



# CURRENT ISSUES AND COMPARATIVE ANALYSIS OF MOBILE BANKING IN SERBIA

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## Abstract:

The goal of the paper is to determine the level of mobile banking development in Serbia through a comparative analysis of mobile banking services offered by the leading banks in Serbia. A criterion for the selection of the banks was the success in implementation of alternative channel management products (ACMP), and the highest profit on the basis of ACMP and total assets. The sample consists of nine leading Serbian banks in ACMP. Moreover, the subject of the analysis were the main issues, threats, and technology bases of mobile banking. Finally, the paper also considers the architecture of m-banking solution developed for the first digital bank owned by mobile operator.

## Key words:

mobile banking, comparative analysis, mobile technology,  
mobile application, Serbian banks.

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## 1. INTRODUCTION

The development of electronic banking services, smart phones, wireless communication networks, mobile applications and technologies have influenced the emergence of mobile banking. Due to an increasing number of mobile-cellular subscribers, around 7 billion in 2015 (Figure 1), mobile banking has become a key strategy for development and improvement of banking services.

The evolution of the Internet into the Internet of Things (IoT), the emergence of the big data analytic systems, the development of new information and internet technologies, as well as the change of users’ awareness, affects banking business that needs to adapt to new trends and requirements. In order to keep up with those trends, banks are constantly working on process innovation, improvements of service efficiency, and personalization of the services that meet the finest demands of their clients. Mobile banking is an ideal way to introduce the aforementioned innovations, especially personalised banking. Through mobile banking, clients can save their time and money, have high qualitative and customized services in any time, and from any location (anywhere banking). Therefore, banks can further expand their offering to provide better services to their clients.

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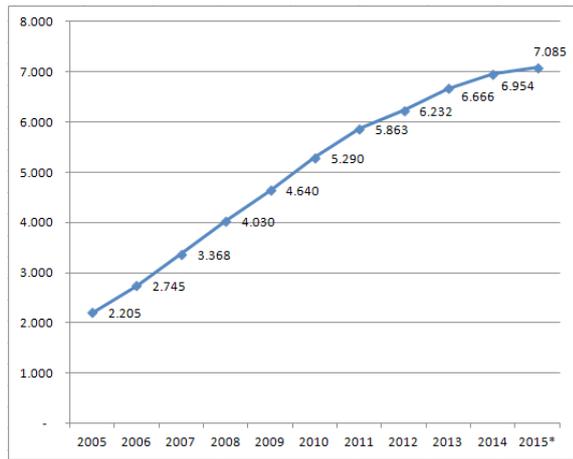


Figure 1. Mobile-cellular telephone subscriptions in the World (in millions) (ITU, 2015)

The aim of this paper is to determine the level of mobile banking development in Serbia through comparative analysis of mobile banking services offered by the leading Serbian banks. Criteria for the selection of the banks were the success in m-banking implementation, and the highest profit and total assets. The sample consists of the following nine Serbian banks: Banca Intesa, Komercijalna bank, UniCredit bank, Raiffeisen bank, Societe Generale bank, ProCredit bank, Erste bank, Telenor bank and OTP. The research is conducted during January 2016. The key research questions of this study are:

- RQ1: How many banks in Serbia implement new m-banking services?
- RQ2: What are the main issues in introducing m-banking solutions?
- RQ3: Which bank offers a wider range of m-banking services?
- RQ4: Which technologies are behind these solutions?

The structure of this paper is divided into three parts. The first part discusses mobile banking issues, and underlying technology. The second part represents the current state of mobile banking in Serbia, the comparative analysis of m-banking services by Serbian banks, and technical background of analyzed mobile applications. In the final part, the main conclusions of this research are given.

## 2. LITERATURE REVIEW AND THEORETICAL BACKGROUND

In order to cope with the existing challenges such as competition, technology, security, costs, and customers, banks should act on improving their services, innovate processes, redesign existing platforms or creating new

ones, and analyzing customer behavior, their requirements, and desires. One solution is implementation of mobile banking. According to the Javelin Strategy & Research report, with mobile banking financial institutions can decrease costs, retain the existing and attract new customers using mobile banking. They can also become a market leader with technology and be more competitive (Van Dyke, 2015) (Federal Reserve Bank of Boston, 2013).

