APPLICATION OF AUTOMATED TELLER MACHINE IN SERBIA

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Abstract— The banking sector has noticeable a tremendous application of numerous applied sciences for its everyday operations. Essentially the most massive of such technologies has been the introduction of automated Teller Machines (ATMs). At the start, ATMs had been used only for giving cash, however now present round-the-clock offerings for a diverse quantity of operations, e.g., digital switch of funds, paying bills, viewing past transactions of financial institution money owed, changing the ATM signal in credentials etc. In this paper is given the review of ATMs and their application and usage in the Republic of Serbia.

Keywords— Automated Teller Machines, economy, finance, Serbia

I. INTRODUCTION

IN In these days' trade world, globalization and global expertise has ended up the significantly principal.

Banking industries can not get away with operating loosely linked agencies of businesses that happen to be placed around the world, however ought to strategically integrate their pursuits. Best the banks, corporations, industries, and entire by way of societies that obviously fully grasp the new principles of doing business in a world financial system will prosper. World competition within the banking sectors has pressured management and executives to appreciate that they must suppose otherwise about banking routine and administration. As a world banking, the one strategy to be triumphant is to strengthen and strong world banking management process with personnel capable of designing and imposing transnational trade tactics through using brand new technological know-how similar to automated teller machines (ATMs).

Although each banking operation requires some science functions, researcher differs on the discipline of the connection between the level of employed automated teller machines, and the worth of the banking effectively expand. All researchers agree on the significance of ATMs for the further traits of the banking industry, but some of them have discovered the lack of proportionality between the expanded within the scale of technological know-how utilization and the broader in banks

profitability. Automated Teller computer (ATM), sometimes called an automatic banking computer (ABM) or cash laptop and by means of several other names, is a computerized telecommunications device that provides the purchasers of a financial tuition with access to fiscal transactions in a public area without the necessity for a cashier, human clerk or bank teller. On most latest ATMs, the consumer is identified through inserting a plastic ATM card with a magnetic stripe or a plastic smartcard with a chip, that comprises a specified card quantity and some safety know-how corresponding to an expiration date or CVVC (CVV). Authentication is furnished by the purchaser entering a private identification number (PIN). Utilizing an ATM, consumers can access their bank money owed with a view to making cash withdrawals, credit card cash advances, and assess their account balances as good as purchase pay as you go mobile phone credit.

II. HISTORY OF ATMs DEVELOPMENT

ATMs have been analyzed in the literature for some thirty years. The earliest experiences concentrate on explaining the adoption of this new science. Creator of [1] discusses ATM adoption in the US. The first ATM was once set up in America in 1969 and only 10% of all country wide banks had adopted even one ATM after eight years. A bank's adoption of innovation depends on its size, branching fame and aggressive role. In these days adoption of recent technology was related extra carefully to competition than to cost savings. Authors of [2] evaluate how firms react to rivals' precedence in technology adoption procedure. The authors use information on the adoption of ATMs via a large sample of US banking companies in 1971–1979. Consistent with the gain knowledge of, opponents' adoption of ATMs increases the conditional likelihood that the other businesses will even adopt ATMs. Authors state that market attention has optimistic results on the adoption of ATMs. In step with their outcome, ATM adoption delays are decreased as community effects develop. The authors use the quantities of branches as a proxy for community results because, within the Seventies, most ATMs were

located in financial institution branches. Nevertheless, today this kind of proxy would no longer be proper due to the fact that many ATMs are placed outside of banking premises. Additionally, the authors state that ATMs are adopted the sooner, the higher the creation scale economies. Authors of [3] talked about network externalities and shared ATM networks. In line with this be taught, the quantity of financial institution's own branches will not be concerning early ATM adoption but the quantities of different banks' branches are. Survey ATM diffusion studies by authors of [4] of their article on empirical stories of economic innovation. The six studies summarized by way of frame and White talk about preliminary adoption, or diffusion, of ATM science. Nonetheless, the demand for ATMs after the first section of adoption has now not been mentioned very broadly. Authors of [5] be taught selections on ATMs in Italian banks. In step with their outcome, the quantity of ATMs is positively associated e.g. to the financial institution's quantity of branches and deposit money owed. There are stories on ATM pricing and fees. There are more than a few costs regarding ATMs: An interchange rate is a rate that the patron's bank pays to the ATM proprietor when the consumer makes use of a different bank's ATM. A surcharge fee is paid by means of the cardholder to the ATM owner. A foreign rate is paid via the cardholder to his bank when making use of a further bank's ATM. These and other cost definitions are determined in [6]. Authors of [7] discuss the pricing decisions of shared ATM networks. He states that ATM networks must do away with their pricing ideas for interchange expenses and that there must berate competition between ATM house owners with the

