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TECHNOLOGICAL CHANGE AND FINANCIAL INNOVATION IN BANKING

Abstract: The banking sector is changing due to technological revolution, globalization, innovation processes, and new ideas. Hence now adays banks' concentration is on investments in advanced technology and innovation it is made to improve operational procedures in order to serve the customer in accordance with their needs and requirements. To understand how the banking industry has evolved over time, we need to understand the process of financial innovation, which has transferred the entire financial system.

This paper first describes the role of innovation in the banking system and how those changes such as: technologies, globalization, innovation has affect banking system. The main objective of the present resource is review the empirical studies relating to several specific financial and banking innovation. Research has been carried out using secondary data drawn from a diverse pool of materials, including books, journals and other credible reports from international institutions. This research concludes that development and application of a variety of financial technology, has improve the way of doing business and enhance competitiveness of commercial banks by reducing bank operating costs, improving service efficiency, strengthening risk control capabilities, and creating enhanced customer-oriented business models for customers.

Keywords: innovation, baking, technology change.

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INTRODUCTION

During the last two decades, innovation has been an important topic for researchers, because of its influence and contribution in economic growth and to the stability of financial systems. In process of achieving a market condition of managing bank system should implementation an innovation technology in order to increase competitiveness.

Based on the literature review, financial innovation has been different ways defined. According to Schumpeter innovation means something new that may involve a new good or higher quality than their previous counterpart, new production, new source of supply, the opening of new markets.³

On the same view, Rogers definition for innovation is prescribe as a an idea, practice or object that is perceived as new by an individual or group (or organization).Also he refers the word “technology” and “innovation” as the same one meaning that technology is instrumental action that decrease the uncertainty in the cause-effect relationships in order to achieve wanted outcome.⁴ Based on the Solans definition it is mention that financial innovation on the same way as technological advances simplify access to information, way of the payment and trading, and the needs for new financial instruments and services, new way of organization which will developed and complete financial market.⁵Also, Frame and White defined an innovation new concept, a new product and organizational that helps to reduce cost or risk for banks, the overcoming of agency problems and information asymmetries, and improvement of the service for the whole financial system.⁶

While defining financial innovation it is important to mentation that innovation can be separation into three groups, according to where innovation take place:⁷

- Process innovation means to a new process that give the opportunity for a new financial product and service.

³ Schumpeter, J. A. (1934). *The theory of economic development – An inquiry into profits, capital, credit, interest, and the business cycle*. Cambridge, MA: Harvard University Press

⁴ Rogers, E.M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.

⁵ Solans, D., (2003). *Financial innovations and monetary policy*. Speech, Delivered at the 38th SEACEN Governors Conference and 22nd Meeting of the SEACEN Board of Governors on Structural Change and Growth.

⁶ Frame W.S., White L.J. (2004) *Empirical studies of financial innovation: lots of talk, little action?*, *Journal of Economic Literature*. Vol. 42, p: 116-144.

⁷ Vargas, A. R. (2009). *Assessing the contribution of financial innovations to the production of implicit services of financial intermediation in Costa Rica*. *IFC Bulletin*, Vol.3,p: 445-466.

- Organizational innovation involves a new organizational structure which will be implemented in the company and will influence the whole system of the company.
- Product innovation are new product or service are created to fulfil costumers needs based on the market demands

On the other hand, Lerner & Tufano, divide innovation into two categories, which are product and process innovations. The products are new derivative contracts, new corporate securities or new forms of pooled investment products, the process are new means of distributing securities, processing transactions or pricing transactions.⁸

Nowadays innovation is alternative word for the development countries, progressive financial system and all other sectors of the economies of the country. Innovation contains two part: first one is the act of invention and second one is diffusion even though those to parts are connected with each other because most of the financial innovation are evolutionary adaptation of prior products.

At this time, embrace of financial technologies in banking industry has becoming a crucial for development and enhancing of profit in banking industry and has influence the application of electronic banking, digital technology, alternative payment methods, block chain and cryptocurrencies, artificial intelligence and machine learning and etc.

