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Banking innovations and their effect on profitability

Innovaciones de la banca y su efecto en la rentabilidad

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ABSTRACT

This research seeks to answer these questions by analyzing multiple empirical articles carried out at different times, in different countries, and with various innovations. The research is divided into three sections: first, it presents a chronology of the evolution of banks, their main innovations, and events that have modified the banking business model to adapt it to banking today. The second is based on bibliometric tools to present the primary references of the articles that analyze the relationship between innovation and bank profitability and its conceptual structure. Finally, the third section analyzes the concept of branchless banking and its factors. Three findings stand out: 1) according to the empirical literature consulted, it is concluded that innovation does affect profitability, 2) publications have grown in recent years, with China being the most productive country and the United States the most influential, and 3) The concept of branchless banking is a viable alternative to measure innovation in the Mexican banking sector.

Keywords: Innovation, Profitability, Branchless banking, Adoption.

JEL CODE: O330

RESUMEN

La presente investigación busca contestar estás interrogantes mediante el análisis de múltiples artículos empíricos realizados en diferentes tiempos, distintos países y con diversas innovaciones. La investigación se divide en tres apartados: primero presenta una cronología de la evolución de los bancos, sus principales innovaciones y sucesos que han modificado el modelo de negocios de la banca hasta adaptarla a la banca en la actualidad. El segundo, se apoya en las herramientas de la bibliometría para presentar los principales referentes de los artículos que analizan la relación entre la innovación y la rentabilidad bancaria y su estructura conceptual. El tercer apartado analiza el concepto de banca sin sucursales y los factores que lo componen. Se destacan tres hallazgos: 1) de acuerdo con la literatura empírica consultada se concluye que la innovación si tiene efecto en la rentabilidad, 2) crece las publicaciones en años recientes, siendo China el país más productivo y Estados Unidos el más influyente, 3) el concepto de la banca sin sucursales es una alternativa viable para medir la innovación en la banca mexicana.

Palabras clave: Innovación, Rentabilidad, Banca sin sucursales, Adopción.

JEL CODE**:** O330

INTRODUCTION

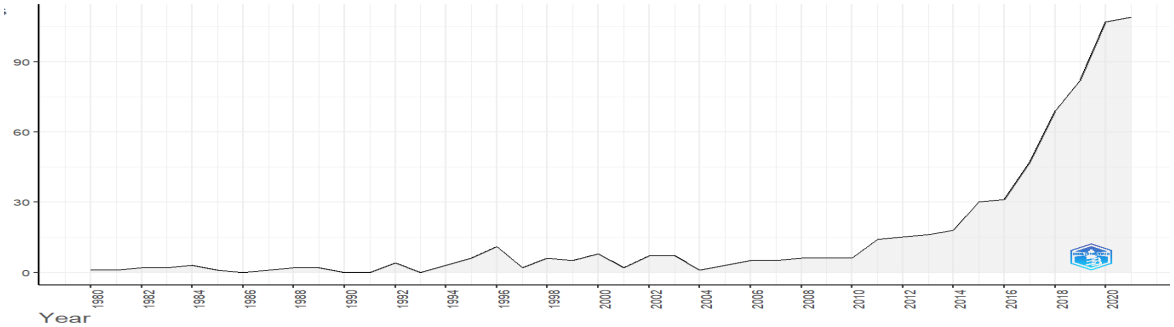
Commercial banks, like for-profit companies, aim to maximize their profitability. The scientific literature that addresses the determinants of bank profitability is extensive, and researchers classify the factors that affect profitability into internal and external factors (Misra, 2015; Neves et al., 2020; Rahman et al., 2020). A third category is market factors. Among the investigations that use this classification are: Adrianzen (2016), Dietrich and Wanzenried (2011), and Mirzaei et al. (2013).

The internal factors evaluate the performance of bank management, such as risk, liquidity, efficiency, and operability, among other indicators. Market factors include the size of banks, competition, monetary policy, bank ownership, Etc. Finally, in the category of external factors are determinants such as macroeconomic variables such as inflation, gross domestic product, and central bank interest rates. Likewise, in this classification is the performance of the stock markets and the trend of new technologies.

Furthermore, it is precisely on the factor of new technologies on which this study is based, on analyzing the influence of technological advances, which we will call innovation from now on. The literature has confirmed the importance of innovation and its impact on the performance of an entity. This research recounts the main innovations in the banking sector, the studies that analyze their relationship with banking profitability, and the adoption of these innovations by the Mexican banking sector during the period 2011-2021.

In recent years, there has been an increase in publications that analyze the relationship between innovation and banking performance, as seen in graph 1. The increase in publications in recent years is due to the attention given to financial innovation since the 2008 financial crisis (Khraisha & Arthur, 2018).

Graphic 1. Articles analyzing the relationship between innovation and bank profitability



Source: Own elaboration with data obtained from the Web of Sciences portal.

Innovation in the banking system is approached in this research from the Schumpeterian perspective of creative destruction, which is defined as a dynamic production system in permanent evolution and periodically dominated by waves of innovation (Montoya Corrales, 2012).

More specifically, the concept is specified from the point of view of the banking sector, and Alvarez (1993) defines it as the adequacy of supply to customer and market demand. Khraisha and Arthur give a broader definition of financial innovation and define it as a process carried out by any institution which involves the creation, promotion, and adoption of new (including both incremental and radical) products, platforms, and processes or an enabling of technologies that introduce new ways or changes in the way of carrying out a financial activity. These definitions adjust to the current situation of the banking sector and its tendency to invest more in alternative channels to physical branches as digital users demand.

For these users normalized with technology, their consumption habits have changed in the last decade, and it is expected that before making a purchase decision, they look for a reference in social networks of previous experiences and thereby reduce the risk (Han & Jun, 2021; Jiménez-Barreto & Campo-Martínez, 2018).

The scientific literature has not been oblivious to this new trend of obtaining everything with a single click and has carried out research that analyzes the adoption and behavior of these digital user consumption habits that range from transportation with applications such as Uber and Blablacar to ordering food delivery, Uber eats, Rapid, DiDi Food, Etc., and even trust that an algorithm can make better decisions to find a partner with applications such as Tinder (Amin et al., 2020; Bueno et al., 2017; Rita et al., 2021; Willis & Tranos, 2021).

The banking sector has also adjusted to this trend of digital services; the payment of services, credit cards, and money transfers, among other services, can be done without having to be in a branch. Among the alternatives that banks offer are internet banking, ATM, and banking correspondents, in addition to the fact that more and more businesses accept non-cash payments, such as payments with bank cards, electronic transfers, digital code payments, CODI, and even cryptocurrencies like Bitcoin.

Among the main benefits that users obtain is having access to carry out transactions at any time and from any place with internet access, contract credits, or other instruments from different devices, among others that improve the user experience (Bueno et al., 2017; Jebarajakirthy & Shankar, 2021).

The proliferation of alternative access points to branches is not new, the banking sector has been characterized by its ability to adapt to constant changes, not only technological but also political, economic, and social, and this has allowed it to evolve and provide its users with experiences according to the innovative environment that we live in these times and that is hardly found in other sectors.

To cite a few examples, in the last decade, mobile banking, the adoption of identity verification by biometric data, Blockchain technology, and Artificial Intelligence in various processes, among other innovations, have become popular. To reach this moment and consolidate themselves before society as institutions with recognition and trust, banks have traveled an ancient path that has not been free of obstacles according to the times, places, and culture in which they carried out their operations.

This research recounts the main innovations in the sector, in the adoption of the Mexican banking sector, and its relationship with profitability. The article is presented in three sections: the first recounts the most important events and innovations throughout banking history. In the second section, a bibliometric of the studies that analyze the relationship between innovation and banking profitability is carried out. The third section refers to the term branchless banking groups banking innovations of access points outside the traditional business model of branches, and finally, the conclusions are presented.

EVOLUTION OF THE BANKING SECTOR

Old history

The first signs of banking date back to the 7th century BC. in the Red Temple of the city of Uruk; in ancient Babylon, the priests were the first bankers. People deposited their assets for safekeeping and the new bankers, backed by their excellent image, lent them guarantees (Tristán, 2015). There is evidence that Babylonians used writing, contracts, promissory notes, mortgages, and pledges, other civilizations, such as the Egyptian, Greek, and present Roman, have evidence of banking activities (Villegas & Ortega, 2002)

Among the regulations that have stalled the expansion of banks is the promulgation of the XII Tables during the Roman Empire that prohibited the charging of high interest to debtors, protecting them and providing them with the minimum guarantees for the satisfaction of their credits (Salazar, 2004). Also, during feudal times in Europe, the church prohibited charging interest to the poor (Gutiérrez, 2019).

It was not until the 14th century, during the Renaissance, in city-states such as Genoa and Venice, that banking activity regained its importance, generating great fortunes in families such as the Medici. The discovery and colonization of America, the consolidation of the

European States, and the international commercial expansion through oceanic routes, in addition to the current economic thought of mercantilism and excess credit, impact banking functions and force banks to create new financial instruments such as the exchange transfer (Guerra Martínez, 2002).

