Digitalization of Banking services as a Driving Force towards Profitability – IT Perspective of the Macedonian Banking Sector

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Abstract — In the last decade, with the increasing advancement of information technology, banks are introducing innovation in their products and services, by continuously upgrading their technologies, systems and processes. Their investment in the IT segment is aimed for providing innovative products and services at the market, coping with the technologically improving external environment, abiding by the latest rules, policies, and regulations, increasing their customer base and achieving higher profits. The purpose of this paper is to measure the effect of one of the aspects of digitalization of banking services, i.e. investment in information technology, on the profitability of banks which constitute the Macedonian banking sector – represented by ROE and ROA. Furthermore, a comparative analysis is performed between the performance of banks constituting the small, medium and large banking groups, in terms of their investment in IT and its impact on the profitability performance. This paper could be beneficial both scientifically, in terms of initiating research in the area of digitalization of banking services in the country, the Balkans and in Europe, as well as for providing recommendations to the banks’ management in terms of improving the constituted strategies and becoming more digitalized.

Keywords — digitalization, banking, ROA, ROE

I. INTRODUCTION

In the 21st century, the globalization has exerted a tremendous influence on the banking business operations, since traditional branches of commercial banks have been transformed into places which implement the latest trends in digitalization of banking products and services. With the development of e-banking, e-commerce and the technologically advanced environment, banking institutions are gradually introducing alternative channels. A higher portion of their products and services are accessible online, as well as through mobile phones, tablets, Automated Teller Machines (hereinafter: ATMs) and other electronic devices used by their customers. Therefore, these financial institutions are offering flexibility in terms of usage of banking services 24 hours a day, 7 days per week. The implications of digitalization are various, and among others, they include achieving higher customer satisfaction, higher profitability figures and possessing higher share of the financial services market. Despite the benefits of the digitalized era, banks operating under the principle of traditional banking are still unaware of the benefits of implementing an intensive digitalization of their products and services, and transforming their branches into ‘banks of the future’. Therefore, banks’ annual and financial reports rarely include data regarding profits achieved by offering digitalized products and services in the portfolio.

The main aim of this paper is to analyze whether and to what extent one of the main factors of digitalization, i.e. investment in information technology (hereinafter: IT) affects the profitability figures of small-sized, medium-sized and large-sized banks in Macedonia throughout the period 2012 to 2015. In order to investigate whether and to what extent the IT investment influences the profitability indicators, i.e. Return on Equity (ROE) and Return on Assets (ROA), multiple regression models will be computed for each of the banking groups.

II. INVESTMENT IN INFORMATION TECHNOLOGY AND BANK PROFITABILITY

A. Positive Relationship between Investment in Information Technology and Bank Profitability

The literature suggests that there is scientific evidence indicating a positive relationship between IT investment as one of the aspects of digitalization and bank profitability. According to Ho & Mallick (2006), there are two positive effects stemming from the relationship between IT and banks’ performance. Firstly, through the introduction of IT, banks are experiencing a reduction in their operational costs, an example of which would be using online banking for conducting
transactions. Secondly, the implementation of IT provides the possibility for doing transactions within the existing bank network, as usage of ATMs on dispersed locations in a country [1]. The study of Chowdhury (2003) analyzed the impact of IT on the profitability performance of a sample composed of 327 banks in Asian and Pacific Basin countries (Australia, Hong Kong, Japan, Malaysia, New Zealand, South Korea, Taiwan and Thailand). The results from the conducted profitability-based analysis indicate that the IT capital has a positive and significant effect on the profitability variables of the bank observations being analyzed – ROA and ROE [2]. Furthermore, by implementing the Stochastic Frontier Approach (hereinafter: SFA), Romdhane (2013) conducted an empirical analysis of the IT effect on the performance of a bank sample of 15 Tunisian banks during the period 1998 to 2009. The results generated designate that the IT variable positively and significantly affects the cost efficiency of banks [3].

