TRANSFORMATION OF TELLER/COUNTER SERVICES USING MODERN MOBILE DIGITAL INFORMATION TECHNOLOGIES

Mirko **SAJIĆ**[1], Dušanka **BUNDALO**[2], Željko **VIDOVIĆ**[3], Zlatko **BUNDALO**[4], Dejan **LALIĆ**[5], Luka **SAJIĆ**[6]

[1]*Independent University Banja Luka, Faculty of Information Technologies, Republic of Srpska, Banja Luka, *[2]*University of Banja Luka, Faculty of Philosophy, Republic of Srpska, Banja Luka, *[3]*University of East Sarajevo, Faculty of Traffic Engineering, Republic of Srpska, East Sarajevo, *[4]*University of Banja Luka, Faculty of Electrical Engineering, Republic of Srpska, Banja Luka, *[5]*NLB Banja Luka, Republic of Srpska, Banja Luka, *[6]*Pan-European University Apeiron Banjaluka, Faculty of Information Technologies, Republic of Srpska, Banja Luka*

Abstract: *The paper considers, proposes and describes the possibilities and ways of transforming teller/counter services using modern and mobile information technologies in order to increase the efficiency of such business. The shortcomings of the traditional teller/counter services are pointed out, and the reasons that will lead to the transition to a modern automated way of providing teller/counter services, without the physical presence of a person, are presented. Then, various variants of partial or complete automation of teller/counter services using modern mobile information technologies are considered. The impact of the pandemic on accelerating the online working and services is mentioned. Then, ways of transforming teller/counter business are proposed and described, through several variants, such as the use of intelligent digital teller/counter terminals and the application of remote online services, through several practical examples. Factors that influence the limitation of the degree of automation and what needs to be done to overcome these limitations are highlighted. Groups of users are profiled who, according to their objective and subjective reasons, will use certain types of automation of teller/counter operations. Appropriate intelligent multifunctional devices are presented, which are already used in some areas as a transitional solution in the automation of the provision of teller/counter services.*

1. INTRODUCTION

The first thing to focus on is the reasons why someone who organizes the provision of teller/counter services would look for some new possibilities in relation to the classic, well-established way of providing counter services.

Modern man (user of the mentioned services) is increasingly realizing the advantages provided by modern mobile digital technologies and devices. And he rightly wonders if some things can be done "online," e.g. to buy various goods through web shop stores. That exactly means that the user chooses the time when he will do it and the place from where he will do it (it is important that he has access to the Internet), so why not get the possibility of "online" servicing. [1] Modern man has less and less free time at his disposal. Furthermore, there is less and less time to perform certain tasks, which include the provision of teller/counter services. Because these services, if performed in the classic way, require the user to go to a specific and prescribed place to do so. This again entails wasting time, nerves, etc., as traffic jams are to be expected at that time. Because as working people have their working hours, so do the counters, realized in the classic way.

The employer is dissatisfied, because the worker has to leave his job, lose time while doing his jobs related to the performing teller/counter services, such as going to banks, municipalities, various other state institutions, to pay something, get a certain document. Since the classic counter has the prescribed working hours, then, depending on the frequency of services it provides, you can expect crowds and queues in front of such counters. We are also witnessing other problems brought to us by the modern age, in the form of pandemics, which further complicates the provision of counter services in the traditional way. Because the prescribed distance is required, there is little space in the rooms themselves, so people are waiting outside in line, in the cold, rain, snow, high heat.

All this contributes to the modern client feeling dissatisfied, this way of organization increases his nervousness and stress, which he certainly has too much, living a modern fast-paced way of life and work. And he rightly demands more and more that he be allowed to choose the time and, if possible, the place where and when he will perform certain counter services.

Those who are in charge of the organization and cost-effectiveness of providing teller/counter services, are also realizing more and more, the problems that are accumulating, providing services in the classic traditional way. [2] Certain attempts to extend and shift office hours have only partially alleviated customer dissatisfaction. On the other hand, shift work has increased the cost of providing services. Thus, the organizers of these services are brought into a dilemma, whether to reduce the profit from services, or increase the prices of services. It

should not be emphasized that the latter would further increase the dissatisfaction of users of counter services.