Mobile banking (m-banking) operates outside the confines of traditional infrastructures (such as physical branches, ATM's and so on) and provide access to banking services and execution of financial transactions using mobile devices (Ledgerwood *et al*, 2013) (Nicoletti, 2014). With m-banking client can perform individual and business banking and manage loans. M-banking services can be divided into three groups, as follows:

- ♦ Banking services (such as checking account balance, view transactions)
- ♦ Payment services (such as Bill payments, Virtual wallet)
- ♦ Value added services (such as Social media banking, Personal financial management, Biometric apps and security features, Cloud storage, Cross-selling and marketing)

According to the SANS Institute research, the most used m-banking services are: check an account balance or recent transactions (90%), transfer money between two accounts (42%), and made a bill payment (26%) (Pegueros, 2012). The latest generation of mobile phones, and 4G (IMT-Advanced) mobile communication system enable better availability of data, and the new range of services (such as voice mail, audio-video conferencing).

### *Mobile banking issues*

M-banking brings new opportunities as well as risks. Among major concerns are security and confidentiality of information while performing financial transactions on mobile devices. Other reasons for not using mobile banking are: mobile phone screen is too small (39%), lack of feature in the mobile phone (37%), do not trust the technology (34%), do not have a smart phone (32%), lack of knowledge about mobile payment options (31%), difficult and time consuming to set up or use mobile payments (31%), lack of option at shopping places (23%) and other (KPMG, 2015). The major threats of mobile banking can be classified into three main categories: broad threats, phone/handset threats, and online/internet threats (Table 1).



Broad threats	Handset threats	Internet threats
– Unauthorized access	– Memorycards	– Mobile email
– Malicious applications	– Downloads	– Sms
– Cross platform malware	– Mobile browsers	– Mobile instant messaging
– Mobile viruses	– Smart card	– Voice
– Wireless carrier infrastructure	– Mobile applications	– Online games
– Unsecured WiFi	– Hardware and OS	– Online free applications

Table 1. M-banking threats (Islam, 2014) (SANS, 2012).

Besides customers, banks are also affected by m-banking risks. Clients usually save either their password, personal data, or payment receipt on mobile phone, so due to theft of mobile device, or virus infection, hacker can easily get this information. The most secure way for banks is not to send sensitive data to the handset or to delete it at the end of each session. In case that sensitive data are stored into the mobile phone, data encryption should be provided. However, banks should implement the appropriate privacy, and security governance programs. ISACA's Business Model for Information Security can address the context and protection of mobile payment data. The COBIT and Risk IT frameworks provide useful approaches for banks to ensure that an effective risk control mitigation process is established (ISACA, 2011).

#### *Technological basis of mobile banking*

Architecture of a modern m-banking system should be based on the standards and contemporary achievements in the development of mobile networks, technologies and applications. According to the smart phone vendor market share in 2015 (IDC, 2015), most clients are equipped with Samsung mobile phones (with a 21.4% share), and then with Apple iPhone (with 47.5 million units shipped, and a 13.9% share). Android operating system still dominates the market with an 82.8% share in 2015.

Broadband communication is fundamental for the entire economy (Kumar *et al*, 2011). Today, among the hierarchy of human needs, behind food/water and shelter is voice and data connectedness i.e Internet/Mobile

phone (Meeker, 2011). To support the ever growing mobile users, and increasing demands for high data rates, ITU (International Telecommunication Union) has provided the International Mobile Telecommunication (IMT) Advanced standard for 4G generation mobile network. This network enables seamless connectivity, mobile communication within heterogeneous networks (PSTN, LAN, 3G, WiMAX, sensor network, and other), high data rates, high quality mobile services, user-friendly applications and so on. However, the next generation of mobile networks is coming, called 5G. It is defined as an end-to-end ecosystem that will enable a fully mobile and connected society. The 5G network relies on Cloud RAN (Radio Access Network) with software-centric network architecture that will use cognitive radio techniques to allow the infrastructure to automatically decide which type of channel to offer (Gopal *et al*, 2015).