intention to develop the efficiency. Authors of [8] examine shared ATM networks, banking competitors and expenses. The authors use a three-bank mannequin to be taught the style wherein banks make their ATM networks suitable. They conclude that in equilibrium both a subset of banks will share ATM networks or there shall be complete incompatibility. This is a reasonably stunning influence, on the grounds that many countrywide ATM networks appear to be compatible (e.g. ECB 2001). The paper was once released in 1994, when incompatibility was extra natural than at the moment. According to them, totally compatible networks are observed in international locations the place the banking process is totally collusive, dominated with the aid of public banks, or competing in distinct geographical markets. Moreover, they state that network prices enhance the possibility of compatibility.

III. Model of the ATM system

An ATM system is an actual-time front terminal of automatic teller services with the help of a primary financial institution server and a centralized account database. This paper model an ATM that provides cash withdraw and account balance management services [9]-[11]. The architecture of the ATM method, as shown in Fig. 1, encompasses an ATM processor, a system clock, a far off account database, and a suite of peripheral contraptions akin to the card reader, screen, keypad, expenditures storage, and costs disbursed. Functions of ATM processor have been shown in Fig 2.
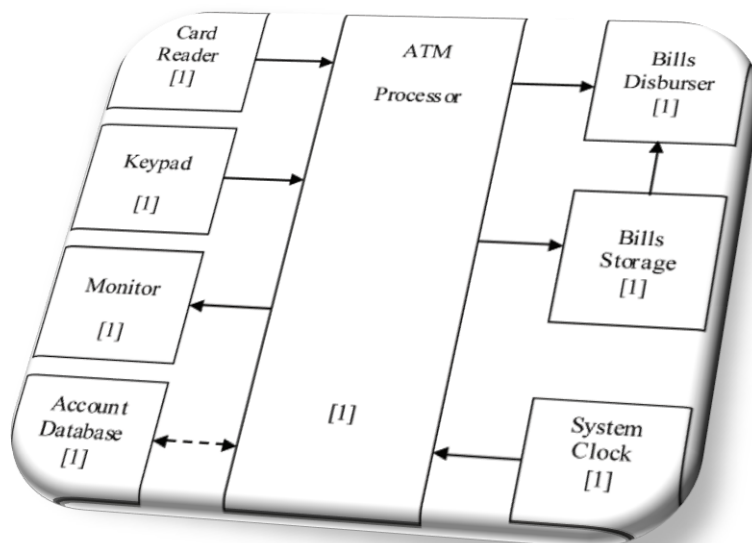

Fig. 1. Generic model of ATM system [3]

The conceptual model of an ATM approach is frequently described by using a Finite State Machine (FSM), which adopts a suite of states and a collection of state transition services modeled through a transition diagram or a transition table to describe the fundamental behaviors of the ATM method. On the foundation of the conceptual model of the ATM procedure as given in determining 1, the highest degree behaviors of ATM can also be modeled in a transition diagram as shown in Fig. 2. Similar to the transition diagram of the ATM as given in Fig. 3, a proper model of the ATM approach as an FSM [12]- [14].
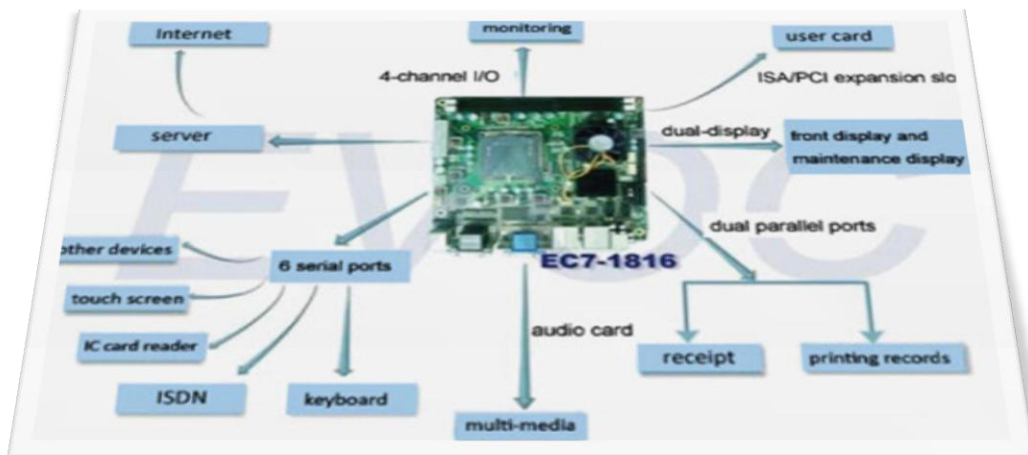