All the above reasons contribute to the fact that the organizers of teller/counter services, as well as customers, think and increasingly use modern mobile digital technologies (software - hardware components). Normally to the line, that existing legislation allows them to do so. It is known that legal regulations are generally quite late for technology.

2. REASONS FOR THE GRADUAL TRANSITION OF ORGANIZATION OF TELLER/COUNTER SERVICES FROM CLASSIC TO MODERN AUTOMATED WAY

Some of the reasons have already been mentioned in the introduction. There is very little reason left to organize teller/counter services in the traditional way. The only real reason is the impossibility of quality automation, due to the specificity of the service provided at the counter.

There are many reasons for modernization: [3]

1. The desire of the service user for a flexible time in which he can receive certain counter services. In most cases, this desire comes down to the so-called 24/7 service, ie. that the service is constantly available.

2. The desire of the service user to, in addition to time, choose the place from where he will be able to receive the service. Most often, it is a house, office, but it can also be a restaurant, beach, hotel or any other place where the user happens to be and has the opportunity to request that service. This usually means an "online" service performed over the Internet.

3. For some types of services and depending on the level of technical education, common fear of virtual things, age, the client chooses to do it in the official place of the service provider, but automatically, via appropriate digital devices. It is enough for such clients to be able to choose the time of performing counter services, in order to avoid crowds. These types of services also involve setting up a 24/7 service.

4. Performing the service becomes expensive for both, users and service providers. Service users must spend their time (and time is money), bear the costs of transportation to the place of performance of services and the costs of the requested service itself. Service providers, on the other hand, have the costs of arranging the workplace where they provide services, the costs of human staff, and other costs such as security, video surveillance, heating, electricity, water, utilities and the like. When all this is added to the need to organize extended working hours, all this together results in an increase in the prices of services. That's a thing that will never meet with user approval.

5. Extending the working hours of providing services, as well as the flexibility of the place from which the service can be performed, significantly increases the possibility of servicing a larger number of services than is the case with the classic provision of services at the counters. Service providers are aware of this, but users are also slowly becoming aware of it. For example. let's say a user needs a certificate of citizenship. He remembers taking it out some time ago, but by coincidence, he doesn't remember where he could have left it. The user, in order to save himself the time of painstakingly rummaging through things and drawers around the house, makes the decision to retrieve the document again, as he passes by the digital device, where it is possible to retrieve the certificate quickly and without waiting in line. In doing so, he sacrifices to pay for the service again, but he does so because the price of the service is not high. The question is, would he have made a similar decision, if he had been forced to go to the municipal counter and wait in line, all during his working hours. The more automated and accessible the service is to the user, the more often he will decide to use it.

All these reasons contribute to the conclusion that it is time to consider the possibilities of automating, digitizing and robotizing counter services, so that they can be provided "online", without limiting the place and time of service. [4]

Below is an example of what is happening with banking services, which by nature have been over the teller/counter so far.

Figure 1 shows a typical architecture and block diagram of a modern bank information system. In addition to the central part of the bank, two channels of communication and performing the bank's business with clients are shown. These are through personal arrival and physical contact, and through remote access using mobile technologies.