When comparing the impact of increasing IT investments on the profitability of high IT level banks, in their research study, Leckson-Leckey, Osei and Harvey (2011) found the following. Banks which made higher investments in IT experienced higher profitability figures in comparison with low IT level banks, which proves for a positive and statistically significant relationship between IT and ROA of high IT level banks. Furthermore, when estimating the effect of IT expenditures on the profitability of all banks represented by ROE, the same results were produced. The relationship between IT investments and ROE of high IT level banks was positive, but not statistically significant. These findings imply that IT investments exert a greater influence on the profitability of high IT level banks, compared to the effect on profitability of low IT level banks [4]. By analyzing the impact of IT on the bank performance of selected 11 banks in Nigeria, during the period 2001 to 2011, the following results have been generated (Muhammad, Gatawa and Kebbi, 2011). The authors have conducted a regression analysis with ROE as a dependent variable and Net Profit, ATM and e-banking services in Nigeria as independent variables. Their findings suggest that there is a strong, positive and statistically significant relationship established between IT and ROE [5].

B. Negative Relationship between Investment in Information Technology and Bank Profitability

Despite the scientific evidence showing a positive relationship between IT investment and bank profitability, there are numerous research studies indicating that there is a negative association between these two variables.

A mid-nineties research conducted in the United States of America (hereinafter: USA) by Prasad and Harker (1997) suggests that banks’ investment in IT does not influence their profitability expressed in terms of ROA and ROE, and that it also does not represent a barrier for entry in the retail banking industry [6]. These findings have been confirmed in the study by Markus and Soh, 1993, cited in Beccalli, 2007, who argue that there is no significant relationship established between investment in IT in small-sized banks and their profitability performance. Regarding the performance of banks which belonged to the large banking group, the authors suggest that these institutions experienced negative returns as a result of their permanent spending on IT operations [7]. Furthermore, Mallick and Ho (2008) were also examining whether investment in IT influences the financial performance of a panel set composed of 68 banks in the USA during the period of analysis ranging from 1986 to 2005. Their research findings indicate that during the observed period, banks which report higher figures for IT also show lower profitability, which implies that IT has a negative effect on the profitability of banks in the USA [8].

Farouk and Dandago (2015) were analyzing the relationship between investment in IT and banks’ profitability in Nigeria, as measured by ROE, ROA, Net Profit Margin (hereinafter: NPM) and Earnings per Share (hereinafter: EPS). Their research suggests that there is an existence of a significant relationship between the IT performance and ROA. They further elaborate that the banks’ investment in IT does not have a positive contribution to the profitability performance, since a 1% increase brought for a decrease in this financial ratio of 1.587%. The same results were also generated for the impact of IT investment on the financial performance of Nigerian banks, measured by ROE, NPM and EPS [9]. In addition, the study of Beccalli (2007) examined the relationship between IT investment (hardware, software and other IT services) and financial profitability measures of 737 commercial banks in the European Union located in France, Germany, Italy, Spain and in the United Kingdom (hereinafter: UK), during the period ranging from 1993 to 2000. The empirical results of the study have indicated that on short-term, the correlation between investment in IT and ROA ratios is both – negative and statistically significant. When calculating the correlation between IT investment and business performance (ROA and ROE) for each country which was part of the sample, he learned that there is a negative and statistically significant relationship for four of the countries, apart from Germany [10]. Further research (Günsel and Tükel, 2011) analyzed the relationship between IT capability and bank profitability of a research sample composed of 15 banking institutions in Turkey. The relationship between these two variables had been tested by using several methods, among which were the correlation and regression analyses. The regression model analyzing the relationship between IT capability and ROE, suggests there is no statistically significant relationship between the two variables. The same results were generated by the regression analysis conducted between IT capability and ROA [11].

III. DATA SAMPLE AND DESCRIPTIVE STATISTICS

A. Quantitative Data Analysis

The bank-specific data which we use in this paper were obtained from the annual and financial reports of Macedonian small-sized, middle-sized and large-sized banks throughout the period 2010 to 2015. These figures have been analyzed by using Excel spreadsheets and the statistical software Statistical Package for the Social Sciences (hereinafter: SPSS). Multiple regression analyses were performed for the purpose of
indicating whether, and to what extent the aspects of digitalization (IT and Software and Marketing and Administrative expenses) influence the profitability indicators (ROA and ROE) of Macedonian small-sized, middle-sized and large-sized banks.