Research analyses about the application of new technology and the performance of Turkish bank during period 1996 and 2005 conclude that the adoption of online banking has significant impact on the performance of commercial bank.⁹ On the same view, research analyses that is done in UK retail banks for the period 2010 to 2016 with the purpose to explain the role and impact of Fintech digital banking start-ups in the financial industry, the result conclude that Fintech have a positive effect on incumbents' stock returns.¹⁰

Furthermore, analyses done on Lebanese bank for the period 2010 to 2017 studied the influence of technological innovation on bank performance. Findings suggest that financial innovation such as: internet banking, mobile

⁸ Lerner, J., & Tufano, P. (2011). The consequences of financial innovation: A counterfactual research agenda.

⁹ Onay, C., Ozsoz, E., & Helvacioğlu, A. P. D. A. D. (2008). The impact of internet-banking on bank profitability-The case of Turkey. In 2008 Oxford Business & Economics Conference Program, St. Hugh's College, Oxford, UK.

¹⁰ Li, Y., Spigt, R., & Swinkels, L. (2017). The impact of FinTech start-ups on incumbent retail banks' share prices. *Financial Innovation*. Vol.3(1),p:1-6.

banking, ATMs and investment in computer software had a positive impact on bank profitability.¹¹ Broadly speaking based on the above research, findings conclude that Fintech support the development of banking industry also Fintech services would have a positive impact on banks' performance.

Therefore, the main reason for the research of this topic is to investigate the type of financial innovation and technological change that have impact on profitability of commercial banks.

1. New banking financial technology with focus on innovations

The banking sector is changing due to technological revolution, globalization, innovation processes, and new ideas. Nowadays banks concentration is in investments for advanced technology and innovation it is made to improve operational procedures in order to serve the customer in accordance with their needs and requirements.

Meanwhile, the improvement of technology and innovation in products, process and organizational of banks could help to minimize the growing risks faced by the sector itself. According to Berger, investment in technological improvements such as ATM's and internet banking, which are considered as product (ATM) and process (internet banking) innovations, are proved to be positively linked with bank profitability and also will reduce costs and increase the quality of lending favor the client.¹²

The most important source of changes in supply conditions that has stimulated financial innovation has been the improvement in technology information. Technology information has had two effects. First, it has reduced the costs of processing financial transactions, creating new financial products and services. Secondly, it has made it easier for investors to get information.

Banks focus should be new technological and innovation to improve efficiency, increase productivity and overall performance.

The development of technology has led to new product and service also the ability to provide services electronically. The adoption of new technology in banking system has become the standards as way of securing a competitive advantage in the electronic age.

¹¹ El-Chaarani,H., & El-Abiad, Z.(2018). The impact of technological innovation on bank performance, *Journal of Internet Banking and Commerce*. Vol. 23(3) p: 1-33.

¹² Beck, Th., (2003), *Financial Development and Economic Growth: Stock Markets versus Banks?*, *Private Sector Development* , Proparco's Magazine, *Africa's Financial Markets: A Real Development Tool?* Vol.5

Banks are interested in increasing customer service that can always be available to customers while generating profit for the bank requires investment costs. Thus, the innovations in banking sector include:

1.1. Electronic banking

An integral part of a bank in this century is that with the development of technology the need to advance with technology is imperative. Development of new electronic banking such as mobile software, development of automation and digital security.

Nowadays, banks offer different forms of online banking or electronic banking. The challenge of this industry is to design this new channel for providing banking services, in a simple and reliable way to be used by customers. This service provided by banks must meet two basic conditions which are: to be safe and to be functional and for this service clients pay a certain fee.

According to Santo about the services that banks offer through e-banking, they are classified into four groups:¹³

- Informative. The bank uses the online system to inform clients about the products and services it offers in electronic way.
- Communicator. This system enables communication between the client and the bank in electronic way.
- Interactive with the user. The client is informed about the products and services that the bank offers by clicking on each product or service to get the relevant information. If the client is interested in getting a loan, they can calculate the interest rate, the monthly online instalment and can apply online the same applies to deposits.
- Transactional. The online system enables the client to perform transactions himself. The client can transfer money within his own bank accounts, to any other bank, apply for loans, for debit/credit card, make various payments. So all the typical services of a traditional banking are performed by online banking.

Compared to traditional banking, electronic banking offers ease, convenience and access for their customers so that they can use the banking site for all types of transactions in a secure environment. Customers can interact on the banking site 24 hours a day, seven times per week.

¹³ Santos, J. (2003) .E-service quality: a model of virtual service quality dimensions, Managing Service Quality: An International Journal, Vol. 13(3), p: 233-246.