To deliver m-banking application there are usually four stakeholders involved: a bank, mobile network operator, a mobile banking vendor, and the consumer. Mobile banking vendor plays an integral part that provides the mobile banking platform which facilitates the integration of the bank system, mobile network operator channel and the end consumer.

The existing theoretical and empirical research about mobile banking has mainly dealt with its importance, effects, impact, and issues, but mostly about factors that affect the user adoption of mobile banking services. Very little or almost no research has dealt with comparative analysis of mobile banking services among financial institutions. Bagoria (2014) in his research related to the comparative analysis between private and public sector banks in mobile banking in India, has concluded that mobile banking ratio is very low compared to ATM banking or other channels, and that the average value of mobile transactions is higher in public sector banks than in private.

### 3. MOBILE BANKING IN SERBIA

According to the data of the National Bank of Serbia, provided by the Ministry of Finance - Treasury administration Republic of Serbia and Banks, in 2015 (Figure 2), the number of clients using Internet banking is much higher than the use of mobile banking, but with a significant increase of m-banking users. The total number of clients who have signed contract with a bank on the use of certain types of banking services is 8.9 million (NBS, 2015b).

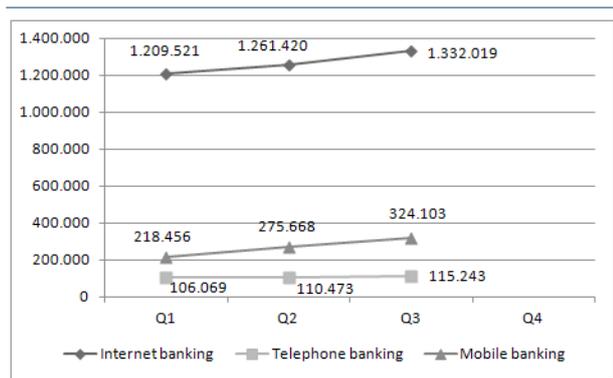


Figure 2. Number of clients by type of services per quarter in 2015 (NBS, 2015b).

The first bank in Serbia that introduced m-banking service is Banca Intesa (in 2010). Its mobile application called “Intesa Mobi” is available for Android and iOS devices, and offers almost all the features that a client has in bank branches. The next service that Banca Intesa will offer is Wave2Pay application, based on Host Card Emulation technology that will enable contactless payments. In 2013, telecommunication company Telenor Group, one of the leading mobile operators in the world, bought the license from KBC Bank, and opened the first bank for online and mobile banking in Serbia in 2014 (without branches). Telenor bank, owned by Telenor Group, is digital/direct bank with a multichannel platform as the single point of contact between Core Banking System and all channels.

There are currently 33 banks in the Serbia market, of which only four are domestic banks with star capital: Komercijalna (Commercial) bank, Poštanska štedionica (Postal Saving) bank, Srpska (Serbian) bank and Jubmes bank. However, Commercial Bank is already in the process of privatization, and there are forecasts that in the next three years, the other banks will also be privatised. Banks which implemented m-banking in their business, and key features of their m-banking application, are listed in Table 2. Data were collected from websites and available documents, and manuals, from considered banks.