An important innovation in the means of payment was the check. There is a record that this instrument was used in the 16th century in Italy, Spain, and Holland. Among the advantages of using the check are the ease of collecting it and the certainty it gives the person who received it (del Ángel, 2019). Another event of great relevance in the financial sector was the creation of the first stock market as a legal institution, born in Amsterdam, the Netherlands, in 1602 (Stringham, 2003).

During the Renaissance, Fra Lucca Paccioli incorporates double entries in the register of the financial situation. In the centuries after the Renaissance, the mercantilist and physiocratic currents of thought established their vision of trade between nations. The financial system was a preponderant player that promoted significant innovations during the industrial revolution, and internally, banks created new and attractive instruments.

Financial instruments are not only issued for companies but also the countries' governments, such as the issuance of bonds (Ferguson, 2008). In the second part of the 19th century, the first banking institutions were established in Mexico; the Bank of London was of English origin, the first to come into operation in 1864.

This bank not only carried out its usual operations, attracting deposits and granting loans to its clients but also, among its functions, stood out in the issuance of paper money and banknotes, which were accepted in large part of the national territory. The function of granting credit prior to banks' incorporation was mainly granted by religious orders (Turrent, 2008).

The 20th century

The evolution of banks during the 20th century has been radical, both in theoretical and operational terms. In the first decades and an environment of mergers and the growth of monopolies in various sectors of the US economy, finance ceased to be a branch of economics. Instead, it consolidated as an independent area with its theories and models.

Faced with a changing and high-risk environment, the Federal Reserve acquired greater power to regulate the banking system; among its leading powers was to force banks to deposit their reserves in its coffers and to act as lenders of last resort. Meanwhile, European banks operating in an environment of recession and reconstruction caused by the First World War adopted the Universal Bank model to finance businesses and rebuild their countries' economies and infrastructure, achieving stability in the following years. Their central banks

acted differently, defeating countries such as Italy and Germany with a greater economic impact and, therefore, a more significant intervention (Jácome, 2002).

In 1929, the New York stock market collapsed, caused partly by uncontrolled credits granted by banks, and invested in the stock market, in addition to the evident conflict of interest of the commercial banks themselves that were buying and selling assets. The speculative bubble burst on Thursday, 29 October and the consequences for the US banking system were the failure of 11,000 banks. The financial crisis turns into an economic crisis with high unemployment.

The US government, led by President Franklin D. Roosevelt, passed a law to separate commercial and investment banking activities and prohibited commercial banks from underwriting, holding, or trading corporate securities, either directly or through securities subsidiaries. These regulations helped to cushion the impact on banking during World War II (Kroszner & Rajan, 1993). European banks responded with various strategies, including providing state guarantees to stimulate the interbank market, recapitalizing banks with public money, and creating bad banks to remove troubled assets from banks' balances (Bordo & James, 2011).

The 1950s and 1960s are considered the heyday of capitalism. The United States established itself as the world power, and the reconstruction of Europe and Japan and the growth of production overpopulation resulted in a 5.4% increase in GDP from 1948 to 1971.

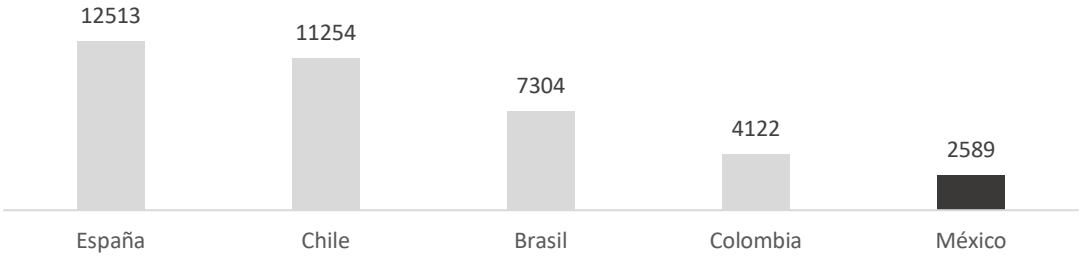
Japan was the most prominent country in that period, with a growth of 9.4% between 1953 and 1965. Among the factors driving this performance was the relationship between banking and its emerging industry (Aparicio, 2014). Along with economic and technological growth, competitive pressures, and market changes, financial theories, models, and related fields such as working capital and cash flow management, optimal allocation of resources, expected returns, measurement and projection of operating costs, capital budgeting, formulation of the company's financial strategy and the theory of capital markets are developed (Flóres, 2008).

Credit Card

It was in 1948 that US banks began to issue credit cards for their most solvent customers, being in the fifties when more than 200 US banks adopted this innovation. Private companies such as Diner's Club Inc. and American Express were also developed, which extended their network to several countries. In Mexico, although commercial establishments such as Puerto de Veracruz S.A., Palacio de Hierro, and Puerto de Liverpool S.A., among others, used credit cards in the '50s, among the banks, Banamex was the first bank that implemented the granting of credit in this modality. However, it was until 1968 (Acosta, 2000).

Among the first investigations that analyze the relationship between credit cards and banking, profitability is the one carried out by Sinkeyand Nash (1993), in which financial institutions specialized in credit cards are compared with traditional banks in 1984 and 1991. It is concluded that the returns of the former, measured by the ROA indicator, were extraordinary, although with more significant variability and insolvency; that is, they are riskier than traditional banks.

Graphic 2. Comparison of Credit Cards between countries for every 10,000 adults



Source: Prepared by the authors with data from the International Monetary Fund, Financial Access Survey, 2019

In Mexico, the research carried out by Trejo-Garcia et al. (2014) stands out in which they propose an improvement for the current model used by the CNBV for the selection of credit card users to predict default, minimizing the creation of provisions and increasing the profitability of financial institutions and meeting national and international regulatory requirements. The penetration of this financial instrument in our country compared to other countries is observed in Graphic 2.

The second half of the 20th century

The economic growth trend of past decades ended in the early 1970s. Economic recessions characterized the following decades. Among the events that caused this scenario, the following stand out 1) devaluation of the dollar by removing the gold standard, 2) crisis between the Organization of Petroleum Exporting Countries (OPEC) and the United States, given their support for Israel in the conflict with Syria and Egypt and 3) inflation in the United States due to the high deficit of the trade balance due to the overvaluation of the dollar (Aparicio, 2014).

Prior to this environment of economic crisis, dollars were abundant in the capital market; Mexico, like several countries, contracted debt in dollars at competitive rates, but that scenario changed in 1982 when the Federal Reserve modified its monetary policy by going from its interest rate -11.2% in 1977 to 16.8% for 1982.

This adjustment causes Mexico to find itself suddenly in a scenario of unpayable foreign debt. Consequently, the intervention of the Bank for International Settlements (BIS), the International Monetary Fund, and the United States was necessary to restructure Mexico's debt in exchange for the country making structural adjustments, with high unemployment and a contraction in economic growth part of the consequences (De Olloqui, 1984).

Between the decades of the 70s and 90s, characterized by global financial turbulence mentioned above, the development of banking did not stop and created technological innovations. Fanjul and Valdunciel, (cited in Avendaño, 2018) divide this period into four stages. 1) In the sixties, there were no technological advances, and the banks' priorities were to increase productivity, reduce costs and increase security. 2) During the 1970s, teleprocessing was introduced; this system allowed users to carry out banking operations by telephone. 3) In the 1980s, new access points were introduced that allow the user to carry out operations outside the bank. Some examples are the consolidation of ATMs and the increase in businesses that accept payment by credit card. 4) In the nineties, the adoption of virtual banking begins. Unfortunately, the implementation begins with the banks' internal networks (intranet) and presents vulnerabilities and security deficiencies.

Automatic Teller Machine (ATM)

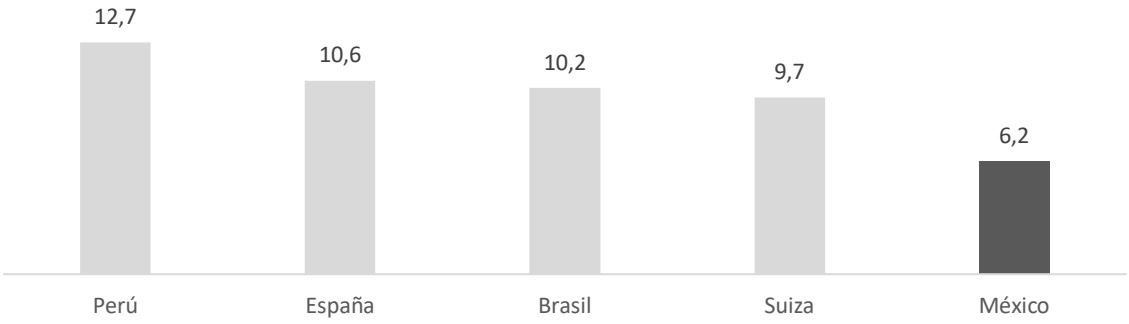
With the advancement of new information technologies, retail banking competes with new alternative channels to the traditional business model of banks based on the number of branches. The first innovations that allowed financial users to carry out transactions outside the bank branch took place in the seventies. They were the appearance of electronic teller machines, Automatic Teller Machine (ATM). However, the first ATM was installed in June of 1967 on the street in Enfield, London, in a Barclays bank branch; it was not until the following decade that its use became widespread (Batiz-Lazo, 2009).