Figure 1 clearly shows that over time, more and more customers will use remote access with the help of mobile devices for doing banking business. It clearly shows the Client migration path. This will increasingly weaken the strength and importance of individual branches, agencies and counters and parts of their networks. There will inevitably be a transformation of branches, agencies and counters. In doing so, some of these places will be turned into a combination of reception offices and self-service devices when performing banking operations. Some of these places will be completely closed. Reception offices will serve as suitable places where trained bank employees will perform the tasks of banking financial advisors to clients who want to do so through physical contact and who need this type of assistance. Complete closure refers especially to rented places, ie to premises that are not owned by the bank. After the migration of a sufficient number of clients to mobile technologies, the cost-effectiveness and sustainability of certain places where branches, agencies and counters are located will no longer be possible. [6]
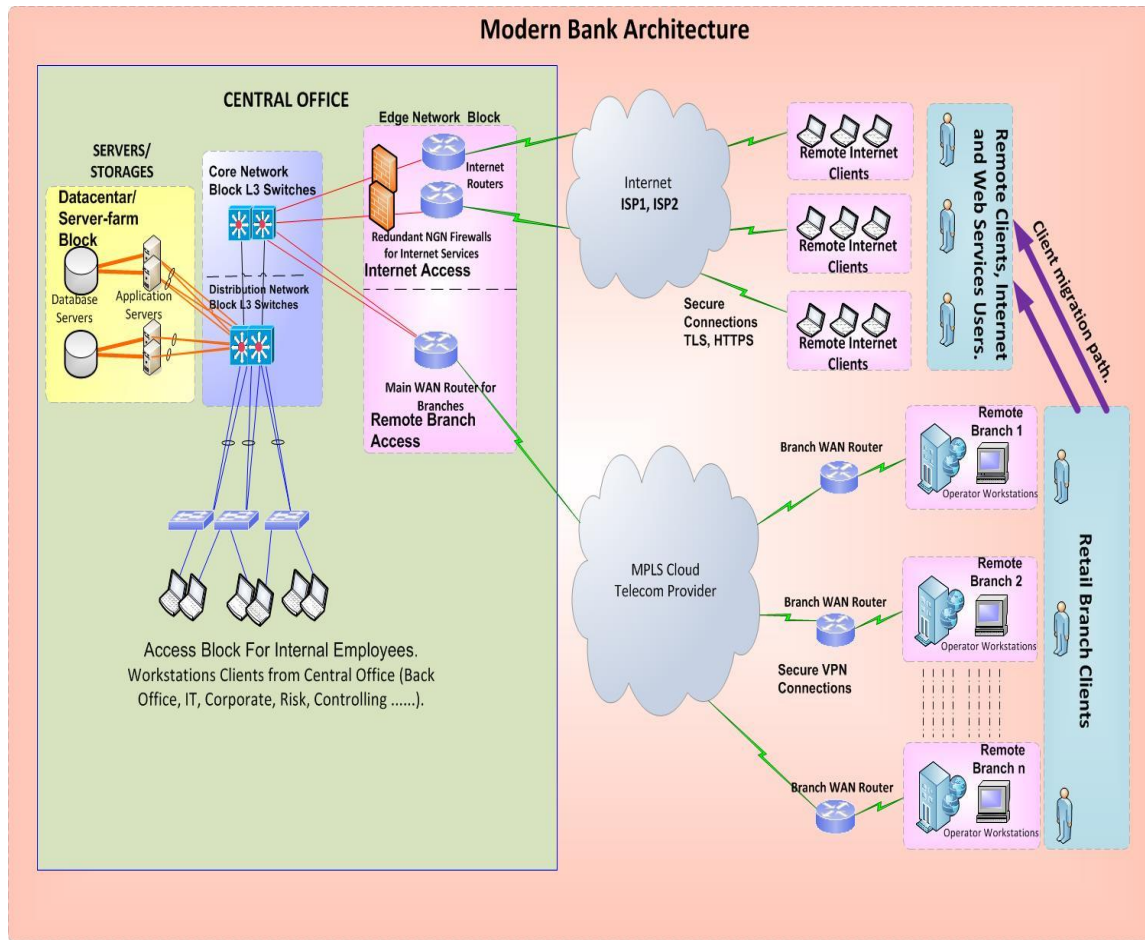
Fig. 1. Typical architecture and block diagram of a modern bank information system [5]

3. WAYS OF ORGANIZING COUNTER SERVICES WITH THE HELP OF MODERN MOBILE DIGITAL TECHNOLOGIES

Starting from the reasons stated in the previous chapter, it is clear that teller/counter services should be organized so that they are fully automated and available "online" on a 24/7 basis. Such services are already provided now, and in the future, there will be more and more of them, by various mobile applications, such as Mobile banking services. But the question is, in witch percent will be possible to automate such services in a certain region. [7]

Depending on the situation, different degrees of service automation should be considered and based on that the performance itself. For example in the Balkan region, still in most countries, a digital signature law either has not been enacted or has not taken root in practice. In that case, certain teller/counter services, such as the issuance of birth certificates, marriage certificates, etc., which are under the jurisdiction of municipalities and similar state institutions, cannot be organized "online" in full. It is also not possible to send a scanned confirmation of the amount of personal income, because it cannot be digitally signed, but the law prescribing personal delivery of the original or a certified paper copy is still in force.

