

The Impact of IT on the Banking Productivity

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ABSTRACT – *There has been much debate on whether the investment in Information Technology provides improvements in productivity and business efficiency of banks and, whether the usage of the opportunities of Digital Technologies to better serve customers and achieve firm goals the proliferation of technologies offers vast new opportunities. This paper investigates the impact of ICT capital on productivity in banks. For the analysis, data from various research reports, and reliable studies on banking efficiency and productivity and digitalization of their services are employed. The results obtained shed some light on the relative impact of ICT capital, and provide new insights about the structural dynamics between these factor inputs. We find that the banks as financial service sectors in developed countries are quite similar in terms of efficiency, and that efficiency and productivity depends more and more on ICT capital. Although, the financial services industry and banks in particular increasingly invest in technologies to improve their online banking and more recently their mobile payment solutions, the Serbian case, as banking sector in transition countries, shows slower implementation of new digital trends in operational activities of the banks. At the same time, banks use tools such as social networks, digital tools kits, online competitions, online advertising campaigns, mobile apps, location-based services and online market research to connect with customers. The paper also provides an overview of digital trends in general and the banking industry in particular and best practices how digital media tools are helpful to achieve marketing goals, and ultimately generate higher revenues at lower costs. The contribution of the paper can be seen also in: Deepening the understanding of (stationary and mobile) digital technologies in the marketing tool box; Further exploring the digital landscape and the types of digital customers in the banking industry, and in discussions the cases of the introduction of a mobile payment system*

KEY WORDS: *Serbian banks, financial crisis, productivity, ICT, digitalization*

Introduction

The banking industry world-wide is being transformed. The global forces for change include technological innovation; the deregulation of financial services at the national level and opening-up to international competition; and - equally important - changes in corporate behaviour, such as growing disintermediation and increased emphasis on shareholder value. In addition, recent banking crises have accentuated these pressures. The banking industries in central Europe and South East Europe have also been transformed as a result of

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privatisations of state-owned banks that had dominated their banking systems in the past. With the increasing use of standardized products and services in the banking business that are based on electronic risk ratings of customers, the banking industry increasingly utilizes computers and telecommunication equipment connected via the Internet as the ordinary distribution channel of their services. Ranging from Online brokerage and Home banking to Electronic insurance contracts, information and communications technologies (ICTs) have changed the financial service industry significantly over the past decade.

Banks that deploy technology more successfully to get more from the higher-quality knowledge employees they attract will gain large business model advantages—and drive substantial growth and productivity gains. In further *Table* is showed executives weighting in on the major developments that will be important for business over the next five years, employing. Information streams as the infinite by-product of a knowledge economy, and support the idea that the best companies will turn this free good into gold.

Table 1. The impact of global forces on business, (% of executives who mark the force), 2010

Forces reshaping the global economy	Is important for business	With the positive effect on profits	Is being actively addressed by their company
The great rebalancing	85	48	72
The productivity imperative	57	40	58
The global grid	61	41	68
Pricing the planet	48	23	51
The market state	57	39	29

Source: Source: McKinsey global forces survey of 1,400 executives, 2010

A final productivity driver will be something businesses are creating in digital bucket loads: information. Although the volume of data created is expected to increase fivefold over the next five years, best-guess estimates suggest that less than 10 percent of the information created is meaningfully organized or deployed. To sustain wealth creation, developed nations must find ways to boost productivity; product and process innovation will be the key.

The banking industry exhibits the highest proportion of IT investment compared to all other industries after 1995 (for the US see e.g. Council of Economic Advisors, 2001, for the EU see EITO, various yearbooks 1996 until 2001). The financial service industry will only be able to grow steadily in the future by innovations in terms of new financial services. While automatic teller machines and credit cards were the early enablers to reduce the need for front-desk service workers, such as cashiers etc., the pervasiveness of the Internet provides the opportunity to offer and use ubiquitous financial services from virtually everywhere. A particularly attractive option is the conduct of financial transactions via mobile communications devices. This transformation process has not been completed yet, so that one might expect that there is a still on-going labour-saving process that could last well into the near- and even mid-term future.