ATMs changed the business model of the banking sector; their incorporation into the market went from being a competitive advantage in its early years to a minimum requirement for competition among retail banks. As a result, ATMs have become an essential service that other banks can easily replicate. Janet Hartung, Mellon Bank Senior Vice President and Director of Network Services, agrees that these systems are essential but have limited competitive advantage: "Competitive impact? ATMs are important not to lose market share, but no quota is captured (Clemons, 1990).

Some studies that analyze the relationship between these and profitability are mentioned. Based on data from US banks, Massoud et al. (2003) analyze the relationship between ATMs and bank profitability and find a direct relationship between the additional charges for using ATMs and bank profitability. Itah & Emmanuel (2014) study Nigerian banking in which they examine the effect of ATMs, points of sale, and transactions through the Internet on bank profitability through a method of multiple regression analysis by ordinary least squares. The

result showed that ATMs and points of sale are positively related to ROE. Graphic 3 compares ATMs in different countries and shows a lag in Mexico.

Graphic 3. Comparison of Mexico with other countries in ATM per 10 thousand inhabitants.



Source: Prepared by the authors with data from the International Monetary Fund, Financial Access Survey, 2019

Other innovations have impacted the banking sector: process automation, telemarketing, and debit cards, among others, occurred in the last two decades of the 20th century. The internet era in the banking system began in 1994; Stanford Federal Credit Union in California was the first credit institution to offer services through an internet page (del Ángel, 2019), thus beginning the era of digital banking. In 1998, Banamex was the first Mexican bank with an Internet site.

BANKING IN THE 21ST CENTURY

The new century coincides with the positioning of new native Internet companies. Search engines and the birth of social networks provided an environment conducive to innovating in traditional businesses. Amazon in commerce, Airbnb in travel, Netflix in entertainment, and Uber in transportation, are examples of the changes in business models driven by the internet.

The financial sector is no exception. Given the opportunity provided by the new digital environment, platforms and applications are being developed to facilitate payment systems and access to financial products and services. Banks are not the first to innovate; the first generating agents of this transformation were the Fintechs. Among the main advantages that Fintechs present that allows them to innovate before large credit institutions are their orientation to solve a specific problem and greater flexibility, functionality, and human capital aligned to technology.

Schueffel (2016) highlights that among the numerous and disruptive innovations that have taken place by Fintech are internet banking, mobile payments, collective financing loans

between individuals (lending), online identification, Etc. Given this scenario, during the first decade of the new century, banks see the need to improve their distribution channels per the growing evolution of Information and Communication Technologies (ICT).

Online bank

Internet banking is the proposal of the big banks that allows its users to carry out their operations at any time from their cell phone or computer with Internet access, improving their experience. Bueno et al. (2017) mention that the growing adoption of these innovations can be explained by two factors interacting. The accelerated change in operating processes and marketing channels and the sociocultural change arising from the new digital society is carried out by two generations, the millennials and the centennials.

Many empirical studies analyze the adoption of Internet banking. Among the most cited is the one by Tan, Margaret & Thompson (2000). They conclude that among the main factors that explain the adoption of Internet banking on the internet, there is social influence, the perception of having a relative advantage, compatibility, the possibility of trying, and additional support from the government of Singapore to promote electronic commerce.

Furthermore, the adoption of internet banking services in Hong Kong is analyzed by Chan & Lu (2011). In this research, the authors evaluate the intention to use internet banking either because of its perceived utility or ease. The results reveal that the most important factors are: 1) computer self-sufficiency, that is, if the user believes they can use a device, and 2) subjective norm, which refers to whether a prominent character considers using internet banking.

Mansumitrchai & N. AL-Malkawi, (2011) analyze Mexican financial users and their attitude towards adopting internet banking. Among his findings, he mentions the two factors that have the most significant impact on users who refuse to use Internet banking: 1) insecurity and 2) the preference to have contact with a human to carry out their transactions.

Faced with greater competition and the consolidation of ICTs, the second decade of the century begins in an environment marked by greater regulation; because of the US mortgage crisis of 2008, Fintech and larger commercial banks opt for uniting their efforts in joint projects. The former provides alternative proposals that contribute to the transformation of banking to the digital age, and the banks support financing the projects that the Fintech companies alone could not achieve (Igual, 2018).

Mobile banking

The development of access channels continues to evolve and consolidate among the population. The banking application for mobile devices is perhaps the most widely accepted banking innovation. Mobile banking began in Mexico with pilot plans in 2007, Banco Azteca and Bancomer being the first (del Ángel, 2019).

This application is consolidated as one of the main access channels among Mexican users in the following years. According to data from the National Banking and Securities Commission (CNBV), account holder contracts with access to mobile banking went from 162,442 in 2011 to more than 63 million in 2021.

The data produced by the National Survey on the Availability and Use of Information Technologies in Households (INEGI, 2021) put the adoption of mobile banking by Mexican users in context. In 2020, in Mexico, there were 88.2 million cell phone users, 91.6% being smartphones. In addition, 21.7% of users carry out banking operations, higher than 16.8% in 2019.

The average age of Mexicans can explain the acceptance of mobile banking in 2020 which is 29 years old, according to INEGI data. In his research on the adoption of mobile banking, (Gutiérrez, 2020) mentions the characteristics of the application users in Mexico and Portugal. He concludes that the profile of users in Mexico are young people with an advanced level of education, an upper middle income, knowledge of technology, and who have a good image of the innovation they are adopting.

Among the studies that analyze the relationship between mobile banking and profitability is the study by Mutua (2013). The author analyzes 43 commercial banks with mobile applications and six cell phone service providers. As a result, she finds a positive, albeit weak, relationship between mobile banking and bank profitability, as measured by the ROA indicator.

For their part, Medyawati et al. (2021), through a data panel, analyzes the relationship between Indonesian banks and access channels such as ATMs, mobile banking, and internet transactions. It concludes that mobile banking and internet transactions positively affect profitability, measured by ROA. On the contrary, Dedeh Sri Sudaryanti & Nana Sahroni (2018) conclude that the ROA indicator of banks listed on the Indonesian stock exchange negatively affects their relationship with mobile banking.

Banking correspondents

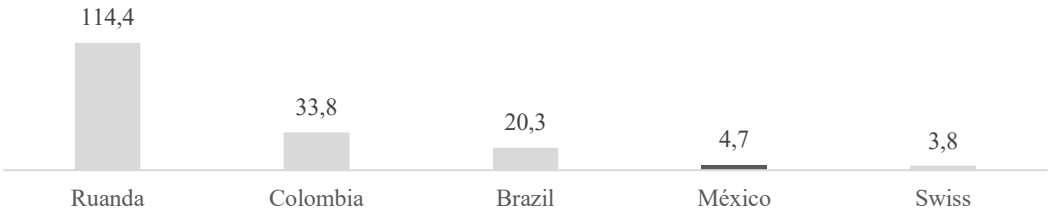
Another innovation that financial users and commercial banks have very well received is the commission agent model. This model is mainly used by developing countries with a large territory and a significant difference in terms of wealth, with Brazil and Kenya being the primary references.

This model is promoted by international organizations such as the World Bank and local governments to increase the financial inclusion of their population. The CNBV defines bank commission agents as natural or legal persons with a business relationship with credit institutions, allowing them to act on their behalf and offer products and services to customers, acting as if they were them, obtaining payment. Commission for each transaction made.

Correspondents, as they are also known, have growing participation in the country's financial system; each year, financial users carry out more banking operations in these establishments: in 2011, 80.51 million were carried out, and by 2021 the total number of transactions was 518.48 million, being its growth of 544% in that period.

Several countries around the world use the commission agent model. Brazil is the first Latin American country to adopt this model. In 1973, the Central Bank of Brazil authorized commercial banks to contract with third parties for the sending and receiving of payments, as well as the collection of checks. The figure of correspondents allowed this country that millions of citizens could have access to banking products and services. By 2005, 10 million users used banking correspondents, and in 2010 there were 151,958 correspondents in that country (Reyes, 2020).

Graphic 4. Comparison of correspondents per 10 thousand adults.



Source: Prepared by the authors with data from the International Monetary Fund, Financial Access Survey, 2019

In Mexico, the increase in this channel is due to the strategies of banks to have new access points for their users, in addition to the expansion of chains such as Oxxo, which adds new stores every year (ENIF, 2018). In addition to the strategies of the correspondents, another critical factor that explains the acceptance of this model is the high cost for banks of opening

a branch in a distant town, such as the border areas of large cities and towns. rural (Peña & Vázquez, 2012).