After the analysis of available m-banking services by Serbian banks, the comparative analysis is done, in order to observe which bank offers wider range of m-banking services. Even though there has been a lot research papers conducting m-banking, there are few studies carried out in Serbia. Banks involved in this study are selected based on two criteria:

1. the most successful ones in implementation of alternative channel management products (ACMP), which includes modern m-banking solutions

2. according to the total assets criterion, and highest profit in the segment of ACMP (NBS, 2015a)

Bank	M-banking application	Key features
Banca Intesa	Intesa Mobi	<ul style="list-style-type: none"> <li>◆ Check account balance</li> <li>◆ Review transaction details</li> <li>◆ Insight into the balance and turnover on payment cards</li> <li>◆ Transfer of funds within accounts, locally and abroad</li> <li>◆ Exchange operations (sell/buy of foreign currency)</li> <li>◆ Make Payments (monthly bills, taxes, etc)</li> <li>◆ Personal finance management</li> <li>◆ Editing of personal data</li> <li>◆ Activation/deactivation of SMS or e-mail notifications.</li> </ul>
Commercial Bank	PlatiMo	<ul style="list-style-type: none"> <li>◆ Transfer of funds between accounts</li> <li>◆ Monthly bills payments</li> <li>◆ Internet purchase</li> </ul>
Raiffeisen Bank	Moja mBanka	<ul style="list-style-type: none"> <li>◆ Locating all branches and ATMs via Google Maps</li> <li>◆ Status and turnover of accounts and payment cards</li> <li>◆ Transfer of funds between dinar accounts, and foreign currency accounts without currency conversion</li> </ul>
ProCredit Bank	mBankar	<ul style="list-style-type: none"> <li>◆ Insight into the balance and turnover on payment cards</li> <li>◆ Transfer of funds between accounts</li> <li>◆ Exchange transactions</li> <li>◆ Bill payments</li> </ul>
Societe Generale Serbia	SOGE m-bank	<ul style="list-style-type: none"> <li>◆ Insight into accounts, funds on credit cards, loans</li> <li>◆ Transfer of funds between bank accounts</li> <li>◆ Exchange of foreign currency</li> <li>◆ Locating the nearest branch or ATM</li> </ul>
UniCredit Bank	m-banking	<ul style="list-style-type: none"> <li>◆ Insight into balance and transactions for all accounts including loans</li> <li>◆ Transfer of funds between bank accounts</li> <li>◆ Payment for all account types</li> <li>◆ Currency Converter (from foreign currency to RSD)</li> <li>◆ Locating the nearest branch or ATM</li> </ul>
Erste Bank	m-banking	<ul style="list-style-type: none"> <li>◆ Locate the nearest branches or ATMs</li> <li>◆ Review of all debit, credit and savings accounts</li> <li>◆ Payments with “Scan&amp;Pay” functionality</li> <li>◆ Currency exchange</li> <li>◆ Discover the best possible savings mode</li> </ul>
OTP Bank	m-banking	<ul style="list-style-type: none"> <li>◆ Insight into current, deposit and credit accounts, and payment cards</li> <li>◆ Internal/external transfers in foreign or local currency</li> <li>◆ Overview of the transfer and payment</li> <li>◆ Review of currency exchange rates</li> <li>◆ Use locators to find branches/sub-branches and ATMs</li> </ul>
Telenor Bank	Telenor bank	<ul style="list-style-type: none"> <li>◆ Opening accounts</li> <li>◆ Insight into accounts, payment cards and loans</li> <li>◆ Transfer funds</li> <li>◆ Payments of credit cards, monthly bills</li> <li>◆ Currency exchange</li> <li>◆ Limit and control consumption</li> <li>◆ Managing cards: activate, block, replace and so on.</li> </ul>

Table 2. Key features of m-banking application per banks



### Comparative analysis of mobile banking in Serbia

Because of its specificity in m-banking service implementation, two banks were added: Telenor Bank and Erste Bank. Telenor Bank is the first online bank (no branches) owned by mobile operator in Serbia. Erste Bank is the only bank in Serbia that has the service "Scan&Pay" that was awarded for innovation in 2014 (service invoices per click). Banca Intesa, Unicredit Bank, and Raiffeisen Bank are top three banks according to the highest profit in 2015 (NBS, 2015a). Among top 5 banks, according to the total assets criterion is: Banca Intesa, Commercial Bank, Unicredit Bank, Raiffeisen Bank, and Societe Generale Bank (NBS, 2015a).

It should be noted that the level of offered services, shown in Table 3, is not fixed, but is prone to change due to the fact that banks constantly upgrade their m-banking services. The comparative analysis is conducted in January 2016.