In this paper is investigated the impact of ICT capital, and labour input at different skill levels, on aggregate productivity and employment in the financial intermediation sector.

Literature overview

Several studies over the years have been conducted at both the industry and firm-level to examine the impact of IT on productivity. There has been much debate on whether or not the investment in Information Technology provides improvements in productivity and business efficiency. Firm-level studies, primarily in the manufacturing sector, have shown that there are significant positive contributions from IT investments toward productivity. Using data collected through a study of retail banking institutions in the United States, it could be concluded that additional investment in IT capital may have no real benefits and may be more of a strategic necessity to stay even with the competition. However, the results indicate that there are substantially high returns to increase in investment in IT labor, and that retail banks need to shift their emphasis in IT investment from capital to labor. Brynjolfsson (1993) and Wilson (1993) provide reviews of this literature on the business value of IT. Some studies have drawn on statistical correlation between IT spending and performance measures such as profitability or stock value for their analyses (Dos Santos *et al.* 1993, Strassman 1990), and have concluded that there is insignificant correlation between IT spending and profitability measures, implying thereby that IT spending is unproductive. Brynjolfsson and Hitt (1996), however, caution that these findings do not account for the economic theory of equilibrium which implies that increased IT spending does not imply increased profitability. The researches which have been drawn upon the economic theory mostly use a technology or production function which relates the output of a firm to its inputs and contribute significantly to the establishment of the "IT Paradox" with the industry-level studies of the mid- and late 1980s; this "paradox" indicated a negative correlation between IT investments and productivity.

More recent firm-level studies, however, paint a more positive picture of IT contributions to productivity. These findings raise several questions about miss-measurement of output by not accounting for improved variety and quality, and about whether IT benefits are seen at the firm level or at the industry-level. Such issues have been discussed in Brynjolfsson (1993), and to a lesser extent in Brynjolfsson and Hitt (1996). One illustration of the industry-level studies is that of Morrison and Berndt (1991), which found that in the manufacturing industry, "estimated marginal benefits of investment in IT are less than marginal costs, implying over investment". Of late, the increased availability of firm-level data has led to several other studies which report results different from those found in industry-level studies. Loveman (1994), for example, using data from the Management Productivity and Information Technology Database in a Cobb-Douglas production function framework, concludes that for the manufacturing firms included in his study, there is no significant contribution to output from IT expenditure. Lichtenberg (1995), on the other hand, concludes that there is significant benefit from investment in IT. For his analysis, he draws data from annual surveys conducted between 1988 and 1991 by *Information Week* and *Computer World* magazines. Using a Cobb-Douglas production function, he estimates that there are "substantial excess returns to investment in computer capital" and further, that one Information Systems employee is equivalent to six non-IS employees in terms of marginal



productivity. The latest in this trend of research is Brynjolfsson and Hitt (1996) and Hitt and Brynjolfsson (1996). Brynjolfsson and Hitt (1996) use data from two sources: the dataset compiled by the International Data Group, and Standard and Poor's Compustat II database. The IDG data includes self-reported firm-level details of IT expenditure collected annually. Using this data in a Cobb-Douglas production function, Brynjolfsson and Hitt conclude that "computers contribute significantly to firm-level output." In fact, they find that computer capital contributes an 81% marginal increase in output, whereas non-IT capital contributes 6%. Similarly, they show that IS-labor is more than twice as productive as non-IS labor. Most of such studies relating to the contribution of IT toward firm-level productivity have been restricted to the manufacturing industry, possibly owing both to a lack of data at the firm-level in the service industry and perhaps, more significantly, the difficulty of unambiguously identifying the "output" of a service industry.

The latter problem is particularly persistent in the banking industry, which is the focus of this study. As Parsons, Gotlieb, and Denny (1993) argue in the banking industry, "the growth of output, and the measurement of productivity, is very sensitive to the choice of output. Parsons, Gotlieb, and Denny (1993), in fact, is one of the very few studies that deal with the impact of IT on banking productivity per se. They conclude from their estimation of data from five Canadian banks using a trans log production function that, while there is a 17-23% increase in productivity with the use of computers, the returns are very modest compared to the levels of investment in IT.