Nevertheless, not all countries approve of the correspondent model; India is one of them. Among the reasons not to approve the use of third parties to handle cash on behalf of a bank is the risk of fraud and theft. For example, the Reserve Bank of India prohibits deposit and withdrawal transactions from savings accounts that can only be handled by bank employees or ATMs (Ivatury, 2006). The World Bank has also pointed out risks in this model; its report, The Decline in Access to Correspondent Banking Services in Emerging Markets: Trends, Impacts, and Solutions, mentions the risk that banking correspondents are used for money laundering and terrorist financing (WB, 2018).

The installation of two access channels, mobile banking, and banking correspondents in rural Kenya, is studied by Irura and Munjiru (2013). The main findings show that the main factors that would encourage the adoption of these financial innovations are the improvement and guarantee of security, reliability, trust, and the improvement of the propensity to take risks by SMEs that adopt the technology. In addition to the improvement in the political framework, and the telecommunications infrastructure, among others.

Kenya has a large amount of research that addresses this issue (Barasa, 2013; Irura & Munjiru, 2013; Ombui, 2019) are some of the publications that analyze banking correspondents as a factor that drives the performance of commercial banks. For example, Mwange (2017) addresses the relationship between commission agents and bank profitability; the author analyzes innovation's effect on banks' performance in Kenya. He concludes that the relationship positively affects financial performance and is expressed in the increase in profitability; with a more significant number of correspondents and a greater volume of transactions, the performance increases. Also, in Kenya, an empirical study is being carried out that analyzes 17 banks that have banking correspondents. This research by Norah (2018) concluded that the increase in the number of commercial bank agents leads to higher financial performance, so there is a positive correlation.

So far, the evolution of banks has been described; the essential innovations, their adoption, and the relationship with bank profitability if there is empirical research. The following section refers to studies that measure banking innovation as a variable with multiple dimensions. Empirical research is mentioned that relates banking profitability to the term innovation, emphasizing the term branchless banking.

ANALYSIS OF THE LITERATURE THAT ANALYZES THE RELATIONSHIP BETWEEN INNOVATION AND BANK PROFITABILITY

In recent years, the publications that study the relationship between innovation and bank profitability have increased. This section analyzes a database of 646 publications from the Web of Sciences (WOS) portal. The most influential elements in this field of knowledge are identified through the elaboration of tables, graphs, and scientific maps. The database is obtained with the advanced search of TI = (bank* OR banking AND profit or profitability) AND TS = (Innovation).

They are filtered by articles and magazines on finance, economics, administration, and business to obtain a more precise result. In addition, debugging is done in the final database by concatenating words with a similar meaning, for example, banks, banks, or the banking sector. The RStudio program and the Bibliometrix application are used to process the database. The tables of the most significant elements are journals, countries, authors, and articles. In addition, a scientific map of co-words is presented, which aims to understand the conceptual structure of this field of knowledge.

Among the results obtained, high-impact journals publish research on the subject. Of the ten journals that publish the most, seven are from the first quartile, Q1, and the remaining three are from Q2. The American journal Technological Forecasting and Social Change has the most publications and belongs to quartile 1.

Table 1. Journals that publish the most the relation Banking Profitability and Innovation

Journal	*Articles*	*Cites*	*H-index*	*Country*	*Quartil*
Technological Forecasting and Social Change	28	606	13	United States	Q1
Marketing and Management of Innovations	24	104	5	Ukrania	
Journal of Banking & Finance	14	407	9	Netherlands	Q1
Journal of Business Research	13	602	9	United States	Q1
Research Policy	11	494	8	Netherlands	Q1

Source: Own elaboration with data from the Web of Science

The most influential article by the number of citations is “Relational embeddedness and learning: The case of bank loan managers and their clients”, which has 576 citations and was published in 2003. In second place is the publication “New service development competence in retail banking: Construct development and measurement validation”. This 2007 Journal of Operations Management article has 238 citations.

Table 2. Most influential articles

Article	*Author*	*Journal*	*Cites*
Relational embeddedness and learning: The case of bank loan managers and their clients	(Uzzi y Lancaster, 2003)	Management Science	576
New service development competence in retail banking: Construct development and measurement validation	(Menor y Roth, 2007)	Journal of Operations Management	238
The Economic Effects of Technological Progress: Evidence from the Banking Industry	(Berger, 2003)	Journal of Money, Credit, and Banking	189
Cell phone banking: Predictors of adoption in South Africa - An exploratory study	(Brown et al., 2003)	International Journal of Information Management	148
Funding gaps? Access to bank loans by high-tech start-ups	(Colombo y Grilli, 2007)	Small Business Economics	140

Source: Own elaboration with data from the Web of Science

China has the most publications, with 387 articles and 3,243 citations. The United States follows it with 296 publications, the most influential with 7,585 citations. The United Kingdom occupies the third place with 147 publications and 1088 citations. Among the institutions with the most publications are four from China and one from the Netherlands. The Southwestern University of Finance and Economics of China is the most productive institution, which has 20 publications.

Table 2. Most productive countries and Institutions

Country	*Articles*	*Citations*
China	387	3242
United States	296	7585
United Kindom	147	1088
Italy	107	920
Germany	80	968

Institutions	*Articles*	*Country*
Southwestern University of Finance and Economics	20	China
Beijing Normal University	19	China
Universidad Erasmo de Róterdam	15	Netherlands
Xiamen University	14	China
Peking University	13	China

Source: Own elaboration with data from the Web of Science

The scientific map in Graph 4 uses the Louvain algorithm that identifies standard features between elements to form communities or clusters. In the analysis of co-occurrence or co-words, as it is also known, the use of two words in a higher unit (document) is identified. A dependency relationship is presumed if there is a strong relationship, which we identify with the number of links and closeness of the labels. The centrality and size of the tags help us identify the most influential words. These word relations define the conceptual structure of the field of knowledge.

The results obtained group the keywords into 4 clusters. Color helps us identify words that have elements with similar characteristics and thus form a community. The size of the circles and labels are associated with the occurrence of the elements, the larger the size, the greater the importance. To identify the clusters, a label is assigned that is the word with the most occurrences of each group of words, being as follows: Research and Development, Determinants, Adoption, and Performance. They are briefly described to specify the focus of the investigations of each cluster.

Graph 4. Scientific map of co-words of articles with the terms bank profitability-innovation

Source: Own elaboration with data from the Web of Science

The cluster with green nodes has as its central word the words Research and Development and the words with which it has a significant relationship: productivity, investment, competition, knowledge, and growth. The red cluster has determinates as its central word and is related to technology, management, product, and information, among others. The blue cluster is in the central part of the network, the word adoption, and is related to information technology, internet banking, and accessibility. Lastly, there is the purple cluster with the word performance as the concept with the most remarkable centrality. It is related to the words: impact, industry, and companies.

REVIEW OF THE EMPIRICAL LITERATURE

Below are quantitative studies that measure innovation as a variable affecting bank performance. Tian et al. (2020) analyze the relationship between innovation, technical information, and competition in US banks. They measure innovation by (1) the number of patents generated per million dollars of investment in Research and Development (R&D) and (2) the performance of R&D. Among the conclusions presented in his research, novel evidence stands out that the increase in banking competition improves the efficiency of innovation both in terms of R&D inputs (investment) and results (patents and profits generated by R&D).

Another proposal to measure banking innovation is the scientific construction of the Internet Finance Index. Dong et al. (2020) propose measuring Internet finance's impact on Chinese commercial banks. The results show that the development of Internet finance has a positive impact on the profitability, security, and growth of commercial banks and a negative impact on the liquidity of commercial banks. In addition, Internet financing has promoted the improvement of the overall business performance of commercial banks.

For their part, Qamruzzaman and Jianguo (2018) measure the innovation of Asian banks with two proxy variables: M2/M1 and growth of bank credit to the private sector as a percentage of GDP. With data obtained from secondary sources from the World Bank (WB) and the International Monetary Fund (IMF), the study concludes that the government should encourage financial innovation in the financial system through technological advancement and institutional integration.

In addition to formulating an economic policy that favors the development of the banking sector, allowing institutional development, business risk management, and promoting healthy competition in the financial system. Scott et al. (2017) analyze adopting a financial telecommunications network called SWIFT that measures digital innovation. A sample of banks from 29 European countries is analyzed, and their relationship with profitability is analyzed. A positive relationship is found that is maintained over time.

Lee et al. (2020) analyze data from 40 developed and underdeveloped countries and analyze the relationship between financial innovation and bank performance. The financial innovation variable uses two indicators: the financial intensity of Research and Development (FIR), which denotes R&D expenses, and the second measure of financial innovation adopted is the relationship between off-balance sheet items and the total assets of all banks (FIO). The results conclude that the two indicators affect the performance of banks in countries with more significant financial innovation. In contrast, the relationship between financial

innovation and banking growth tends to be higher in countries with weak banking regulations, financial reforms, and weak governance indicators.