E-banking can improve the efficiency of a bank and increase competitiveness, in this way existing and potential customers can benefit more and this will affect transactions way of doing.

1.2. Debit and credit card

Credit card are the most standardized instruments that are used to obtain money, property, or service on credit with specific credit terms established by the issuing bank.¹⁴

The success of credit card banks has led banks to come up with a banking innovation that is debit cards. Debit cards are essentially instruments that give the costumers access to their funds to pay or to withdraw money at ATM machines.¹⁵

Thus, debit cards are used for purchases in the same way as credit cards, but unlike a credit card in which the buyer is issued a credit to which he owes, credit card purchases only deduct the amount of the purchase from the cardholder's bank account.

Using debit and credit card have some benefits based on Zimman analyses, those benefits are:

- Acceptance: credit and debit card have same high acceptance rate.
- Security: credit and debit card have same level of protection and incurred the same fraud risk.
- Time costs: credit and debit card do not requires going to bank.
- Portability: credit and debit card have similar advantages.
- Pecuniary costs: the different consequences/costs for a customer that would exceed his line of credit are: over limit fee, decrease of the credit score, penalty pricing.¹⁶

Moreover, debit and credit cards are payment instruments issued by banks so that customers can access their funds at any time to make payments, as well as to withdraw cash from ATMs. Although bank cards are a technology invented many decades ago, their use in Republic of North Macedonia and the region still remains in the shadow of cash which dominates payments in the economy. However, the trends of banking customers in recent years are in the direction of using digital services, including bank cards.

¹⁴ Woelfel, C.J. (1994) .The Dictionary of Banking. Illinois, NY: Probus Publishing.

¹⁵ Fitch, T.P. (2000). Dictionary of Banking Terms. Hauppauge, NY: Barron's Educational Series, Inc.

¹⁶ Zinman, J. (2009), Debit or Credit?, Journal of Banking and Finance, Vol33(2), p: 358-66.

This trend of increased use of credit cards can be confirmed also in the Macedonian banking sector. The following table shows the number of Credit Card and Debit Card cards for the period 2005-2018 in Republic of North Macedonia. From the table we see that we have a significant increase from year to year in the use of bank cards offered by banks operating in Republic of North Macedonia.

Table 3.1. Number of debit and credit card in circulation on Republic of North Macedonia period 2005-2018

| Year | Na. of CREDIT CARD in circulation | Na. of Debit CARD in circulation | Total CARD |
|------|-----------------------------------|----------------------------------|------------|
| 2005 | 75,859 | 77,783 | 153,642 |
| 2006 | 115,827 | 221,617 | 337,444 |
| 2007 | 178,630 | 353,551 | 532,181 |
| 2008 | 197,740 | 481,477 | 679,217 |
| 2009 | 267,947 | 559,198 | 827,145 |
| 2010 | 374,159 | 1,048,183 | 1,422,342 |
| 2011 | 351,545 | 1,098,800 | 1,450,345 |
| 2012 | 350,580 | 1,156,562 | 1,507,142 |
| 2013 | 368,135 | 1,188,947 | 1,557,082 |
| 2014 | 369,953 | 1,231,492 | 1,601,445 |
| 2015 | 381,639 | 1,289,126 | 1,670,765 |
| 2016 | 564,691 | 1,316,985 | 1,881,676 |
| 2017 | 548,968 | 1,273,029 | 1,821,997 |
| 2018 | 550,088 | 1,271,395 | 1,821,483 |

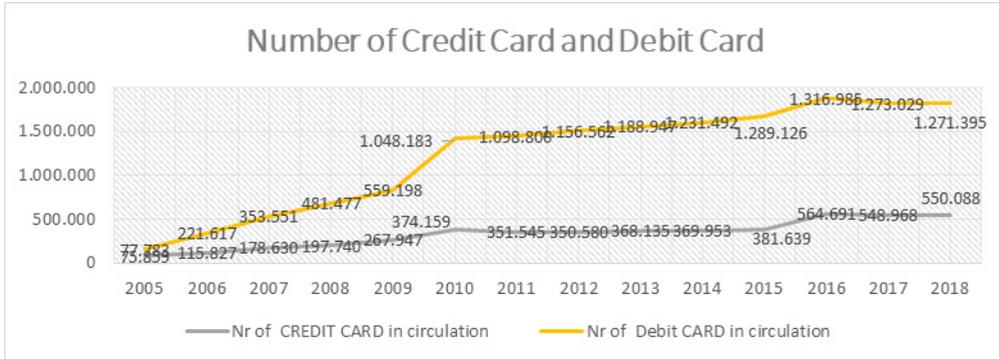
Source: Authors' compilation based on the Report on the use of payment cards and devices for their use in the country, National Bank of the Republic of Macedonia.