Productivity of banks highlights

The productivity and efficiency of banks critically impacts the productivity and efficiency of all economic activity and is a matter of concern for policy makers and economy watchers, while the banks form the core of a nation's financial system, performing the vital function of financial intermediation through liquidity, maturity and risk transformation. The banking efficiency could be like highlighted as allocation and operational. *Allocational efficiency* focuses on ensuring that the precious financial resources are allotted to the most productive activities as per development needs of society. It seeks to ensure that the broad national priorities are furthered through the process of resource allocation and that the interests of the most vulnerable sections are protected. *Operational Efficiency* means banks seek to provide financial services in a safe, secure, speedy and cost effective manner. The goal should be to ensure that the transformation function generates least friction in terms of time and cost overlays. These concepts of efficiencies have considerable inter-linkages and the challenge for banks is to ensure optimal performance on both fronts.

Technology in banking

According to McKinsey Institute (2013), as top Retail Banking Trends could be seen further Predictions:

- **Drive-to-Digital:** Impacting delivery, marketing and service usage
- **Payment Disruption:** New players, technologies and innovations
- **Increased Competition:** Neo banks and non-traditional player pressures



- **Branch Optimization:** Maybe not branchless, but certainly less branches
- **Focus on Customer 3.0:** Digitally astute, social and yearning for insight
- **Breaking Down Silos:** Product and data silos begin to crumble
- **Simplifying Engagement:** Removal of friction and steps to engage
- **Improving Contextual Experiences:** Leveraging data for improved service
- **Differentiating Brands:** Avoiding commoditization in a digital world
- **Global Innovation Perspective:** Expanding view of tomorrow's innovations

According to conventional wisdom, new information technology is not at present likely to impinge much on the development of the banking industry in the emerging economies, which remain technologically behind the industrial countries. For example, the low level of penetration in most emerging economies means that the internet is not seen as a threat to traditional banks. Given the signs of a possible bursting of the e-banking bubble in the United States and Europe, some have also argued that the issue of electronic banking may go away before the emerging markets need to worry about it.

This conventional view can be challenged on several grounds. As noted above, the major issue about new IT is its impact on the processing of information, which is the very essence of the banking business. Perhaps the most significant innovation has been the development of financial instruments such as derivatives that enable risk to be reallocated to the parties most willing and able to bear that risk, thereby inducing more investment in real assets and fostering the development of banking and financial markets in general.⁴ The use of such instruments is not the preserve of industrial countries:

- With their increasingly sophisticated IT applications, banks in the emerging economies use new financial instruments daily in their transactions. Their banking systems and financial markets are thus in a position to advance much more rapidly from a rudimentary to a fairly advanced stage of development of risk management and other commercial banking functions. Such potential skipping of financial development stages would not have been possible in the past, when information processing technology was not readily available, and when the development of futures markets and other domestic financial institutions that enable unbundling and shifting of risks on a large scale was much more time-consuming and costly.
- The potential for rapid development of commercial banking functions offered by alternative delivery channels such as ATMs, debit cards, telephone, internet and electronic banking should not be underestimated. Despite the still low level of usage of such channels (with the exception of ATMs, which are now very widespread), the vast majority of banks in the emerging economies see such channels as a must for their industry. Banks fighting for some important part of the retail market believe that they have to offer such services as an essential marketing tool, although the true demand for them has so far been limited.
- In advanced economies, new technology is affecting the structure and performance of the banking industry in the emerging markets mainly through its impact on the costs and the determination of optimal scale. Branch-based transactions are much more expensive than alternative delivery channels. This



cost advantage would seem to favor smaller institutions, as investments needed to attract deposits or provide banking services via the internet are in principle lower than the costs of setting up a traditional branch network. At the same time, investments needed to develop adequate back office and risk assessment systems are very high, creating considerable cost advantages for larger institutions. Moreover, branch networks are not expected to shrink as a result of the However, just because share prices of internet stocks fall, this does not mean that the impact of new technology on banking will disappear.