The comparative analysis reveals that Societe Generale bank, Erste bank and Telenor bank offer most m-banking services to their clients. Poor design and environment for performing m-banking is given by Commercial Bank. A pleasant design and intuitive environment is offered by Banca Intesa, Unicredit bank, Societe Generale bank, Erste bank and Telenor bank. Raiffeisen bank and Unicredit bank offer essential services, but the colors (black and yellow) of Raiffeisen bank are not suitable for longer work.

### Technical background of m-banking applications

Upon analyzing the features of available m-banking applications, it is observed that behind all these m-banking solutions stands Asseco Group Company, one of the largest software vendors in Europe, with 20 years of experience in banking software and more than 60 references in the banking sector. Some of their solutions for

Services	Banks	Banca Intesa	Com-merc-ial Bank	Unicredit Bank	Raiffeisen Bank	Societe Generale Bank	Erste Bank	Telenor Bank
Online opening a bank account								
Online opening of savings account								
Insight into accounts and payment cards								
Review transaction details								
Transfer of funds between accounts								
Payments								
Review of exchange rate								
Currency exchange								
Savings and loan calculator								
Online savings								
Scan&Pay								
Locate the nearest branch or ATM								
Total offered services		8	4	6	6	10	10	10

Table 3. Comaprative Analysis of m-banking services in Serbia in January 2016



banking are ASEBA iBank SMS, ASEBA Web2.0 iBank, ASEBA OfficeBanking, and ASEBA iBank Electronic Banking. More than 20 banks in Serbia are using at least one of their solutions (<http://www.24x7.rs/srp>). The most challenging one was the solution developed for Telenor Bank that connects two industries in one place - telecommunications and banking. The architecture of this solution incorporates ASEBA Multichannel Hub, ASEBA core banking, SMAP (Secure mobile application platform), and different mobile platforms (Android, iOS, and Windows phone) (Mihaljek *et al*, 2014).

ASEBA Multichannel Hub has set of services for all channels, such as branch, call center, ATM, web, social network, mobile *etc.* The basis for channels integration is ASEBA Banking Process Suite (BPS) which is an enterprise content management solution built on EMC technologies (EMC, 2012). ASEBA Multichannel has several modules, such as: CRM (integrated with Telco's system); Online sales (campaign definition, conducting and evaluation); and online helpdesk (using chat, compliant management options).

## CONCLUSION

The rapid development of mobile technologies has completely changed the way people interact and work. Many companies are changing their business models and becoming more flexible to the user's needs. Even businesses themselves have a lot of benefits from the use of mobile technologies, some of them are: reaching customers globally, engaging customers and gathering insights on customers, besides cutting the cost and efficient work. The banking industry is a leading implementer of the latest technologies. This study analyses the extent to which Serbian banks keep pace with the newest mobile banking technologies. The comparative analysis of available m-banking services has shown that Serbian banks do not lag behind the latest trends. The fact that supports that is the opening of Telenor bank, owned by one of the largest mobile telecommunication companies, operating in 14 countries, with 189 millions of subscribers. According to the comparative analysis, three banks offer the most m-banking services to their clients: Telenor bank, Erste bank, and Societe Generale bank. Not far behind are Banca Intesa, and Raiffeisen bank, and Unicredit bank. However, it is noticed that they have something in common, and that is technology developed by one company called Asseco. This study also considered the main issues in introducing m-banking to the market. However, there is a slight shift from security issues to the functionality, and available features of mobile applications.