At the end of 2018, the number of cards in use was about 1.82 million cards, of which 550 thousand Credit Card and 1.27 million Debit Card. The trend of the largest increase of cards in use was recorded in the period 2005 - 2010.¹⁷

¹⁷ Report on the use of payment cards and devices for their use in the country, National Bank of the Republic of Macedonia.

The following chart best explains the trend of moving the number of bank cards on Republic of North Macedonia.

Figure 3.1 Number of Credit and Debit Card on Republic of North Macedonia period 2005-2018



Source: Authors' compilation based on the report on the use of payment cards and devices for their use in the country, National Bank of the Republic of Macedonia

This confirmation that the behaviours of the clients also have a key role in introducing new products. The increase in bank card transactions is a positive indicator both for the replacement of cash with card transactions which in direct way have impact on increasing non-interest income for banks and for the whole economy country's as well. The main benefits and advantages for bank card payments are numerous including:

- Higher security and efficiency in payments, enabling payment even for transactions for small and daily amounts;
- Bank card payments can be made on all POS equipment of Republic of North Macedonia banks, without commission and regardless of the amount you pay;
- Bank card payments help fight the informal economy and prevent the spread of counterfeit money;
- Easier and faster control of payments through electronic banking report;
- Increase non-income for banks and this have a direct contribution on bank profitability

The banking sector in Republic of North Macedonia continuously contributes to the digitalization of the process hence there is a positive trend of

increased number of credit cards and debit cards and increased value of payments made with them because improvement and modernization started.

1.3. ATM

An important form of an electronic banking device is the Automated teller machines (ATM). Automated teller machines (ATMs), is another financial innovation which were introduced in the early 1970s and diffused rapidly through the 1980s which resulted from the desire to avoid the restrictions of branching.

The reduce cost of computer and telecommunications technology enabled banks to provide ATMs at lower costs, making them profitable innovations. Moreover, empirical analyses done in UK during the period the period 1976–1996, proposed that the high number of ATMs installed by the bank the higher the bank profitability.¹⁸ Also, another empirical analysis done in the 11 European country highlights that the number of ATM and electronic payments have positive effect on bank profitability by reducing the operating cost to asset value.¹⁹

Analyses of electronic payment system (EPS) in Republic of North Macedonia shows that electronic payment system (EPS) is new compared to other European countries, the key reform started in 2000 and last till 2002. This reform change the environment of banking industry and bring new modern way of payment such as: ATMs, imprinters and POS terminals.

The trend of increasing use of ATMs can be confirmed based implantation of reforms in the Macedonian banking sector. The following table shows the ATM and POS for the period 2005 - 2018 on The Republic of North Macedonia. From the table we see that we have a significant increase from year to year in the use of banking innovation offered by banks operating in The Republic of North Macedonia.

¹⁸ Holden, K., El-Bannany, M., (2004). Investment in information technology systems and other determinants of bank profitability in the UK. *Applied Financial Economics*, Vol.14(5),p:361-365.

¹⁹ Valverde, S.C., Humphrey, D.B., (2009). Technological innovation in banking: the shift to ATMs and implicit pricing of network convenience. In: Anderloni, L., Llewellyn, D.T., Schmidt, R.H. (Eds.), *Financial Innovation in Retail and Corporate Banking*. Edward Elgar, Cheltenham, UK.