Table 2. Costs of banking transactions (in US dollars)

	Estimates by US Department of Commerce (1998)	Estimates by Booz, Allen & Hamilton (1997)	Estimates by Goldman Sachs & Boston Consulting Group
Physical branch	1.07	1.07	1.06
Phone	0.52	0.54	0.55
ATM	0.27	0.27	0.32
PC-based dial-up	0.11	0.02	0.14
Internet	0.01	0.01	0.02

Source: Sato, Hawkins and Barentsen (2001)

Banks are increasingly losing their privileged access to information about investment opportunities, and are thus under pressure to merge or build alliances with domestic or foreign-owned banks and technology companies in order to share the costs and exploit the benefits of the development of new IT applications.

For retail banks, today's markets are fraught with challenges: new digital competitors and digitally empowered customers prominent among them. Yet most still pursue business as usual, striving to be all things to all customers. Despite their best efforts to focus on the customer, many still don't offer what their customers actually want. These banks also tend to manage their extensive channel networks—including digital—separately, and not as a holistic function impacting all aspects of their retail operation.

According to the Accenture Report (2013, conducted online interviews with more than 2,000 US retail banking customers of the 15 most leading retail banks doing business in the US today. When asked how happy they are with the performance of their primary bank provider, 71 percent declared themselves "satisfied" and 68 percent said they would be "extremely likely" to recommend their primary bank to a friend, family member or colleague). This research, however, also reveals just how fragile this apparent customer loyalty really is. More than a quarter (26 percent) of bank customers who remain with their primary provider do so simply because they consider switching to be a hassle. Among them, about half just haven't seen competing offers compelling enough to make them move, and the other half believe the process of switching to another bank is just too difficult. This not only exposes the tenuous relationship banks have with their customers. It also confirms that the right offering and approach can induce them to switch.