Due to existence of a small banking sample in Macedonia, two multiple linear regression analyses will be performed. The first one will be used to determine the nature of the relationship between ROE as a dependent variable and the investment in IT and Software and the Marketing and Administrative expenses of the Macedonian banking sector as independent variables. In addition, the second multiple linear regression analysis will be used to determine the nature of the relationship between ROA as a dependent variable and the figures representing the factors of digitalization, used as independent variables.

B. Descriptive Statistics of the Sample

Table I. AVERAGE VALUES OF SMALL, MEDIUM AND LARGE BANKING GROUPS IN MACEDONIA DURING THE PERIOD 2010 TO 2015

<table>
<thead>
<tr>
<th>Values</th>
<th>Banking groups</th>
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<tbody>
<tr>
<td></td>
<td>Small banking group</td>
<td>Medium banking group</td>
<td>Large banking group</td>
<td></td>
</tr>
<tr>
<td>ROE</td>
<td>-0.0620</td>
<td>0.0235</td>
<td>0.0872</td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>-0.0108</td>
<td>0.0024</td>
<td>0.0161</td>
<td></td>
</tr>
<tr>
<td>IT and Software expenses (in MKD thousand)</td>
<td>40.708</td>
<td>22.021</td>
<td>39.077</td>
<td></td>
</tr>
<tr>
<td>Marketing and Administrative expenses (in MKD thousand)</td>
<td>10.222</td>
<td>15.406</td>
<td>62.620</td>
<td></td>
</tr>
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</table>

Table I shows a comparison of average values for the Macedonian banking sector used in the paper. Regarding the ROE figures, the Table indicates that the management of the large banking group was the most successful in paying higher dividends to its shareholders and supporting future growth. Its ROE of 0.0872 suggests that per 1 Macedonian Denar (hereinafter: MKD) investment in equity, banking groups’ shareholders managed to earn an average return of 8.72%, applicable for the period from 2012 to 2015. In addition, the medium banking group reported ROE at the value of 0.0235, implying that during the four fiscal years, by investing MKD 1 in average equity, medium-sized banks’ shareholders earned an average return of 2.35%. Lowest profitability expressed as ROE was achieved by banks classified as small-sized, due to their negative average return on the equity invested on part of the shareholders, amounting to -0.0620. These figures show that throughout the period 2012 to 2015, a MKD 1 investment in equity, has yielded a negative average return of 6.2%. Therefore, on the basis of these average values, it was concluded that the shareholders of large Macedonian banks managed to earn the highest return on the equity they had invested (Karadja, 2017) [12].

The average ROA of the large banking group was the highest in comparison with the figures of the small-sized and middle-sized banks, at the value of 0.0161. Therefore, by investing 1 MKD in their total assets, during the four-year period of analysis, banking institutions in Macedonia classified as large-sized banks, managed to make an average return of 1.61%. On the other hand, by investing MKD 1 in total assets, the middle banking group reported an average return of 0.24%, whereas the small banking group achieved a negative return on its investment at the amount of ~1.8%.

Astonishing results are shown for the average IT and Software expenses for the small banking group, which were the highest in comparison with the medium-sized and large-sized banking institutions in Macedonia. The average IT investment incurred by the group composed of small-sized banks has amounted to 40.708 thousand MKD. These figures suggest that on average, these banks invested a significant portion of their budget on IT infrastructure, software and systems as well as necessary licenses for conducting their operations. When analyzing the IT figures of the large banking group, it can be concluded that during the period from 2012 to 2015, large-sized banks in Macedonia made an average investment of nearly MKD 40.000 thousand. On the other hand, the IT and Software expenses for the middle banking group were the lowest, in comparison with their competitors, implying that medium-sized banks in the country did not spend a lot of their funds on a digital transformation of their services.
On the basis of Figure 2, what can be concluded is that Bank K reported the highest IT and Software expenses in the group of middle-sized banks during the period 2012 to 2015. Bank G incurred the second-highest IT investment expenditures on its Income Statement in the first two fiscal years, in comparison with its competitors. The lowest figures were reported in the last fiscal year. When analyzing the performance of Bank E, one can advocate that in comparison with its medium-sized bank competitors, this financial institution reported a decline in this type of operating expenses from 2012 to 2013. Moreover, these figures decreased by a tremendous amount in 2014, followed by an increase in IT and Software investment in 2015.