Although interesting, these proposals to measure banking innovation are limited by the complexity of obtaining the data. The following section analyzes the concept of branchless banking financial innovation. This concept comprises indicators of banking infrastructure outside the bank branch and is a viable option to measure innovation in the Mexican banking sector.

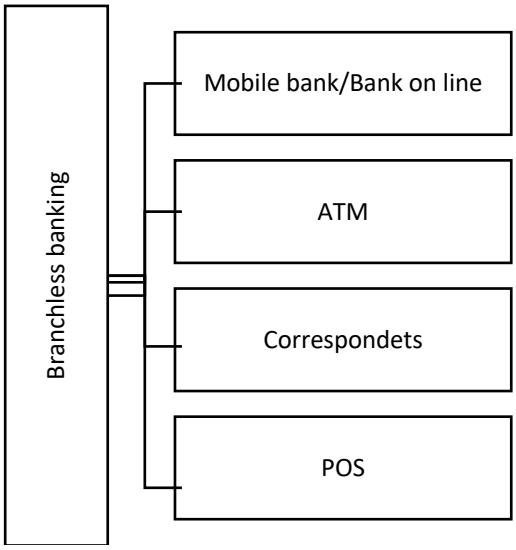
Branchless Banking

Branchless banking is a concept that brings together the main innovations in access points outside the bank branch. The first article that is recorded and that addresses the subject of banking services outside the bank branch is the one carried out by Morison and Frazer (1982), who analyze banking services and the future of US retail banking, among which they mention the increase in bank outlets outside the branch. According to Marshall and Richardson (1996), the term refers to providing banking services through information and communications technology (ICT) to provide retail services outside bank branches.

The use term is a proposal to measure banking innovation used mainly by developing countries with large territories and marginalized areas where banks have little or no penetration and, therefore, a population excluded from the formal banking system. (Ky et al., 2021; Palaon et al., 2020; Zhu et al., 2021). Banking services are provided from remote locations to branches using devices with internet access such as customers' mobile phones, points of sale (POS), automatic teller machines (ATM), and through third parties that represent the bank, who are known as correspondents or commission agents (Muthinja & Chipeta, 2018).

This model benefits users and banks; for the former, it extends the distribution of financial services to remote areas, such as rural communities and the outskirts of large cities, which are not reached by traditional bank branch networks. Among its main benefits for its users is avoiding trips and waiting times. For banks, the cost of building and operating a branch is reduced, which would have little influx due to its location (Ivatury & Mas, 2008). Although there is empirical research on this term, most are from African countries, in which Kenya stands out.

Graph 5. Components of the branchless banking model



Source: Own elaboration

In Latin America, Brazil and Peru have research, among which those carried out by Diniz et al. (2012) stand out, which exposes the experience of the municipality of Autazes in the Amazon region and where a correspondent attended millions of people who did not have access to banking services. It concludes that the positive experience is the local socio-economic development; the negative part is the over-indebtedness of the low-income population, the reproduction of practices of social exclusion, and the reinforcement of power asymmetries. It is concluded that access to financial resources must be accompanied by other mechanisms, among which financial education stands out.

The inequality that characterizes Mexico is also observed in the banking infrastructure. In 2020, 70% of adults living in urban areas had a bank account compared to 55% living in rural areas. The gap between these populations is also found in access to digital channels such as mobile applications, with a differential of 16% in favor of urban areas. Internet access and schooling are two main limitations of using mobile applications in rural areas. These data are obtained from the National Survey of Financial Inclusion of 2021, ENIF-21 (CNBV, 2021). 6% of the Mexican adult population speaks an indigenous language. Three out of four people live in rural areas, and 53% of this population lives in the southern part of the country. This demographic group is the one that presents a lag of 18% in financial inclusion concerning adults in urban areas.

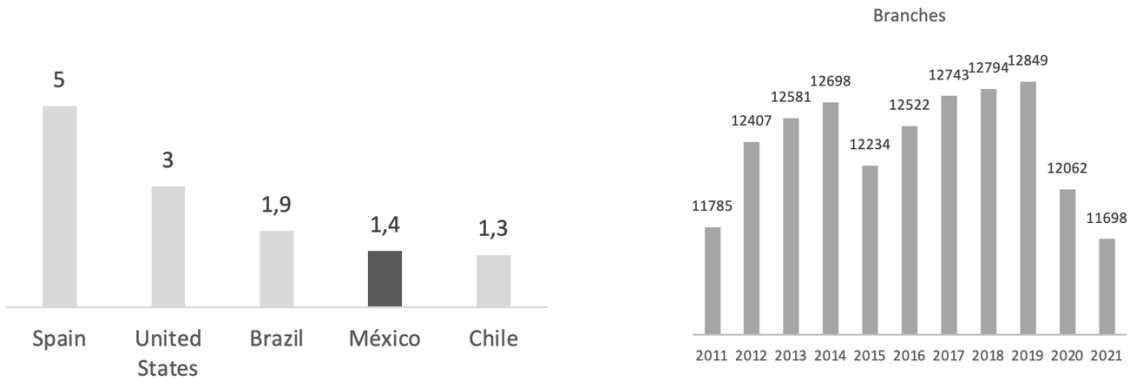
Table 4 shows the growth of banking access points and branches between 2011 and 2021. ATM, Point of Sale Terminals (POS), correspondents, and mobile banking are also part of the dimensions of financial innovation in various articles (Muthinja & Chipeta, 2018; Palaon et al., 2020; Waleed & Tahir, 2020). Mexico presents a significant lag in terms of branches operating in the territory compared to other countries. Spain has 5 branches for every 10,000 adults, the United States 3, and Mexico only 1.4. Despite this lag, it is noteworthy that the number of branches with which it closes the year 2021 is less than 2011 in 87 branches, going from 11,785 branches to 11,698 in 2021.

Table 4. Evolution of banking access points

Year	*Branch*	*ATM*	*Number of Contracts for Trans. through the cell phone*	*POS*	*Transactions in Commission Agents (in millions)*
2011	11785	36427	162445	523578	80.51
2012	12407	40194	804101	556273	128.46
2013	12581	40811	2699378	630700	162.5
2014	12698	42931	5087915	731225	187.66
2015	12234	45781	7600420	851486	219.2
2016	12522	47945	13511393	898853	264.82
2017	12743	49508	15220629	965681	327.96
2018	12794	53270	27935479	1021636	380.4
2019	12849	56674	39049047	1318341	433.23
2020	12062	58059	49745798	1469076	431.9
2021	11698	58841	63440389	1457075	518.48

Source: Prepared by the authors with data from CNBV.

Graphic 6. Comparison of Mexico with other countries in branches (per 10000 habitants) and evolution of branches in México in 2011-2021

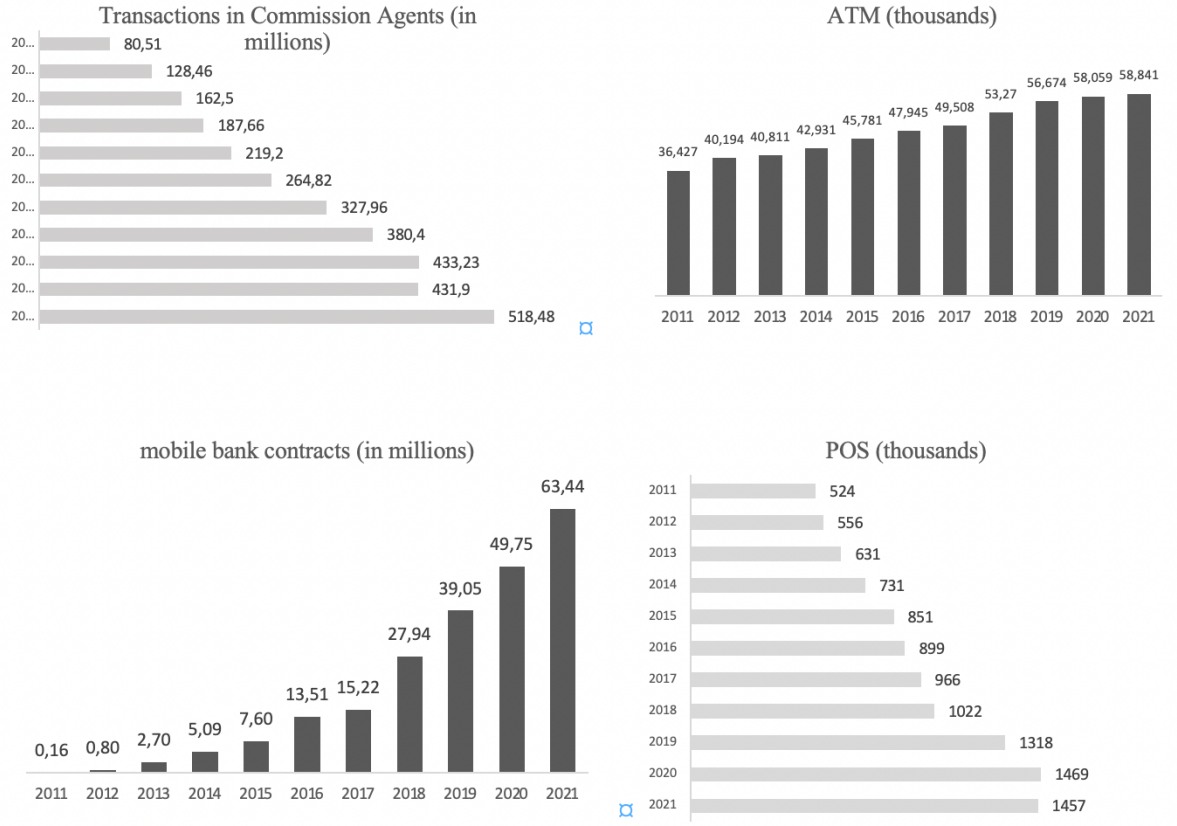


Source: Prepared by the authors with data from the International Monetary Fund, Financial Access Survey, 2019 and Own elaboration with data from CNBV