Fig 2. Functions performed by embedded processor. Source: evoc.com
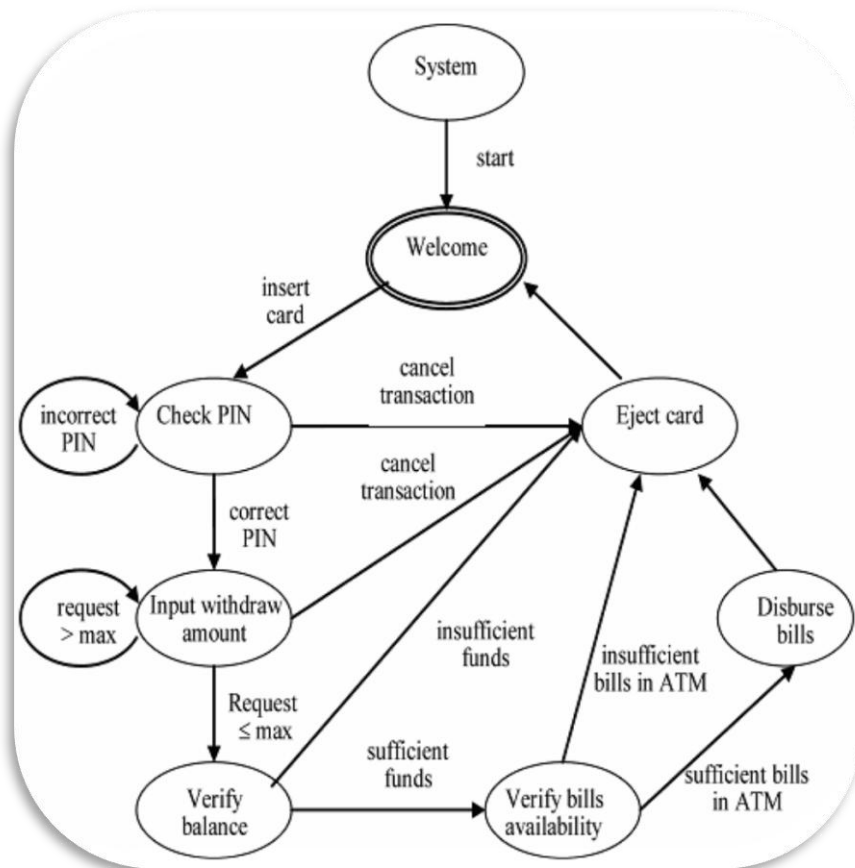

Fig 3. Process of ATM functions [7]

The structure of a hybrid hardware/application approach, specifically a real-time procedure, is a system framework that represents the overall constitution, accessories, methods, and their interrelationships and interactions. This section specifies the architecture of the ATM approach [15]. Procedure architectures, at the prime degree, specify a list of structural identifiers of UDMs and their relations. A UDM could also be viewed as a predefined class of method hardware or interior manage. Items, which can be inherited or carried out by way of corresponding UDM objects as specified situations within the succeeding architectural refinement approaches for the procedure. Comparable to the conceptual mannequin of ATM as shown in Fig. 1 and a couple of, the excessive level specification of the structure of ATM.

IV. USAGE OF ATM IN SERBIA

Financial institution shoppers in Serbia have a collective sign of relief when the automatic Teller computer (ATM) used to be introduced as an instrument to help banking operations. The introduction of the ATM by way of financial institutions modified the face of banking in Serbia but with some inherent challenges. ATM played a key role in any retail banks' efforts to

make use of science as the best weapon to defeat the competition. Automated Teller machine supplies a foremost function in offering comfort, speedy and circular the clock offerings. The ATM has made settlement of fees within the Serbian banking method convenient and safer. These advantages have resulted in phenomena development in a number of ATMs in Serbia.

In Table 1and on Fig 3. are given statistical data on the number of ATMs in Serbia. Units are expressed as a number of ATMs per 100 thousand residents. Time series representation was done according to methods used in [16].