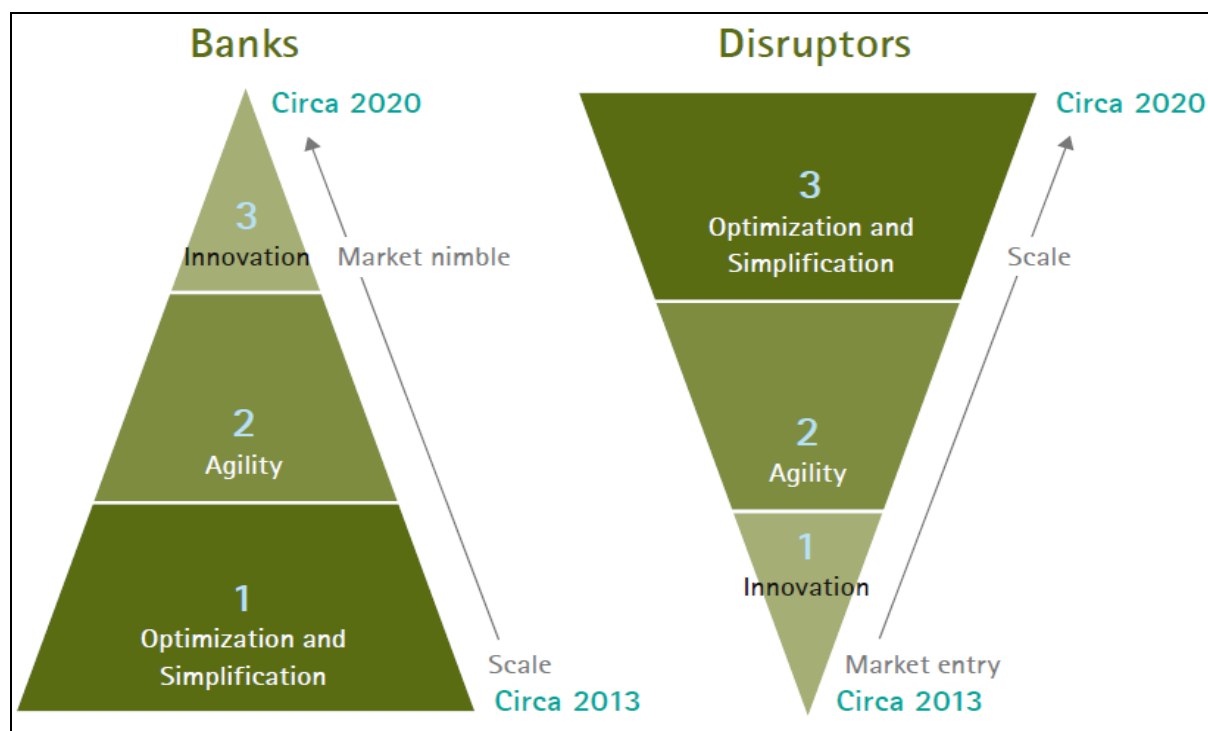


Industry newcomers have understood that in the post-financial crisis environment the most fundamental question in retail banking has changed from “how do you find your future customers?” to “how do new customers find you?” And they are leveraging their innate advantage as digital pure plays to deliver the speed, convenience and low-cost personalized service that today’s customers increasingly seek. Traditional players, of course, also have an innate advantage—the extensive branch networks that customers still value, as our research confirms. But they cannot afford to ignore what the nimble new entrants are telling them: winning with digital in the future will be all about winning more satisfied and loyal customers with trusted, transparent and compelling offerings. And that means becoming an integral part of customers’ lives: an agile, ubiquitous presence, wherever those customers may be. In an era of industry consolidation, new entrants, expanding regulation, more onerous capital requirements, and continuing economic volatility, traditional retail banks urgently need a lower-cost operating model that can generate more predictable and sustainable revenues. Indeed, if traditional providers don’t move swiftly and decisively to build such a model, they will lose more customers. The core challenge for traditional full-service providers: how to build a seamless digital customer experience—and optimize its power with a better and more cost-effective complementary offering in the branches that customers still find so attractive. Common Characteristics of the Emerging Disruptors

- Emphasize social responsibility
- Focus on customer centricity and empowerment
- Present simpler fee structure to customers
- Provide personal financial management tools and access to other accounts
- Embedded with social media, especially Facebook
- Leverage Big Data and analytics
- Offer mobile bill pay, P2P, remote-deposit, free ATM access

One source of concern related to new banking technology is the emergence of a *digital divide* in the access to banking services. According to this view, better educated and more affluent customers will be able to obtain improved service from banks through the internet over the medium term, while the services provided to poorer and older customers will deteriorate as branches are closed, particularly in remote areas. These concerns have led some policymakers to seek a continued role for the state owned commercial banks that maintain traditional, nationwide branch network. With the rapid expansion of ownership of smartphones and tablet devices, today's consumer wants to be able to research, purchase and manage their financial services on demand using the device(s) of their choice in virtually any location. Reinventing the financial services purchase funnel, the way people conduct daily banking, the delivery of insight, and the interaction between channels, the drive-to-digital will provide both opportunities and challenges for financial institutions of all sizes.

Figure 1. Emerging Disruptors



Source: Accenture Report, 2013

In 2014, it is expected to be seen greater experimentation in new products and revenue build around mobile, web and social commerce, and the emergence of Drive-to-Digital competing with Drive-to-Branch. Mobile and web have all been about brochure ware and transactional services to this point – finally we'll start to see a concerted effort to revenue fulfillment digitally. There will be a realization that channels are owned by consumers, and not banks, and thus must meld into a digital experience that exists seamlessly regardless of channel or device. The silos of traditional retail delivery channels will begin to erode and a more holistic approach to a digital banking experience will take hold. In a mobile-first environment, banks will begin to support more complex types of functions and transactions on the small screen, new forms of authentication that better balance security and convenience, and more relevant, contextual information delivery via alerts, push notifications, and other forms of messaging. Banks will also likely promote mobile banking to an older, more risk-averse cohort than in the past.

