citations per publication is 17.20.

Of the total number of publications, 34% ($n = 32/94$) has not been cited, 29.78% ($n = 28/94$) has between one and five appointments, 8.5% ($n = 8/94$) has received between six and ten appointments, 8.5% ($n = 8/94$) has between eleven and twenty appointments, and 18.08% ($n = 17/94$) more than 20 appointments (the maximum being 240).

Table 4 shows the 20 most cited documents, their authors, the source in which it was published, the year, number of citations, average appointments per year and the type of document. The three most cited are the Laforet and Li documents ($n = 240$), Lin ($n = 205$) and Laukkanen T. ($n = 121$). However, those with the highest average citations per year or impact to call it that are Lin's documents ($n = 34.17$); Hanafizadeh, Behboudi, Abedini Koshksaray and Jalilvand Shirkhani Tabar ($n = 30.33$), and Shaikh and Karjaluo ($n = 30.33$). All being quantitative studies with empirical evidence, except for that of Shaikh and Karjaluo, which is of a qualitative type: a literature review.

Table 4. Top-20 of most frequently cited publications on mobile banking adoption

No.	Document Title	Authors	Journal Title	Publication Year	Times cited	Average cited per year	Type of study
1	Consumers' attitudes towards online and mobile banking in China	Laforet S., Li X.	International Journal of Bank Marketing	2005	240	20.00	Empirical quantitative
2	An empirical investigation of mobile banking adoption: The effect of innovation attributes and knowledge-based trust	Lin H.-F.	International Journal of Information Management	2011	205	34.17	Empirical quantitative
3	Internet vs mobile banking: Comparing customer value perceptions	Laukkanen T.	Business Process Management Journal	2007	121	12.10	Empirical quantitative
4	Innovation resistance among mature consumers	Laukkanen T., Sinkkonen S., Kivijarvi M., Laukkanen P.	Journal of Consumer Marketing	2007	92	9.20	Empirical quantitative
5	Mobile-banking adoption by Iranian bank clients	Hanafizadeh P., Behboudi M., Abedini Koshksaray A., Jalilvand Shirkhani Tabar M.	Telematics and Informatics	2014	91	30.33	Empirical quantitative
5	Mobile banking adoption: A literature review	Shaikh A.A., Karjaluo H.	Telematics and Informatics	2014	91	30.33	Qualitative: Literature review
6	Mobile banking rollout in emerging markets: Evidence from Brazil	Cruz P., Neto L.B.F., Munoz-Gallego P., Laukkanen T.	International Journal of Bank Marketing	2010	87	12.43	Empirical quantitative
7	Mobile banking adoption: Application of diffusion of innovation theory	Al-Jabri I.M., Sohail M.S.	Journal of Electronic Commerce Research	2012	80	16.00	Empirical quantitative
8	Mobile banking adoption of the youth market: Perceptions and intentions	Akturan U., Tezcan N.	Marketing Intelligence and Planning	2012	75	15.00	Empirical quantitative
9	Extending the understanding of mobile banking adoption: When UTAUT meets TTF and ITM	Oliveira T., Faria M., Thomas M.A., Popovic A.	International Journal of Information Management	2014	71	23.67	Empirical quantitative
10	Exploring Adoption difficulties in mobile banking services	Yang A.S.	Canadian Journal of Administrative Sciences	2009	51	6.38	Empirical quantitative
11	Perceived risk, usage frequency of mobile banking services	Chen C.S.	Managing Service Quality	2013	42	10.50	Empirical quantitative
12	An overview of mobile banking adoption among the urban community	Sulaiman A., Jaafar N.I., Mohezar S.	International Journal of Mobile Communications	2007	39	3.90	Empirical quantitative
13	Determining critical success factors of mobile banking adoption in Malaysia	Daud N.M., Kassim N.E.M., Said W.S.R.W.M., Noor M.M.M.	Australian Journal of Basic and Applied Sciences	2011	25	4.17	Empirical quantitative
14	Mobile-banking adoption and usage by low-literate, low-income users in the developing world	Medhi I., Ratan A., Toyama K.	Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)	2009	25	3.13	Empirical quantitative
15	An evaluation of e-banking and m-banking adoption factors and preference in Malaysia: A case study	Tan K.S., Chong S.C., Loh P.L., Lin B.	International Journal of Mobile Communications	2010	22	3.14	Empirical quantitative
16	Segmenting bank customers by resistance to mobile banking	Laukkanen T., Sinkkonen S., Laukkanen P., Kivijarvi M.	International Journal of Mobile Communications	2008	21	2.33	Empirical quantitative