In such a case, it can think about setting up multifunctional digital devices that are designed so that they can do the teller/counter work. They should be in the so-called "Zones 24", ie to be available at all times (24/7). In this case, the user of the service must come to the places where these devices are installed, which is a limiting circumstance for a certain number of clients.

Some customers (younger population who are good at mobile devices and who have good eyesight, due to the screen size on these mobile devices) will feel deprived there. However, there is still (and will be for some time) a significant number of users, who for security reasons feel safer and experience these services more credible, if they use them in places where the competent institutions for this type of service are located (banks, municipal buildings, state institutions etc.). Also, the choice to perform the counter service via a multifunctional digital machine, instead of via a mobile application, will be chosen by the elderly, with poor eyesight, people who either do not have sufficient control over technological devices, such as mobile devices. Or a group of people who still have a fear of "hacking" and do not trust this type of service ("online" service). Unfortunately, frequent psychological announcements (sometimes false, sometimes true) about how certain data on the Internet were stolen and the similar situations, contribute to this psychological state.

Also, in cases when the documents have to be submitted in the original, and cannot be digitally signed and sent via the Internet, partial automation can be performed. The institution providing the service should arrange for most of the necessary activities to be done "online", and then for the flow of physical documents to be done through delivery companies. For example. in light of the outbreak of the pandemic, which has been going on for the second year in a row, the performance of work "on line" has accelerated, ie at a distance. Suddenly, there are companies, schools, state, etc. institutions, came to the realization that most jobs can be organized remotely, without any major problems. Because the current technology allows it (internet, good communication connections, computers, mobile devices, various applications such as Skype, Zoom, Google Meet, etc.).

Thus, a large number of universities organized "online" lectures. However, many have stopped there, and it is technologically and legally possible to automate many more processes. One example is that a student enrolls in college without having to physically come. It is enough for the school institution to have the possibility on its website, for the student to send all the necessary scanned documents, proof of payment of tuition fees, and for the automated documents to be verified by the student service employee, to send the information back to the student. Now he needs to submit the same documents in the form of originals or certified copies, in some form of delivery. When these documents arrive at the student service, the student service prepares and sends by index and other necessary documents, which are certified by the school institution. It is clear that in addition to teaching "online", there are other technological devices that allow the student to be examined orally and in writing. It is normal that there are special cases here as well, where it is not possible to organize everything like this. This certainly

includes teaching that requires a special laboratory, studio, ie the physical presence of the student. Various other services could be organized in a similar way, such as delivery to persons with limited movement, personal documents (birth certificate, marriage certificate, real estate cadastral certificate, etc.), until the possibility of digital signature. All this can be very easily solved by a well-designed process realized with a good web application and connected delivery.