In the opposite direction, the evolution of alternate access channels shows constant growth: ATMs show an increase of 61.5%, TPVs show an increase of 178.3%. Transactions carried

out by commission agents grew by 643%. The greatest growth occurs in the users of the mobile application that increased exponentially by 38953%. The evolution of bank branches and access channels in the period between 2011 and 2021 can be seen in the graphics above.

Graphic 7. Evolution of alternative banking access points to branches



Source: Prepared by the authors with data from CNBV.

Table 5. Branchless banking articles

Article	***Author(s)***	***Methodology and data***	***How do you measure innovation?***	***Findings***
The impact 'telemediated' services on corporate structures: The example of 'branchless' retail banking in Britain	(Marshall & Richardson, 1996)	The senior managers of four English banks were interviewed: First Direct, Bank of Scotland, the Royal Bank of Scotland, and TSB. The implementation and results of telebanking are analyzed, the service provided by banks telephone and with support of a computer.	The implementation of telephone banking at an access point outside the branch is analyzed.	The implementation and the results obtained by the implementation of telephone banking are analyzed. It is concluded that the banks are committed to modifying their traditional model and adopting the telebanking model. Among the main advantages are attention to users in remote areas and cost reduction. This model involves using a new workforce with lower wages.
Impact of cashless policy on bank's profitability: Evidence from a developing economy	(Itah & Emmanuel, 2014)	Secondary data from the Bangladesh banking system is used. An ordinary least squares (OLS) multiple regression analysis explores the relationship between cashless banking and bank	Innovation is measured by: ATM Transaction Volume, POS Transaction Volume, Mobile Banking Transaction Volume, Internet Banking Transaction Volume, electronic funds	The study results indicate that internet transactions are the only variable that significantly and positively influences both methods to determine the bank's profitability. The variables -volume of electronic transfers, the volume of check clearing, and volume of transactions in points of sale-

		profitability, ROA, and ROE.	transfers and check clearing volume.	positively impact the determination of the ROE.
Effects of Financial Innovations on the Financial Performance of Commercial Banks in Kenya	(Kamau Muiruri et al., 2014))	44 Kenyan banks answer a questionnaire. A Multiple Linear Regression is used with performance (net profit margin and gross profit) as the dependent variable.	Innovation is an independent variable. Credit cards, mobile banking, internet, and agency banking are indicators.	The study notes that Kenyan banks have embraced new technologies and modern ways of operating that are safer and superior to the old ones. It concludes that the use of financial innovations, including credit cards, mobile banking, Internet banking, and banking agents, has significantly impacted the financial performance of commercial banks in Kenya.
Relationship between Bank Innovations and Financial Performance of Commercial Banks in Kenya	(Gichungu & Oloko, 2015)	Secondary data from 43 commercial banks are used in addition to a survey, and the multiple regression methodology is used to study the relationship between innovation and ROA.	Innovation as dependent variable is the investment made in the last five years in four access points: Mobile banking, ATM, online banking, and banking correspondents.	Mobile banking, banking correspondents, and ATMs positively affect bank profitability, measured by ROA. Online banking does not influence profitability.
Bank performance, risk and economic growth: role of financial innovation	(Usman, 2016)	Data is collected from secondary sources, State Bank Economic Survey, and World Bank Financial Development Report data. Three econometric models are applied, the dependent variables being: 1.- performance of the banking sector, 2.- Risk, and 3.- economic growth. It is estimated with the Least Squares Method.	The financial innovation in the banking sector of Pakistan consists of various products and infrastructure such as ATMs, credit and debit cards, point of sale terminals, electronic banking, funds transfer, web service, Etc.	It is concluded that financial innovation has a positive and significant impact on bank performance. In the second model, after controlling for various indicators at the bank level, it is found that financial innovation minimizes the risk of bankruptcy. Model 3 evaluates the relationship between financial innovation and economic growth. The results indicate a positive and significant relationship in said relationship.
The Effect of Branchless Banking Strategy on the Financial Performance of Commercial Banks in Kenya	(Dzombo et al., 2017)	This research uses primary data from a survey of 42 commercial banks in Kenya. Secondary data from banking access channels and banks' financial performance are also used. These data are obtained from the annual Bank Supervision Reports of the Central Bank of Kenya.	The two channels that make up the concept of branchless banking are electronic banking and banking correspondents.	Among the article's conclusions is that if banking correspondents and electronic banking are used in isolation, they have a significant and negative effect on the financial results of commercial banks. On the other hand, when both channels are used together as a multi-channel strategy, they have a significant effect and a positive relationship on the ROA indicator. It is concluded that the channels are complementary, and it is necessary to invest in both to obtain a positive effect on the performance of the banks.
What Drives Financial Innovations in Kenya's Commercial Banks? An Empirical Study on Firm and Macro-Level Drivers of Branchless Banking	(Muthinja & Chipeta, 2018)	Secondary data obtained from Kenyan banking is used. The data panel methodology analyzes the relationship between innovation, company management indicators, macroeconomic variables that influence innovation, and control variables.	The Innovation Indicators are ATM, Online Banking, Mobile Banking, and banking agents (commission agents).	It is observed that the indicators of the companies that promote branchless banking are: the size of the company, the transaction costs, the limitations of the company, the technological advances at the company level, and the agency costs. Regulation and lack of resources in financial markets are the main drivers of branchless banking at the macroeconomic level.
Financial innovations and bank performance in Kenya: Evidence from branchless banking models	(Muthinja & Chipeta, 2018)	Secondary data from 42 commercial banks in Kenya are used. Dynamic panel estimation is used with the generalized system of moments method.	The innovation comprises the number of ATMs per bank, accounts with Internet banking access, the number of banking correspondents who are partners of the	Evidence is found that financial innovations positively affect bank performance (ROA and ROE), which implies that the shareholders are the primary beneficiaries of the innovations used by the banks.

			banks, and the logarithm of the number of banking transactions per bank.	
The Impact of Branchless Banking on Promotion	(Waleed & Tahir, 2020)	The data is collected through a survey, and secondary data from the Pakistan bank is also used.	The data is collected through a survey, and secondary data from the Pakistan bank is also used.	The data is collected through a survey, and secondary data from the Pakistan bank is also used.
Branchless banking and profitability in the Indonesian Islamic banking industry	(Arif & Cahyani, 2021)	Indonesian Islamic banking data is analyzed. One of the banks operates with the branchless banking model. This study uses regression analysis techniques with fixed effects panel data.	Indonesian Islamic banking data is analyzed. One of the banks operates with the branchless banking model. This study uses regression analysis techniques with fixed effects panel data.	Indonesian Islamic banking data is analyzed. One of the banks operates with the branchless banking model. This study uses regression analysis techniques with fixed effects panel data.

Source: own elaboration

The relationship between branchless banking and bank profitability is analyzed by empirical articles, as shown in Table 5. It presents the methodology used, how the authors measure the innovation variable, and their research's main findings and conclusions.

CONCLUSIONS AND FINDINGS

Section I

• Banking has a remarkable ability to adapt to technological changes. Through the centuries, the banking sector has been characterized by its flexibility and openness to modify its business model.

• Although a significant number of investigations analyze the performance of banks, the publications that study the relationship between innovation and profitability is lower.

• The empirical literature concluded that innovation, emphasizing distribution channels, influences bank performance.

Section II

• Publications on this subject have shown a growing interest recently, with developed countries such as China, the United States, and England standing out.

• According to the co-word map in **¡Error! No se encuentra el origen de la referencia.**, the database's conceptual structure that addresses the innovation-profitability relationship is interpreted by the links between the clusters, with the size and centrality of the nodes being the attributes that rank the most influential words.