The impact of ICT on Serbian banks productivity

The efficiency of the Serbian banks operations has an important bearing on overall economic health of the country. The Serbian banking system which is 78 percent foreign owned in these where state capital is dominated has not succeeded in balancing allocation and *operational* efficiency focuses on ensuring that the precious financial resources are allotted to the most productive activities as per development needs of society. It seeks to ensure that the broad national priorities are furthered through the process of resource allocation and that the interests of the most vulnerable sections are protected. In the purpose



to support the usage of the IT technologies in banks National Bank of Serbia has adopted the decision on minimum information system management standards for banks, (RS Official Gazette, 2013). For the purpose of this Decision:

- *Information system* should be implemented as a comprehensive set of technological infrastructure (hardware and software assets), organization, people and procedures for the collection, processing, storage, transfer, presentation and use of data and information; *information system resources* would include software assets, hardware assets and information assets; *software assets* would adopt all types of system and application software, software development tools and other software and *hardware assets* would include computer equipment, communication equipment, data storage media, and other technical equipment supporting the functioning of the information system.
- *Information assets* in banks should be improved as data in files and databases, program code, configuration of hardware assets, technical and user documentation, internal regulations, procedures, with *information system users* authorized to use the information system (employees in a financial institution, employees in other entities accessing the information system of a financial institution, clients of a financial institution accessing the institution's information system through electronic interactive communication channels).

As *information system risk* is shown to be very high in state owned banks, the possibility of negative effects on the financial result and capital, achievement of business objectives, operation in accordance with regulations, and reputation of a financial institution due to inadequate information system management or other system weaknesses which negatively affect the system functionality or security, and/or jeopardize the business continuity of the financial institution, *controls* are proposed to design and monitor policies, procedures, practices, technologies and organizational structures relating to the information system and established to reasonably ensure that business objectives of a financial institution will be achieved and that undesired events will be prevented or detected. Controls would differ by the implementation method (administrative, technical and physical) and purpose (preventive, detective and corrective). Different type of controls *in that process which would be provided mean*; *administrative controls* means the adoption and implementation of policies, standards, plans, procedures and other internal acts, and the establishment of an adequate organizational structure, for the purpose of achieving and maintaining the adequate level of information system functionality and security; *technical controls* means controls implemented in hardware and software assets of the information system and *physical controls* are controls protecting the information system resources from unauthorized physical access, theft, physical damage or destruction; *preventive controls* means controls aimed at the prevention of problems and incidents; *detective controls* means controls aimed at the detection and recognition of problems and incidents, and the identification of problems and incidents which occurred; *corrective controls* means controls aimed at the limitation and elimination of problems and consequences of incidents.

Information system security would have to uphold the principles of confidentiality, integrity, availability, authenticity, accountability, non-repudiation and reliability as well as *confidentiality* of data and information not to be disclosed or made available to unauthorized



persons. The *integrity* of data, information and processes would have to be better protected from unauthorized or unforeseen modifications, or that any such modifications do not remain undetected; *availability* of data, information and processes more available and usable on request of the authorized party; *accountability* would be upgraded so that each activity in the information system may be traced uniquely to its source. It has to support the faster *electronic banking* systems development which enable bank clients to use services offered by banks (access to financial information, electronic payment) from a remote location through electronic interactive communication channels (e.g. internet banking, mobile banking, telephone banking).

Greater efficiency in banking operations in Serbian banks would have to ensure that the cost of financial intermediation is minimized. At a time when the global and Serbian economy are facing challenges on multiple fronts, efficient financial intermediation would provide impetus to the process of economic recovery by channelizing funds to the most productive sectors at the

Improvement in productivity and efficiency, and the resultant decline in cost of providing financial services will help in furthering financial inclusion, although it seems to be very hard task, as banks don't demonstrate the will to decrease the cost of their services very soon. More importantly, it will help in converting the improved access to financial services into improved usage. This improved usage will make the financial activities commercially viable for the banks and encourage them to scale up their initiatives. Hence, banking productivity and efficiency has a direct impact on improving financial access and financial usage. The recent decline in economic growth has presented significant challenges to banks through rising impairment of assets, pressure on margins and volatility in non-interest income. In this demanding business environment, improved operational efficiency could help banks in standing up to the challenges and enable them to maintain their health and profitability. As banks form the core of the Serbians financial system, the health and profitability of banks will help in ensuring stability and resilience of the entire financial system. Thus, from a systemic stability perspective also, improved productivity and efficiency of the banking system is a definite positive.