17	An empirical study on mobile banking adoption: The role of trust	Liu Z., Min Q., Ji S.	2nd International Symposium on Electronic Commerce and Security, ISECS 2009	2009	20	2.50	Empirical quantitative
18	Investigating the factors influencing the adoption of m-banking: A cross cultural study	Mortimer G., Neale L., Hasan S.F.E., Dunphy B.	Marketing Intelligence and Planning	2015	19	9.50	Empirical quantitative
19	Consumer adoption versus rejection decisions in seemingly similar service innovations: The case of the Internet and mobile banking	Laukkanen T.	Journal of Business Research	2016	18	18.00	Empirical quantitative
20	Mobile banking — Insights on its increasing relevance and most common drivers of adoption	Ha K.-H., Canedoli A., Baur A.W., Bick M.	Electronic Markets	2012	14	2.80	Qualitative: Literature review
20	Cultural, individual and device-specific antecedents on mobile banking adoption: A cross-national study	Laukkanen T., Cruz P.	Proceedings of the Annual Hawaii International Conference on System Sciences	2012	14	2.80	Empirical quantitative

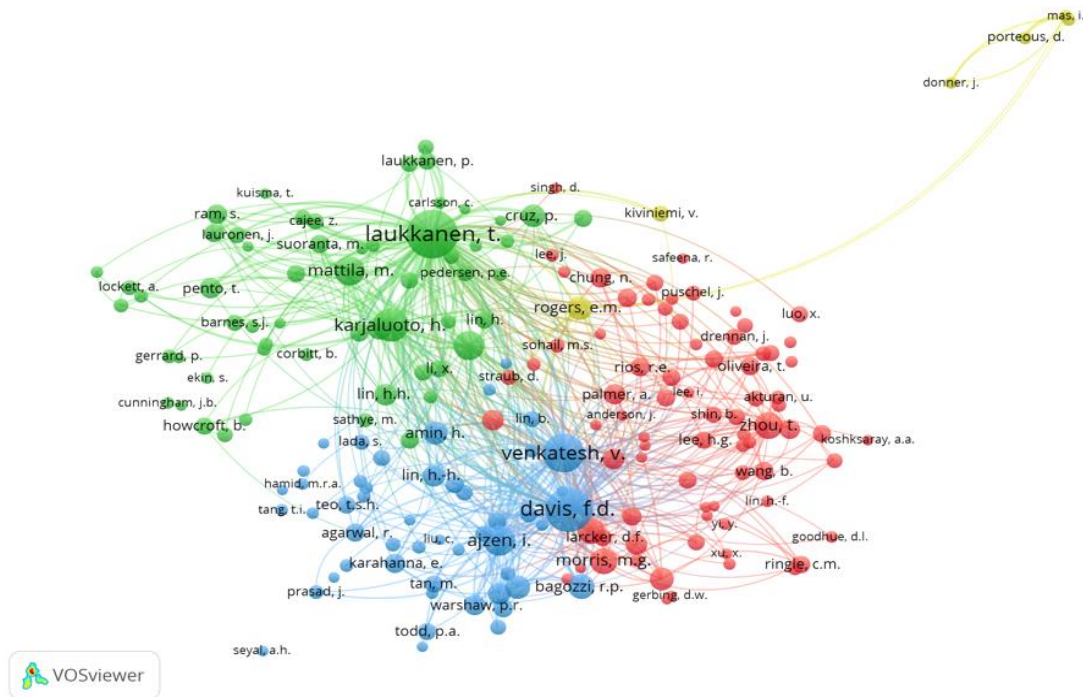
* Equally number of citations by publications have the same ranking number.

3.6. Citing and co-citation analysis

The co-citation analysis refers to the number of publications that have been used as references together by different publications. It would be assumed that the more references have been cited together, there will be more similarity between the publications.

To carry out the co-citation analysis, the restrictions used were that the authors considered had at least 10 citations. The results are shown in Figure 6. The size of the circles means the number of times that you have been quoted, the larger is the more appointments you have received. The distance between the two publications suggests the relationship between the publications, the closer they are the greater similarity between them. Circles with the same color establish a similar theme among publications. The co-citations map shows how the references are grouped together and form four well-defined clusters.