• The blue cluster contains terms such as adoption, information technology, internet banking, and acceptance. Due to its size and distance from the centrality of the map, it is concluded that this topic is little studied and offers a wide field to explore.

• There is no consensus to measure innovation in banking. The authors propose their methodologies according to the available data. Transparency and access to information are essential elements of proposing more robust, sophisticated models with greater certainty.

Section III

• The term branchless banking refers to alternative banking access points to the traditional branch model.
• ATMs, POS terminals, Mobile Banking, and banking correspondents are some channels used in publications that use this term as a synonym for financial innovation.
• Branchless banking is used to measure innovation in underdeveloped countries with large territories, with Kenya and Brazil having the most publications. No empirical publications were found on this subject in Mexico.
• Branchless banking publications find significant relationships with bank performance in at least one channel.
• Due to the availability of information, the territorial extension, and the inequality in banking coverage, mainly with rural populations, banking without branches is a viable option to measure innovation in the Mexican banking sector.
• The Mexican banking sector shows a notable tendency to reduce the opening of branches. Otherwise, it appears with the alternative channels.

The country presents alternatives to banking the population: the current government creates the Banco del Bienestar, it has a regulatory framework that allows the arrival of international financial groups, in addition to the disruption of FinTechs that have a substantial presence with the new generations. Additionally, the future of the branchless banking model is also a viable alternative to increase financial inclusion; two examples are presented that show this:

1. The growth of more than 24 million accounts with access to mobile banking in 2020 and 2021. The period coincides with the new purchasing habits acquired by the COVID 19 pandemic, among other causes.
2. The proliferation of digital banks or neobanks, which base their business models on virtual platforms and applications for mobile devices, the Brazilian FinTech Nubank being the most prominent. With more than 40 million users and a valuation that exceeded 40,000 million dollars by the end of 2021, figures were reached without having any branch (Expansión, 2021).

REFERENCES

Acosta, M. (2000). La tarjeta de crédito bancaria. In Un Nuevo Derecho Bancario (pp. 583–607). Mexico: Porrúa

Adrianzen, C. (2016). *La Rentabilidad de los Bancos Comerciales y el Ambiente Macroeconómico: El caso Peruano en el período 1982-2014.* Doctoral dissertation, Universitat Politècnica de Catalunya.

Alvarez, J. (1993). La banca española Actualidad y perspectivas. *Papeles de la Economía Española*, 54, 127–138.

Amin, A., Arefin, S., Sultana, N., Islam, R., Jahan, I., & Akhtar, A. (2020). Evaluating the customers' dining attitudes, e-satisfaction, and continuance intention toward mobile food ordering apps (MFOAs): evidence from Bangladesh. *European Journal of Management and Business Economics, 30*(2), 211–229. https://doi.org/10.1108/EJMBE-04-2020-0066

Aparicio, A. (2014). Historia Económica Mundial 1950–1990. *Economía Informa, 385*, 70–83. https://doi.org/10.1016/s0185-0849(14)70420-7

Arif, M. & Cahyani, U. (2021). Branchless banking and profitability in the Indonesian Islamic banking industry. *Jurnal Ekonomi & Keuangan Islam, 7*(2), 154–160. https://doi.org/10.20885/jeki.vol7.iss2.art4

Avendaño, O. (2018). Los retos de la banca digital en México. *Revista del Instituto de Ciencias Jurídicas de Puebla, 12*(41), 87–108.

Batiz-Lazo, B. (2009). Emergence and evolution of proprietary ATM networks in the UK. *Business History, 5*(1), 1–27. http:///doi/abs/10.1080/00076790802602164

Berger, A. (2003). The Economic Effects of Technological Progress: Evidence from the Banking Industry. *Journal of Money, Credit, and Banking, 35*(2), 141–176. https://doi.org/10.1353/mcb.2003.0009

Bordo, M., & James, H. (2011). La Gran Depresión y la Gran Recesión: ¿qué hemos aprendido? In Martín-Aceña, P. (Ed.), *Pasado y Presente de la Gran Depresión del siglo XX a la Gran Recesión del siglo XXI*. (pp. 113–139). BBVA Foundation.

Brown, I., Cajee, Z., Davies, D., & Stroebel, S. (2003). Cell phone banking: Predictors of adoption in South Africa - An exploratory study. *International Journal of Information Management, 23*(5), 381–394. https://doi.org/10.1016/S0268-4012(03)00065-3

Bueno, E., Longo, M., Salmador, M., & Morcillo, P. (2017). La Innovación del Modelo de Negocio Bancario: El Reto de la Banca Digital. AECA: *Revista de la Asociación Española de Contabilidad y Administración de Empresas, 120*(3–6), 1–28.

Chan, S., & Lu, M. (2011). Understanding Internet Banking Adoption and Use Behavior. Advanced Topics in Global Information Management, Volume 5, 12(3), 21–43. https://doi.org/10.4018/9781591409236.ch014.ch000

Chipeta, C., & Muthinja, M. (2018). Financial innovations and bank performance in Kenya: Evidence from branchless banking models. *South African Journal of Economic and Management Sciences, 21*(1), 1–11. https://doi.org/10.4102/sajems.v21i1.1681

Clemons, E. (1990). MAC-Philadelphia national bank's strategic venture in shared ATM networks. *Journal of Management Information Systems, 7*(1), 5–25. https://doi.org/10.1080/07421222.1990.11517878

CNBV. (2021). *Base de datos de acceso público, ENIF 2021*. Mexico: CNBV.

Colombo, M., & Grilli, L. (2007). Funding gaps? Access to bank loans by high-tech start-ups. *Small Business Economics, 29*(1–2), 25–46. https://doi.org/10.1007/s11187-005-4067-0

De Olloqui, J. (1984). Un enfoque bancario sobre la crisis mexicana de pagos en 1982 *El Trimestre Económico, 51*(203(3)), 527–544.

Dedeh Sri Sudaryanti, Nana Sahroni, A. (2018). Análisis del efecto de la banca móvil en el desempeño de las empresas del sector bancario cotizadas en la bolsa de valores de Indonesia. *Journal Ekonomi Manajemen, 4*(2). https://doi.org/10.37058/jem.v4i2.699

Del Ángel, G. (2019). *Banco Nacional de México y la innovación en los servicios bancarios*. Publicaciones Internacionales.

Dietrich, A., & Wanzenried, G. (2011). Determinants of bank profitability before and during the crisis: Evidence from Switzerland. *Journal of International Financial Markets, Institutions and Money, 21*(3), 307–327. https://doi.org/10.1016/j.intfin.2010.11.002

Diniz, E., Birochi, R., & Pozzebon, M. (2012). Triggers and barriers to financial inclusion: The use of ICT-based branchless banking in an Amazon county. *Electronic Commerce Research and Applications, 11*(5), 484–494. https://doi.org/10.1016/j.elerap.2011.07.006

Dong, J., Yin, L., Liu, X., Hu, M., Li, X., & Liu, L. (2020). Impact of internet finance on the performance of commercial banks in China. *International Review of Financial Analysis, 72*, 1–12. https://doi.org/10.1016/j.irfa.2020.101579

Dzombo, G., Kilika, J., & Maingi, J. (2017). The Effect of Branchless Banking Strategy on the Financial Performance of Commercial Banks in Kenya. *International Journal of Financial Research, 8*(4), 167. https://doi.org/10.5430/ijfr.v8n4p167

INEGI. (2021). *Encuesta Nacional sobre Disponibilidad de Tecnologías de la Información en los Hogares (ENDUTIH) 2020.* Mexico: INEGI.

Ferguson, N. (2008). *The Ascient of Money*. PBS NewsHour. Link: https://www.pbs.org/video/the-ascent-of-money-part-1-from-bullion-to-bubbles/

Flóres, L. (2008). Evolución de la Teoría Financiera en el Siglo XX. *Ecos de Economía, 12*(27), 145–168.

Gichungu, Z., & Oloko, A. (2015). Relationship between derivatives and financial performance of commercial banks in Kenya. *International Journal of Education and Research, 3*(5), 443.

Guerra, M. (2002). Breve reseña histórica del surgimiento de la banca. *Economía-UNAM, 21*. Link: http://www.economia.unam.mx/secss/

Gutiérrez, I. (2020). *Influencing Factors of Mobile Banking Applications Adoption.* Universidad de Lisboa.

Gutíerrez, I. (2019). Historia del Crédito. *Muy Financiero.* Link: http://www.muyfinanciero.com/historia

Han, J., & Jun, M. (2021). The impact of accessibility of mobile devices on the intention to post online reviews. *European Journal of Management and Business Economics, 30*(3), 386–398. https://doi.org/10.1108/EJMBE-07-2020-0185

Igual, D. (2018). Las Fintech. Oikonomics, *Revista de Los Estudios de Economía y Empresa*, 10, 22–44.