TABLE I. NUMBER OF ATMS PER 100.000 RESIDENTS IN SERBIA.
(SOURCE: WORLDBANK.ORG)

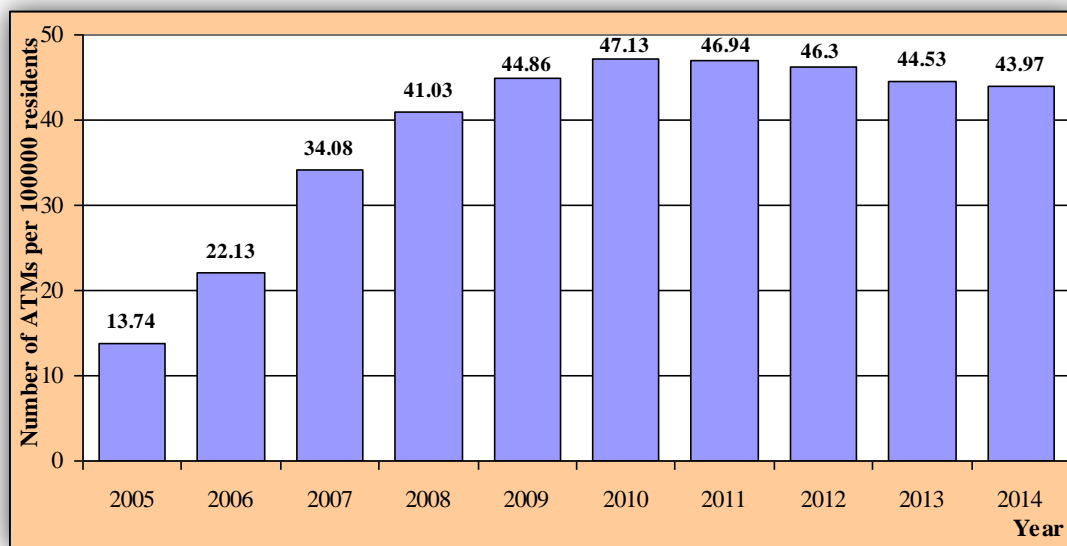| Year	No. of ATMs
2005	13,74
2006	22,13
2007	34,08
2008	41,03
2009	44,86
2010	47,13
2011	46,94
2012	46,30
2013	44,53
2014	43,97

Fig. 3. Number of ATMs per 100.000 residents in Serbia

One more best have an effect on of automated teller computing device and information science is that it contributes immensely to the advertising of advertising banking offerings [17,18]. With the help of information science, funds will also be moved one account to yet another at the push of a button, foremost expertise in the case of a transaction might be made available countless numbers of miles away inside minutes. At present, banks