Table 3.2. Number of ATM and POS on Republic of North Macedonia period 2005-2018

| Year | ATM | POS |
|------|-------|--------|
| 2005 | 157 | 5,914 |
| 2006 | 297 | 9,546 |
| 2007 | 529 | 17,884 |
| 2008 | 761 | 29,153 |
| 2009 | 832 | 31,447 |
| 2010 | 869 | 31,491 |
| 2011 | 876 | 33,435 |
| 2012 | 852 | 33,267 |
| 2013 | 930 | 37,167 |
| 2014 | 959 | 39,027 |
| 2015 | 1,049 | 40,501 |
| 2016 | 1,039 | 34,826 |
| 2017 | 1,031 | 31,995 |
| 2018 | 1,040 | 31,542 |

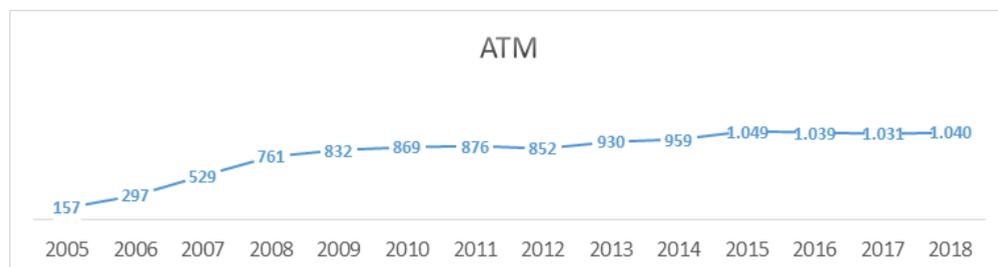
Source: Authors' compilation based on the report on the use of payment cards and devices for their use in the country, National Bank of the Republic of Macedonia.

The number of ATMs on Republic of North Macedonia has increased from year to year. Thus, if we compare the period 2005 - 2018, the number of ATMs has increased from 157 ATMs as they were in 2005 to 1040 ATMs in 2018, which represents an increase of 883 ATMs or expressed in percentage 662%.

The largest increase was recorded from 2005 to 2010, where only for this 5year period an increase of 712 ATMs or 453% was recorded as a result of the full implementation of reforms in ESP.²⁰

The following chart best explains the trend of ATM number movement

²⁰ Report on the use of payment cards and devices for their use in the country, National Bank of the Republic of Macedonia.

Figure 3.2. AMTs trend on Republic of North Macedonia period 2005-2018

Source: Authors' compilation based on the report on the use of payment cards and devices for their use in the country, National Bank of the Republic of Macedonia.

From the figure it is visible that banking industry in Republic of North Macedonia are constantly strengthens the infrastructure for credit card use through increasing of the POS and ATM terminals. The increase of computerized payment systems promises to reduce employee time and the paperwork involved in transferring funds. The use of automatic payment machines (ATMs) provides computerized systems that allow 24-hour banking services, such as electronic withdrawal of money from the deposit account, making deposits and loan payments, as well as the transfer of funds between accounts. Highly advanced ATMs offer customers additional services such as accessing their mutual fund accounts, buying or selling shares, paying utility and store bills, and printing bank statements.

Overall, banking industry in Republic of North Macedonia have adopted information technology to offer classic services in the online form, the growing use of electronic payment systems (EPS) combines both cost savings and increased convenience to customers.

First, reduce costs and improve the quality of customer service as well as to provide standardization of basic services.

Second, the number of bank branches and the number of employees has been reduced, thus minimize cost and increasing the efficiency of banks. In other words, many customers can receive the same service at the same time, without the help of cashiers or bank clerks, reducing administrative work and with it the costs, and consequently the reduction of fees that banks apply to their customers.

In addition, with the help of information technologies and communication technology, it is possible to overcome schedules, waste of time and bu-

reaucratic aspects of traditional banking, to manage personal finances faster and more efficiently.

CONCLUSION

Banking sector develop new products and processes to meet their needs, as well as those of customers driven by the desire to become profitably .The most important source of changes in supply conditions that has stimulated financial innovation has been the improvement in technology information. Technology information has had two effects. First, it has reduced the costs of processing financial transactions, creating new financial products and services. Secondly, it has made it easier for investors to get information.

The development of technology has led to new product and service also the ability to provide services electronically. The adoption of new technology in banking system has become the standards as way of securing a competitive advantage in the electronic age. Hence, financial innovation and technological progress have encouraged to the creation of many financial products, services, production processes, and organizational structures. Innovation it is not the idea of just the creation of a new thing, but it is actually bringing it to market, putting into putting into practice and developing it in a method that leads to new products, process or technology that add value or improve quality. Innovation also mean walking in the same way and in the same direction with the new technology and trying to use it to generate new value to bring new and significant change in society.

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