Itah, A., & Emmanuel, E. (2014). Impact of Cashless Banking on Banks' Profitability (Evidence from Nigeria). *Asian Journal of Finance & Accounting, 6*(2), 301. https://doi.org/10.5296/ajfa.v6i2.6268

Ivatury, G., & Mas, I. (2008). The Early Experience with Branchless Banking. *CGAP Focus Note, 40*, 1–16.

Jácome, H. (2002). Análisis comparativo de la regulación financiera en el sector bancario europeo y americano durante el siglo XX. *Documento de Trabajo, 2*, 201

Jebarajakirthy, C., & Shankar, A. (2021). Impact of online convenience on mobile banking adoption intention: A moderated mediation approach. *Journal of Retailing and Consumer Services, 58*, 102323.https://doi.org/10.1016/j.jretconser.2020.102323

Jiménez-Barreto, J., & Campo-Martínez, S. (2018). Destination website quality, users' attitudes, and the willingness to participate in online co-creation experiences. European *Journal of Management and Business Economics, 27*(1), 26–41. https://doi.org/10.1108/EJMBE-11-2017-0048

Kamau, J., Ngari, J., Lecturer, S., Paul, S., & Limuru, U. (2014). Effects of Financial Innovations on the Financial Performance of Commercial Banks in Kenya. *International Journal of Humanities and Social Science, 4* (7).

Kroszner, R. & Rajan, R. (1993). Is the Glass-Steagall Act Justified? *American Economic Review, 84*(4), 810–833.

Ky, S., Rugemintwari, C., & Sauviat, A. (2021). Friends or Foes? Mobile money interaction with formal and informal finance. *Telecommunications Policy, 45*(1). https://doi.org/10.1016/j.telpol.2020.102057

Lee, C., Wang, C., & Ho, S. (2020). Financial innovation and bank growth: The role of institutional environments. *North American Journal of Economics and Finance, 53(*August 2019), 101195. https://doi.org/10.1016/j.najef.2020.101195

Mansumitrchai, S., & N. AL-Malkawi, H. (2011). Factors Underlying the Adoption of Online Banking by Mexican Consumers. *International Journal of Business and Management, 6*(9), 155–169. https://doi.org/10.5539/ijbm.v6n9p155

Marshall, J., & Richardson, R. (1996). The impact of "telemediated" services on corporate structures: The example of "branchless" retail banking in Britain. *Environment and Planning A, 28*(10), 1843–1858. https://doi.org/10.1068/a281843

Massoud, N., Saunders, A., & Scholnick, B. (2003). *Is There a Customer Relationship Effect from Bank ATM Surcharges?* (Issue July). NYU Stern School of Business Department of Finance Working Paper No. 03-020, Available at SSRN: https://ssrn.com/abstract=422880 or http://dx.doi.org/10.2139/ssrn.422880

Medyawati, H., Yunanto, M., & Hegarini, E. (2021). Financial Technology as Determinants of Bank Profitability. *Journal of Economics, Finance and Accounting Studies, 3*(2), 91–100. https://doi.org/10.32996/jefas.2021.3.2.10

Menor, L., & Roth, A. (2007). New service development competence in retail banking: Construct development and measurement validation. *Journal of Operations Management, 25*(4), 825–846. https://doi.org/10.1016/j.jom.2006.07.004

Mirzaei, A., Moore, T., & Liu, G. (2013). Does market structure matter on banks' profitability and stability? Emerging vs. advanced economies. *Journal of Banking & Finance, 37*(8), 2920–2937. https://doi.org/https://doi.org/10.1016/j.jbankfin.2013.04.031

Misra, S. (2015). Determinants of bank profitability in India. *International Journal of Indian Culture and Business Management, 10*(2), 193–211. https://doi.org/10.1504/IJICBM.2015.068170

Montoya, C. (2012). Destrucción creativa. *Ciencias Estratégicas, 20*(28), 213–216.

Morison, I., & Frazer, P. (1982). Shaping the future of retail banking. *Long Range Planning, 15*(4), 105–115. https://doi.org/10.1016/0024-6301(82)90099-1

Muthinja, M., & Chipeta, C. (2018). What Drives Financial Innovations in Kenya's Commercial Banks? An Empirical Study on Firm and Macro-Level Drivers of Branchless Banking. *Journal of African Business, 19*(3), 385–408. https://doi.org/10.1080/15228916.2017.1405705

Mutua, R. (2013). *Effects of Mobile Banking on the Financial Performance of Commercial Banks in Kenya.* Doctoral dissertation, University of Nairobi.

Neves, M., Proença, C., & Dias, A. (2020). Bank Profitability and Efficiency in Portugal and Spain: A Non-Linearity Approach. *Journal of Risk and Financial Management, 13*(11), 1–19. https://doi.org/10.3390/jrfm13110284

Palaon, H., Wiryono, S., & Faturohman, T. (2020). Branchless banking agents: Business satisfaction, continuity, and viability. *Cogent Business and Management, 7*(1). https://doi.org/10.1080/23311975.2020.1823585

Qamruzzaman, M., & Jianguo, W. (2018). Investigation of the asymmetric relationship between financial innovation, banking sector development, and economic growth. Quantitative *Finance and Economics, 2*(4), 952–980. https://doi.org/10.3934/qfe.2018.4.952

Rahman, H., Yousaf, M., & Tabassum, N. (2020). Bank-Specific and Macroeconomic Determinants of Profitability : A Revisit of Pakistani Banking Sector under Dynamic Panel Data Approach. *International Journal of Financial Studies, 8*(3), 42

Reyes, B. (2020). Los corresponsales bancarios: ¿solución a los problemas de acceso a servicios financieros? El semestre de las especializaciones, 1-2 (2020), 262-304.

Rita, P., Ramos, R., Moro, S., Mealha, M., & Radu, L. (2021). Online dating apps as a marketing channel: a generational approach. *European Journal of Management and Business Economics, 30*(1), 1–17. https://doi.org/10.1108/EJMBE-10-2019-0192

Salazar, M. (2004). La represión penal de la usura en la república romana y su evolución. *Revista de Estudios Histórico-Jurídicos, 26*, 85–111. https://doi.org/10.4067/S0716-54552004002600004

Scott, S., Van Reenen, J., & Zachariadis, M. (2017). The long-term effect of digital innovation on bank performance: An empirical study of SWIFT adoption in financial services. *Research Policy, 46*(5), 984–1004. https://doi.org/10.1016/j.respol.2017.03.010

Sinkey, J., & Nash, R. (1993). Assessing the riskiness and profitability of credit-card banks. *Journal of Financial Services Research, 7*(2), 127–150. https://doi.org/10.1007/BF01046902

Stringham, E. (2003). The extralegal development of securities trading in seventeenth-century Amsterdam. *Quarterly Review of Economics and Finance, 43*(2), 321–344. https://doi.org/10.1016/S1062-9769(02)00153-9

Tan, M. & Thompson, S. (2000). Factors influencing the adoption of internet banking in Malaysia. *Journal of The Ais, 1*(1), 1–42.

Tian, L., Han, L., & Mi, B. (2020). Bank competition, information specialization and innovation. *Review of Quantitative Finance and Accounting, 54*(3), 1011–1035. https://doi.org/10.1007/s11156-019-00815-6

Trejo-Garcia, J., Rios-Bolivar, H., & Martinez-Garcia, M. (2014). Análisis de la Administración del Riesgo Crediticio en México para Tarjetas de crédito. *Revista Mexicana de Economía y Finanzas, 11*(1), 103–121.

Tristán, P. (2015). El secreto bancario: precedentes romanos. La actividad de la banca en Roma y los negocios mercantiles en el Mare Nostrum. In Derecho Comercial Romano (pp. 711–726).

Turrent, E. (2008). Historia Sintética de la Banca en México. Mexico: Banxico.

Usman, M. (2016). Bank Performance, Risk and Economic Growth: Role of Financial Innovation. *RISUS-Journal on Innovation and Sustainability, 7*(3).

Uzzi, B., & Lancaster, R. (2003). Relational embeddedness and learning: The case of bank loan managers and their clients. *Management Science, 49*(4), 383–399. https://doi.org/10.1287/mnsc.49.4.383.14427

Villegas, E., & Ortega, R. M. (2002). Sistema Financiero de México. McGraw Hill.

Waleed, A., & Tahir, A. (2020). The Impact of Branchless Banking on Promotion. *Journal of Finance, Accounting and Management, 11*(1), 53.

Willis, G., & Tranos, E. (2021). Using 'Big Data' to understand the impacts of Uber on taxis in New York City. *Travel Behaviour and Society, 22*, 94–107. https://doi.org/10.1016/j.tbs.2020.08.003

World Bank. (2021). World Development Indicators: Financial access, stability and efficiency. Washington: World Bank.

Zhu, Q., Lyu, Z., Long, Y., & Wachenheim, C. J. (2021). Adoption of mobile banking in rural China: Impact of information dissemination channel. *Socio-Economic Planning Sciences, 83*. https://doi.org/10.1016/j.seps.2021.101011