Some of the most common obstacles in trying to automate teller/counter services are legal obstacles. It has already been mentioned that the legislation, more or less, is behind the technology. This leads to cases where, due to outdated legislation, it is not possible to automate a counter service, although the demand for it is high, it is technologically feasible, and from the point of view of cost-effectiveness, it is desirable. An example is the existing regulations in Bosnia and Herzegovina, where certain documents such as birth certificates, etc., are printed in the proper form by certain authorized printing houses. Certain blanks are left on these forms, where the name, surname, date of birth, etc are filled in. And where is the problem with automation now? It is not a problem that some of the multifunctional digital devices, intended for the provision of teller/counter services, support it. However, each of these forms requires a separate tray in the printer, from where the sheet will be pulled out and the form filled out. It is no problem to create a convenient software solution that would fill these forms, with adequate data. But the problem is that, in the specific case in BiH, for printing only the birth certificate, a printer with 5 drawers must be provided. One for filling in the form, in Serbian Latin, the other for filling in the form in Serbian Cyrillic, the third for Croatian, the fourth for Bosnian language. Finally, the fifth drawer for the international birth certificate form. This seems complicated, because you need to get special printers within the multifunctional digital device, which have the ability to work with 5 drawers, the dimensions of the device itself increase. And most importantly, one device could only serve one type of certificate. And just a small effort that the competent services need to make and adapt the law on issuing documents to the digital era, would be enough for multifunctional digital device to be able to provide the service of issuing a whole range of different certificates. It is enough to give up making a ready-made form, but to format the text of the forms on the device itself, which would print the defined prescribed text on paper. Then, which would have a pre-printed header with all the necessary markings of the institution and everything else that needs to be placed in the header. And, to determine the numbering of each issued document and write it in the printing house. Now it is enough to put the appropriate stamps on those sheets and sign the sheets. The middle of such paper remains for various, pre-defined prints on the certificates, which would be combined with variable data (name, surname, date of birth, etc.). Such a device would be usable, from the point of view of efficiency, profitability and meeting the needs of users. In some parts of the Balkans, legislation is adapted to the digital age, so there is a practical implementation of the described solution, which is in use.

4. PRESENTATION OF A PRACTICAL SOLUTION OF A UNIVERSAL MULTIFUNCTIONAL DIGITAL DEVICE FOR PROVIDING COUNTER SERVICES

The proposed variant of the device, shown in *figure 2*, is multifunctional and can basically support a wide range of services.
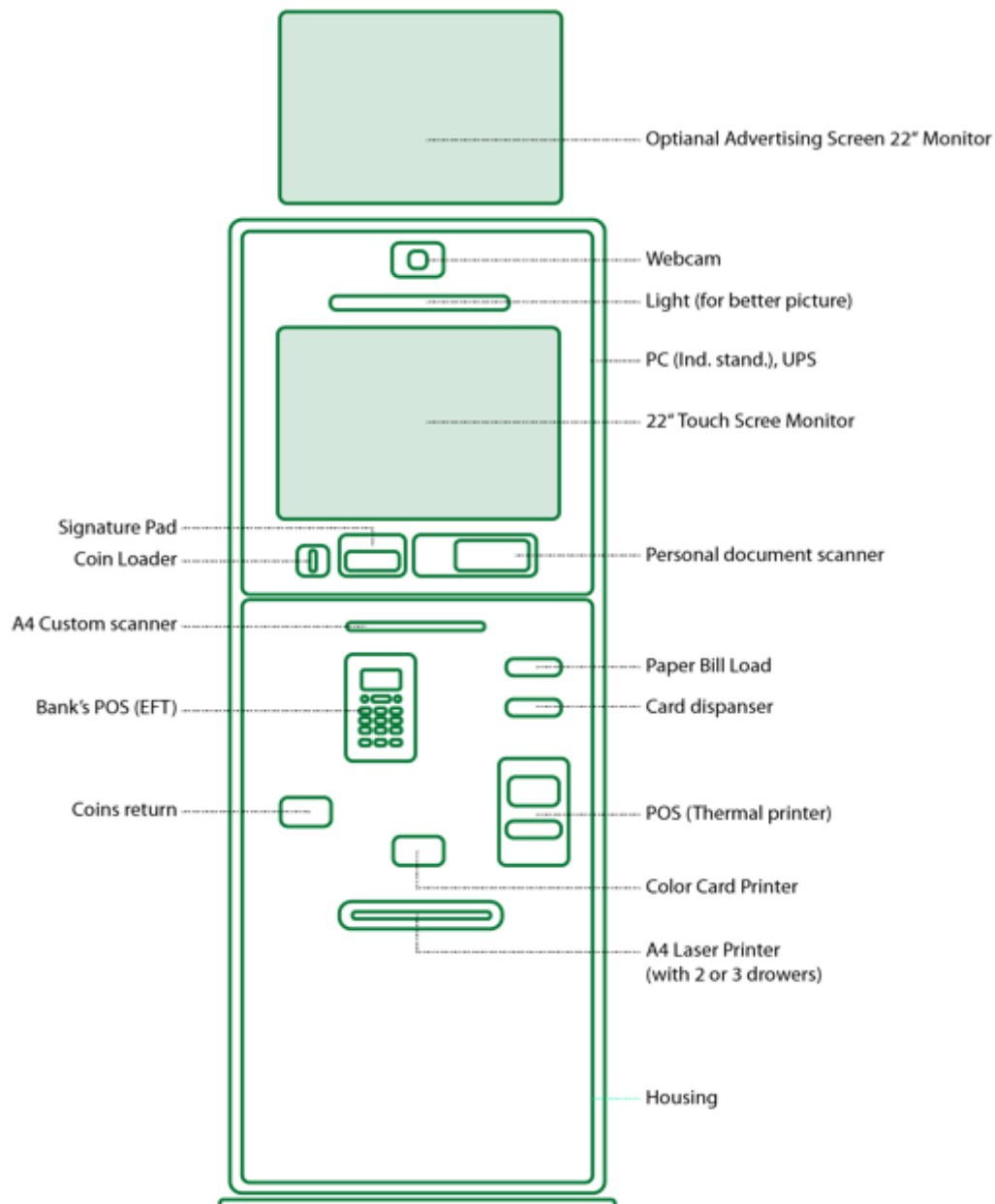