On the other hand, throughout 2012 to 2013, Bank J reported the lowest IT and Software figures within the group. In the following fiscal years, it experienced an increasing trend in terms of its investment. Bank I experienced various fluctuations in its operating expenses throughout the years, starting from an increase in IT and Software expenses from 2012 to 2013, followed by a decline in 2014 and an increase in 2015. Furthermore, Bank H experienced a downward trend in its IT and Software expenditures, followed by a slight improvement in the last fiscal year. Bank F’s figures cannot be compared to the other middle-sized banks, since they have not been disclosed in the annual or financial reports.

![Fig. 3. IT and Software expenses in the group of small-sized banks in Macedonia during the period 2012-2015](image)

When analyzing the performance of small-sized banks in Macedonia in terms of their IT and Software expenses during the period 2012-2015, on the basis of Figure 3, we can conclude that Bank M experienced fluctuations in its figures. They decreased by a small extent from 2012 to 2013, followed by a moderate increase in 2014 and a tremendous decline in 2015. On the other hand, Bank L did not experience various fluctuations in its IT and Software expenses during the four-year period of analysis. It incurred the highest IT and Software costs in 2013, which declined by a small extent in 2014. In the last fiscal year, the Bank managed to increase its investment by a considerable degree. The data of Bank N cannot be analyzed and compared to the competitors, due to their unavailability in the annual reports.

IV. METHODOLOGY OF THE RESEARCH

The Macedonian banking sector is comprised of fifteen banks, i.e. one state owned and fourteen privately owned banks, classified in three groups on the basis of their assets size: large-sized, medium-sized and small-sized banks. Data used in this paper have been obtained from banks’ Balance Sheet and Income Statements, as publicly disclosed information. The data which have been obtained include the ROE, ROA, investment in Marketing (Marketing and Administrative expenses) and investment in IT (IT and Software expenses) of 14 bank observations in Macedonia during the period 2012-2015.

V. DATA ANALYSIS AND FINDINGS

A. Multiple Linear Regression Model with ROE as a Dependent Variable

Since a dependent variable is a continuous variable, first, we apply a multiple regression model with two independent variables. We would like to examine the relationship between investments in IT and ROE as well as the relationship between Marketing and Administrative expenses and ROE of the Macedonian banking sector. The linear regression model is defined with the following equation:

$$\Pi_i = \beta_0 + \sum \alpha B_j + \epsilon_i$$

where $\Pi_i$ is the dependent variable represented by an observation of ROE; the independent variable includes the intercept $\beta_0$, the independent variables $B_j$; the $\alpha$ represents the coefficients, and $\epsilon_i$ is the error.

Hence, we can derive the following regression model:

$$ROE = \beta_0 + \beta_1 \ln IT + \beta_2 \ln Marketing + \epsilon_i$$

where:
- ROE = ROE of the Macedonian banking sector;
- $\ln IT$ = natural logarithm of investment in IT and Software
- $\ln Marketing$ = natural logarithm of Marketing and Administrative expenses;
- $\beta_0$, $\beta_1$, $\beta_2$ = independent variable coefficients, which define the amount of change in y per every change in predictor variable;
- $\epsilon_i$ = random error in ROE, assumed to be well-behaved.

In Table II., we find that the adjusted R square ($R^2$) of our model amounts to 0.144, whereas the R square equals to 0.181. Therefore, the coefficient of multiple determination ($R^2$ = 0.181) indicates that 18.1% of the variance in the ROE of the Macedonian banking sector is explained by the variation in the investment in IT and the variation in the marketing and administrative expenses. The reason for the small amount of R square can be attributed to the unavailability of data in some of Macedonian banks’ annual reports for the fiscal period from 2012 to 2015, as well as the small number of banks constituting the sample size.