are setting up and deployed better – personalized offerings through using automatic teller computer. For example in Serbia at present, banks are supplying buyers with "access Terminals" with which they (shoppers) can entry their balances and view or print movement in their debts. These are distinctive offerings, enjoyed through exact, shoppers, which has been impossible hitherto. Advantages of ATM to the financial institution as
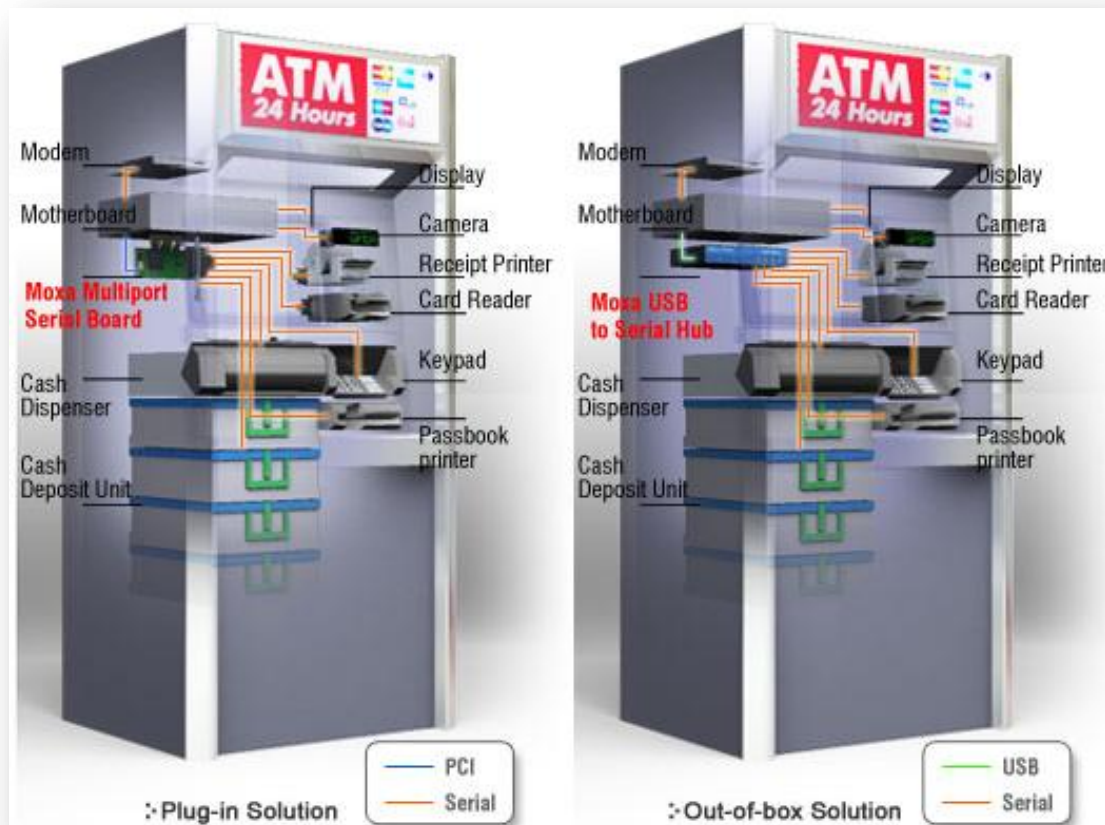
comply with: funding opportunities, reduction in expenses (i.e. Rate savings), effective service delivery, branding of shared network, the delight of patrons and competitiveness etc. ATM facility resulted in the pace of transactions and saved time for shoppers. Other price brought offerings of ATM incorporate college fee, an on-line assortment of the application fee, cell top up, religion/believe donation, invoice settlement, insurance premium payment, and cash switch card to the account, amongst others. Multiplied ATM utilization is also helped by way of the fact that buyers have now the flexibility of utilizing ATMs of different banks, as many of the banks are a part of principal interbank networks. The interbank networks have introduced collectively ATMs of a few banks in order that buyers would attain entry to any of the taking part banks' ATMs. Banks find it more cost effective to pay membership costs to these networks as towards establishing further items in costly-to-deploy areas. There may be additional interest toward white-label ATMs [19]- [21]. Many firms are interested in this model, the place of the possession of the ATM is probably not with the banks however with third parties who set up them and generate income on prices charged on each transaction. The concept is regular on the American continent. Vast acceptance of ATMs by way of

buyers, the introduction of biometric ATMs, and increasing the scope of price-introduced ATM services will hold progress in the industry.

V. ATM CASH MACHINES

Of all electronic distribution channels, ATM (automated teller machine) cash machines offer the greatest relocation potential of routine transactions from branches and, in so doing, to reduce the volume of these transactions at the branch, and that this will help the repositioning of the branches from the checkpoint for performing transactions at checkpoint which offers the sale of products and services. Moreover, ATM cash machines are almost entirely universally available, all clients can interact with ATM visual, on-screen, and they can request a hard copy of the copy, if they wish (Fig. 4).

The main problem of the perception of consumers creates inhibition to use ATMs for functions other than those of basic nature. Since launched as cash machines, where most of the clients are using them primarily for cash withdrawal has become very difficult to convince many customers that there are other functions that can perform ATM cash machines.

Fig. 4.
Components of multi-functional automated teller machine (ATM)

In fact, the transactions that ATMs can carry out are the following:

1) *cash withdrawals and deposits,*
2) *inquiries on account balance,*
3) *transfer of funds,*
4) *publish of printed copies,*
5) *payment on loans and credit cards,*
6) *payment of bills,*
7) *action transactions,*
8) *quotations action,*
9) *service account,*
10) *account application,*
11) *download of smart cards.*

Some banks affirm that ATM cash machines were profitable. Profitability obviously depends on the volume of transactions (usage). Therefore, the extent to which the branch of the ATM cash machines uses will contribute to its greater profitability. Compared with this, the plastic cards in the work with the population were initially used as an access card for ATM cash machines. Since the late 1980s, the role of plastic cards has been expanded. Plastic cards have now become an integral part of the banking program to work with the population. In the long term, to the benefit of all who work in the financial sector that has a network of ATM cash machines and POS terminals.

VI. Conclusion

The paper reveals that Automated Teller Machine is important and very effective, and its discussion is not whether it is desirable or not, but to determine how the emerging technologies can be better annexed and channeled to promote banking sector growth, more productivity, more trade, improve banking records keeping, greater modernization and better-living standard. The activities of the banking industry have been able to rise up, thus, the advent of Automated Teller Machine has enabled bank management and investors aware of some of the techniques being used by their foreign counterpart in achieving competitive advantage.

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