Fig. 2. Model and design of a smart universal multifunctional digital terminal / portal [5]

Some of these services already have practical applications or ready-to-use prototypes, such as: [8]

• Services in the banking sector;

- Services for providing various certification documents issued by city and state institutions;
- Automation of the hotel reception and similar facilities that rent rooms and apartments;
- Various tickets, i. tickets for concerts, theaters, public transport tickets, etc.;
- Attendance records and issuance of access electronic / magnetic cards;
- Personalized cards for mobile phones;
- Payments of invoices issued by companies providing services, such as utilities, payments for electricity consumption, water supply services, mobile operators, etc.

Which components will be installed on the device depends on its purpose, ie about the types of services that should be supported, the degree of authentication and the appropriate software solution.

5. CONCLUSION

Based on everything presented in this document, it is clear that the conventional, traditional way of providing counter services is disappearing. It is being replaced by more modern ways of providing these services, from multifunctional robotic digital devices to completely "online" services, realized by "cloud" technology. As in the past, when some jobs and crafts have almost completely disappeared (scribes, blacksmiths, etc.), now it happens with teller/counter services, which are performed by people in a physically specific place.

It was pointed out what are the factors that can influence the pace at which this transformation will take place. A set of valid legal regulations, the habits of users in a certain region, their technical skills in terms of working with new mobile technologies, fear of the virtual, age structure. Even the emergence of new technologies, which will enable the expansion of screen space, greater visibility on mobile devices, and thus a better interface in the mobile applications themselves. These are all parameters that will affect the speed of transition of the organization and provision of teller/counter business services to automation and robotization, without the need for the physical presence of man, when performing these services.

In the period where not all conditions are met, especially the accompanying legal regulations, certain advice was given on how to do it and to what level, to automate the existing teller/counter services. These tips are given based on concrete examples. A practical version of the multifunctional digital device, which is already in use, and which can satisfy a whole range of counter services in various branches of activity, has also been proposed.

The problem of the lack of digital signature possibilities was especially mentioned. Specifically, the law on digital signature has been adopted in BiH for a long time [9, 10]. However, given the conditions to be met by a body intended to be certified for the issuance of digital signatures to legal and natural persons, it has been shown that this body would be

unprofitable given the small market it covers. From this fact, it is clear that the state should find a way to invest in such a company, in order to establish a digital signature service in accordance with EU regulations. From the attached text in this paper, it is clear how much this would mean for the simplification and acceleration of automation and robotization of teller/counter services.

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