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
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<tr>
<td>1</td>
<td>.268</td>
<td>.181</td>
<td>.144</td>
<td>.032021</td>
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</table>

* Predictors: (Constant), lnmarketing, lnit

Furthermore, Table III. shows the results of the overall F-test in order to determine whether there is a significant relationship between the dependent variable, i.e. ROE and the entire set of independent variables, represented by natural logarithm of IT investment and natural logarithm of
investment in marketing. One can draw a conclusion that the regression model is significant, since there is a significant relationship established between the independent variable represented by Investment in IT; natural logarithm of Marketing and Administrative expenses and the ROE of the Macedonian banking sector as a whole.

Table IV. depicts the regression coefficients, the intercept, the significance of all coefficients as well as the intercept in the model. We find that our regression analysis estimates the linear regression function to be the following:

\[ \text{ROE} = -0.267 - 0.021 \times \ln \text{IT} + 0.052 \times \ln \text{marketing} \]  

(3)

In our first multiple linear regression model, depicted in Table IV., the coefficient which is significant is Marketing and Administrative expenses, represented by \( \ln \text{Marketing} \), which is shown from its p-value, which is smaller than the significance level of \( p \) equal to 0.05. Moreover, the coefficient \( \ln \text{IT} \) does not represent a statistically significant indicator of profitability of the Macedonian banking sector, since the value of 0.229 is higher than the p-value of 0.005.

On the basis of the conducted multiple linear regression model with ROA as an independent variable, we can conclude that the variables are not jointly significant. Therefore, a further elaboration of this regression model is not be provided.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. Limitations of the Study

Due to lack of publicly available data, it is impossible to produce a comprehensive overview of the digitalization of the banking sector in Macedonia. Furthermore, some of the banks have not published their data in their annual reports. Those who have published the information have published only the figures for total investment in externally developed software, and not providing information per segment of digitalization (ATMs, SMS banking, Phone banking, etc.) and statistics per customer segment (retail and business).

B. Conclusions

This paper examined the digitalization of banking services and its impact on profitability indicators of the Macedonian banking sector, during the period 2012 to 2015. On the basis of the results of the multiple linear regression models, one can conclude that as an independent variable, the IT and Software
expenses are negatively related to the profitability of the Macedonian banking sector, represented by two independent variables – ROE and ROA.

C. Recommendations

The main goal of this paper is to initiate research in the area of digitalization of banking services in Macedonia, in the countries of the Balkans and in Europe, in general. Analyzing the digitalization of banking services and their impact on the profitability performance of banking institutions, contributes for a better formulation of strategies on part of the top management, which brings for profit maximization, better market positioning and attracting new customer base in the Macedonian banking sector. Therefore, further research on this topic, not just in Macedonia, but also in the Balkan countries and in Europe, will help the management of banking institutions to better structure their budget aimed for investments in IT infrastructure. Moreover, they will have the ability to improve the evaluation of the bank’s financial performance based on the adoption and implementation of new and innovative banking services and their usage rate in part of the customer base. By spreading the research in the neighboring countries, banking institutions in Macedonia will be able to compare their performance and locate the areas of digitalization which need to be a subject of improvement, for the purpose of better transitioning from ‘traditional banks’ to ‘banks of the future’.

D. Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ATM</td>
<td>Automated Teller Machines</td>
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<td>IT</td>
<td>Information technology</td>
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<td>ROE</td>
<td>Return on Equity</td>
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<td>ROA</td>
<td>Return on Assets</td>
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<td>SFA</td>
<td>Stochastic Frontier Analysis</td>
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<td>USA</td>
<td>United States of America</td>
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<td>NPM</td>
<td>Net Profit Margin</td>
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<td>EPS</td>
<td>Earnings per Share</td>
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<td>UK</td>
<td>United Kingdom</td>
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<td>SPSS</td>
<td>Statistical Package for the Social Sciences</td>
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<td>MKD</td>
<td>Macedonian Denar</td>
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REFERENCES