Discussions and conclusion

This paper has shown the importance of IT capital in the overall productivity and profitability of the banking industry. The results of the research point to the need to continually invest in software and hardware capital in banks. This research can be extended in several directions. First, using data collected from US Reports, EU reports and Serbian banking system, analysis can be conducted as to what firm-level characteristics differentiate banks that use IT better from those that do not. Are there any business process-related parameters that make IT use more productive in some cases, and not in some others? What can we say about human resource practices and work-organization, and how they affect the implementation and use of IT? Does the IT capital budgeting process influence IT contributions toward productivity and efficiency? How does the decision-making process about IT investments affect the success of IT implementation--do firms that employ "technology committees" to make IT-investment decisions see better returns from IT than



those that rely on “pioneers” who promote IT use in the firm? We will seek to explore these and other related questions in our future research.

The Serbian banking system, taken as an case in The Paper, has seen important productivity improvements over the last two decades, bridging the gap with new private banks and foreign banks. However, the pace of progress has declined, largely due to lack of desired impetus. Our banks have to strive towards closing this gap. Banks’ gains in operational efficiency have, however, come at the cost of their allocation efficiency. The improved operational efficiency has been a result of technological progress and structural changes in balance sheet towards more wholesale business. The operational efficiency gains, though profitable for the banks, have not had the desired beneficial impact on the society as a whole, particularly the rural areas, individuals and small businesses. It can be concluded that the vulnerability of the banking system has increased on account of the imbalances arising from growth in operational efficiency without commensurate rise in allocation efficiency.

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Uticaj IT na bankarsku produktivnost

REZIME – Aktualne su brojne diskusije o tome da li ulaganje u informacione tehnologije obezbeđuje poboljšanja u produktivnosti i efikasnosti poslovanja banaka, te da li korišćenje mogućnosti digitalnih tehnologija za u ciju boljih usluga klijentima i postizanja ciljeva banke, širenjem ovih tehnologija i pruža ogromne nove mogućnosti. Ovaj rad ispituje uticaj IKT kapitala na produktivnost banaka. Za potrebe analizu korišćeni su podaci iz raznih izvještaja, istraživanja i studija o bankarskoj efikasnosti i produktivnosti i digitalizaciji usluga. Dobijeni rezultati bacaju svetlo na relativan uticaj IKT kapitala, i pružaju nov uvid o strukturi dinamike između ovih faktora inputa. Nalazimo, da su banke kao finansijski sektor usluga u razvijenim zemljama veoma slične u pogledu efikasnosti, i da efikasnost i produktivnost zavise sve više IKT kapitala. Iako industrija finansijskih usluga i banke povećavaju svoja ulaganja u tehnologije u cilju unapređenja elektronskog bankarstva i plaćanja, srpske banake, kao sektor zemalja u tranziciji, pokazuje sporiju primenu novih digitalnih trendova u operativnim aktivnostima banaka. Istovremeno, banke koriste alate kao što su društvene mreže, digitalnih alata kompleti online takmičenja, online reklamnih kampanja, mobilne aplikacije usluge bazirane na lokaciji i onlajn tržištu istraživanja da se povežu sa kupcima. Rad takođe daje pregled digitalnih trendova globalno ubankarskoj industriji, naglašava najbolju praksu i alate digitalnih medija u podršci marketinških ciljeva, većih prihoda sa nižim troškovima. Doprinos rada može se videti takođe u: produbljanju razumevanja (stacionarnih i mobilnih) digitalnih tehnologija u kao marketinških alata, upućivanju na dalja istraživanja digitalnih oblasti, vrstama digitalnih kupaca u bankarskoj industriji, i dalje diskusije dobrih primera uvođenja mobilnog sistema plaćanja.

KLJUČNE REČI: Srpske banke, finansijska kriza, produktivnost, IKT, digitalizacija

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