## LITERATURE

- Bagoria, R. (2014) Comparative analysis between Private Sector and Public Sector Banks in Mobile Banking in Different Cities. *International Journal of Scientific and Engineering Research*. Vol. 5, Issue 2, February, 2014.
- EMC (2012) ASEBA Banking Process Suite links CMS to Core Banking. EMC Corporation. Hopkinton, Massachusetts. Available at: <https://asseco.com/see/assets/Uploads/Products/ASEBA-BPS/ASEBA-BPS.pdf> (accessed: 03.02.2016)
- Federal Reserve Bank of Boston (2013) Mobile Banking and Payments Survey of Financial Institutions in the First District: Summary of Results. Federal Reserve Bank of Boston - Payment Strategies Group. March 5, 2013. Available at: <https://www.bostonfed.org/bankinfo/payment-strategies/publications/2013/mobile-payments-and-banking-survey-2012.pdf> (accessed: 30.01.2016)
- Gopal, B.G., Kuppusamy, P.G. (2015) A Comparative Study on 4G and 5G Technology for Wireless Applications. *Journal of Electronics and Communication Engineering (IOSR-JECE)*. Vol. 10, Issue 6, December 2015, pp. 67-72.
- IDC (2015) Smartphone Vendor Market Share, 2015 Q2. International Data Corporation (IDC), August, 2015. Framingham, MA. Available at: <http://www.idc.com/prodserv/smartphone-market-share.jsp> (accessed: 30.01.2016).
- ISACA (2011) Mobile Payments: Risk, Security, and Assurance Issues. An ISACA Emerging Technology White Paper, November, 2011. Available at: <http://www.isaca.org/groups/professional-english/pci-compliance/groupdocuments/mobilepaymentswp.pdf> (accessed: 30.01.2016)
- Islam, S. (2014) Systematic Literature Review: Security Challenges of Mobile Banking and Payments System. *International Journal of u- and e- Service, Science, and Technology*. Vol. 7, No. 6, pp. 107-116.
- ITU (2015) "Statistics: Time Series by Country", International Telecommunication Union. Available at: <http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx> (accessed: 30.01.2016)
- KPMG (2015) Mobile Banking 2015: Global Trends and their impacts on Banks. KPMG LLP, July 2015. UK. Available at: <https://www.kpmg.com/UK/en/IssuesAndInsights/ArticlesPublications/Documents/PDF/mobile-banking-report-2015.pdf> (accessed: 30.01.2016)
- Ledgerwood, J., Earne, J., Nelson, C. (2013) The New Microfinance Handbook: A Financial Market System Perspective. International Bank for Reconstruction and Development / The World Bank, Washington, D.C.



- Meeker, M. (2011) Internet Trends. web 2.0 Summit, San Francisco, CA. KPCB. Available at: <https://kpcbweb.s3.amazonaws.com/files/KPCB%20Internet%20Trends%202011.pdf> (accessed: 30.01.2016).
- Mihaljek, R., Žnidarić, S., Perleta, J. (2014) Telenor banka - kako smo implementirali mobile banking za prvu online banku u regiji. Java conference Javantura v2. Zagreb, Croatia. 15.11.2014. Available at: [https://javantura.com/sessions\\_v2](https://javantura.com/sessions_v2) (accessed: 4.02.2016)
- NBS (2015a) Banking sector in Serbia: Report for third quartal in 2015. Available at: [http://www.nbs.rs/export/sites/default/internet/latinica/55/55\\_4/kvar-talni\\_izvestaj\\_III\\_15.pdf](http://www.nbs.rs/export/sites/default/internet/latinica/55/55_4/kvar-talni_izvestaj_III_15.pdf) (accessed: 1.02.2016)
- NBS (2015b) National Bank of Serbia (NBS), 30 September 2015. Available at: <http://www.nbs.rs/internet/english/index.html> (accessed: 3.02.2016)
- Nicoletti, B. (2014) Mobile Banking: Evolution or Revolution?. Palgrave Macmillan, New York.
- Pegueros, V. (2012) Security of Mobile Banking and Payments. SANS Institute. November, 2012. Available at: <https://www.sans.org/reading-room/whitepapers/ecommerce/security-mobile-banking-payments-34062> (accessed: 30.01.2016).
- Van Dyke, D. (2015) 2015 Mobile Banking, Smartphones, and Tablet Forecast. Javelin Strategy & Research, December 2015. Available at: <https://www.javelin-strategy.com/node/22711> (accessed: 30.01.2016).