Figure 6. Co-citation analysis of highly-cited references used in publications on mobile banking adoption



3.7. Review of the 20 most cited studies

In this section, the analysis of the 20 most cited articles, previously mentioned, was carried out in order to identify which theories have been most used as a frame of reference in the adoption of mobile banking, which hypotheses have been raised, which have been common for the different studies and which have been proven; as well as the methodology used to carry out the empirical test (data collection technique, profile, and size of the sample, and technique for the analysis of the data) was verified. It is worth mentioning that the documents by Shaikh and Karjaluoto (2015) and Ha, Canedoli, Baur & Bick (2012), were not considered in this analysis because they are qualitative considerations (review of the literature and concepts, respectively).

The following results can be obtained:

- 1) The theories that have been used as a frame of reference for the development of the study and the definition of the determining variables for the adoption of mobile banking are:
 - a. Original Self-service Technology (SST) Intention to Use Model
 - b. Hofstede's cultural dimensions (2010)
 - c. Task-technology fit (TTF) model
 - d. The Unified theory of acceptance and usage of technology (UTAUT)
 - e. Initial trust model (ITM)
 - f. Technology Adoption Model (TAM) and extended TAM
 - g. Innovation diffusion theory (IDT)
 - h. Theory resistance to innovation
 - i. Rasch Measurement Model (IRT)
 - j. The means-end theory

The most commonly used model is TAM ($n = 6$), followed by Innovation diffusion theory (IDT) ($n = 5$), Theory resistance to innovation ($n = 3$) and Unified theory of acceptance and usage of technology (UTAUT) ($n = 2$).

- 2) Regarding the methodology used, 18 are quantitative empirical studies and two are qualitative empirical studies. For qualitative studies, the technique of data collection was the interview with a sample size of 20 and 90 (see the works of Laukkanen, 2007 and Medhi, Ratan & Tomaya, 2009, respectively).

In quantitative studies it is observed that the main technique for obtaining the data is the questionnaire or survey either paper or electronic (predominantly the latter) generally to bank users through banking institutions or using student populations of universities, the average sample size was 755 respondents (with a range of 128 respondents the smallest size and 3585 the largest sample size). The technique used for the analysis of the most used data was the model of structural equations using AMOS from SPSS, Lisrel or PLS, as well as t-tests, multiple regressions, and logit regressions. In the case of Laukkanen, Sinkkonen, Laukkanen & Kivijarvi (2007), they used for their data analysis K-Means clustering and Kruskal-Wallis tests, χ^2 ; Yang, (2009) by the nature of his questions and data used WINSTEPS program; and Cruz, Barretto, Muñoz-Gallego, and Laukkanen (2010) used PROXSCAL method with PASW software.

3) Regarding the hypothesis, the most repeated is the variables mentioned below as determinants of the intention of use, adoption or use of mobile banking: Ease of use, perceived utility, perceived risk, compatibility, complexity, relative advantage, trust, and observability. Not to mention that the majority made the comparison between groups using sociodemographic aspects such as age, education, gender and income as control variables.

4) The countries in which the study was conducted include: Finland (n = 5), Australia, Thailand, Portugal (n = 2), Iran, Taiwan (n = 3), Turkey, Saudi Arabia, Malaysia (n = 3), Brazil, India, Kenya, Philippines, South Africa, China (n = 2).

4. CONCLUSIONS AND LIMITATIONS

This study presents a bibliometric analysis of the main trends in publications on mobile banking adoption, concluding that it is a trending topic and that it is worth continuing in this line by applying it to Latin American countries where research on this has been scarce. Since technology in financial services is a useful tool for the banking and deepening of the financial sector in the population, it would be worth analyzing the factors of adoption in these countries and the behavior of the population.

In the same way, it is necessary to mention some limitations of the work. First, the search was made exclusively in the Scopus database, which leads to the omission of other valuable information content present in other databases. Although Scopus is among the largest global databases, it does not, of course, contain all publications in the field of mobile banking adoption research. Other international databases could have been used, such as Web of Science or Ebsco. However, Scopus and Web of Science are of the most widely accepted and frequently used databases for the analysis of scientific publications (van Nunen, 2017). Second, the bibliometric analysis uses quantitative methods. Therefore, the content or quality of the publications cannot be interpreted (Dunk and Arbon, 2009). Based on these limitations that characterize bibliometric analysis, a deeper content analysis is recommended for future research (van Nunen, 2017).

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