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AUTOMATION OF COUNTER OPERATIONS WITH THE HELP OF ARTIFICIAL INTELLIGENCE IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

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Abstract: The paper proposes and describes how the progress of counter services automation can be achieved in the context of sustainable development. It is realized by improving jobs related to counter services and for the need of various purposes and types of business, by automating and robotizing the jobs with the help of artificial intelligence (AI). First, it is explained and described how the automation of counter operations by using AI contributes to the improvement of sustainable development, in a general sense. Then, by presenting and describing a concrete implementation of such a device, it is shown how the device completely replaces the work of counter workers. Through the multi-functionality of the device itself, a wider spectrum of its use is shown, and therefore the usefulness it enables in the context of sustainable development.

Keywords: DTM – Digital Teller Machine, AI – Artificial Intelligence, Sustainable Development, Business Automation

1. INTRODUCTION

The role of artificial intelligence (AI) is becoming an increasingly important aspect, related to the spectrum of goals covered by the term "Sustainable Development". As is known, sustainable development is most often associated with the goals of sustainable development described by the United Nations, what include protecting the environment, ensuring a healthy life, reducing poverty and ensuring access to education. From this, it is clear that with the proper use of artificial intelligence, these goals can be more easily achieved.

Possibilities of artificial intelligence are already being used, and will be used much more in the future, in various aspects related to the sustainability of development. The use of AI can influence economic growth, drive various innovations, help in more efficient business through sustainable technologies and new industries. In an ecological sense, it can affect the proper and efficient management of the environment, the optimization and minimization of the use of resources, such as water, energy, the reduction of waste, climate predictions, etc. Also, AI in the light of sustainable development can help in social aspects, especially in the area of ethical issues that continually arise. The key role in the use of AI is to remain sufficiently ethical and responsible, to include mandatory privacy protection, prevent discrimination and bias, ensure liability for possible adverse consequences (e.g., loss of employees' jobs due to incorrect use of AI) and the like [1].

The combination of the use of sustainable development and artificial intelligence should lead to general civilizational progress. Therefore, it requires careful planning, organization, and proper creation of regulations.

AI has also become an indispensable part of business intelligence that enables organizations to be faster, more innovative and more competitive, by improving user experiences to optimizing business processes and predicting market trends.

2. AUTOMATION OF COUNTER BUSINESS PROCESSES

Tools for improving relations with users are becoming necessity in order to maintain a competitive advantage in the market. Also, automation and process optimization play a key role and are a basic prerequisite for successful digital transformation [2].

When the automation of the counter business processes in banks, municipalities and similar organizations and institutions is used, certain advantages can be distinguished such as [3]:

- Greater efficiency and productivity: Since automation eliminates the possibility of errors, the business process is simplified because fewer mistakes are made. By eliminating cumbersome and laborious manual procedures that are performed every day, tasks that inhibit the flow of work are also removed. So, the performance of a greater number of activities at a high level between users and the organization is accelerated.
- Saving time and reducing costs: Automation makes it possible to reduce costs and increase profitability, especially for teams that perform their jobs using manual processes with lot of paper documentation. Since automation speeds up the counter business process, it saves time and money for the resources needed to complete activities. Also, employees who previously performed these activities can be redirected to more important tasks.
- Simple management of data and documents: When using manual processes, employees can easily lose track of written communications, spreadsheets, and other documents, whether they are printed or exchanged via email. Additionally, moving information or calculations from one data source to another presents a greater opportunity for human error, as well as more wasted time. Using automated counter processes eliminates all the problems.
- Visibility and transparency: Automation solutions ensure adherence to best practices and enforcement of management systems. It increases visibility and transparency of all operations and processes.
- Standardization and process compliance: Automated front office processes include guidelines on who can make changes or update documents, creating effective digital workflow automation that ensures the right information reaches the right person at the right time.
- Higher customer satisfaction: By automated counter business processes, clients will be more satisfied with the final service or results because they will receive more accurate and consistent data.

3. ADVANTAGES AND DISADVANTAGES OF COUNTER BUSINESS AUTOMATION IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

The most common activities to reduce costs by automating business processes and digital transformation at the global level refer to: simplification of business processes (38%), modernization of the organization's structure (36%) and improvements through alignment with policies (36%). In the mentioned cases, it is about tactical activities, while the main strategic activities to reduce costs are related to increased process centralization and business model change [4].

There is no doubt that the automation of counter operations reduces the consumption of paper, pencils and similar resources, what contributes to the reduction of overall business costs, and thereby also contributes to the environmental factors (e.g., forest protection). The same is achieved by the introduction of digital forms for filling in, and there is an increasing tendency to send certain confirmations of services performed digitally, avoiding the printing of paper documents.

When it is looked at and calculated what needs to be provided in the classic organization of work at the counter, it is clear that significant savings are also made on energy consumption. In this case, energy is needed only for the operation of the devices, and no longer for the provision of heating and cooling elements for the work of employees. Since the space for work is also reduced, the consumption of electricity is automatically reduced.

Business efficiency is achieved by the transformation of operational activities through the automation of transaction processing, answering frequent user questions, reducing the number of required workers, as well as improving the overall business processes. Through the automation of counter operations, it is very easy to achieve a 24/7/365 type working mode, without breaks, absence of employees, non-working days and the like.

Automation through AI can enable the personalization of the user experience, which is tailored to the needs of each user. As a result, there is greater user satisfaction and a reduction in frustration, what is often the case when using counter services. All of the above strengthens the user's trust, especially since he/she now chooses the time most convenient for him/her, when will perform the counter service. And since the working hours are now non-stop, the usual crowds and waiting times at the counters are avoided.

By reducing the need for physical travel to the counter place and increasing the efficiency of business processes, the automation of counter types of work can contribute to the reduction of emissions of harmful gases associated with transport and energy consumption.

It is very clear what the use of counter business automation by AI can have many advantages in the context of sustainable development. But it is also clear that it can have certain disadvantages.

The automation can lead to a reduction in the need for human labour. Wrong, i.e., unethical, application of such automation of counter processes can result in the dismissal of employees who performed this type of work. That can have a negative impact on the employees themselves, their families, the local community and the employment rate in general.

Counter jobs mainly involve direct interaction with customers or users. The automation can reduce interaction, what can affect the level of service quality. In many cases, users prefer human contact, especially in situations where they need specific information or assistance. Therefore, care should be taken in the design and construction of the devices, as current technology allows information or assistance to be organized in a much better way that would satisfy most users.

Automated systems require regular maintenance, service and monitoring. If they are not maintained properly, malfunctions or interruptions in operation may occur, which in turn may lead to problems in providing services at the counters. Supervision, service and maintenance is much smaller in scope and much easier to organize than in the case of classic service provision at the counters. When the bugs are cleared, the devices will work according to the default automaticity, cyclically repeating actions and will not make mistakes. The human factor is not immune to the cyclical repetition errors of the same action day after day, on the contrary.

Although automation can help reduce costs and increase efficiency, its production and use can also have a negative impact on the environment. The production of electronic devices and their disposal can generate waste and pollution. However, when the benefits related to the impact on the environment, the use of these devices and automation are taken into consideration, the positive aspects still prevail.

Automated AI systems are typically designed for specific tasks. If business processes change or require adaptation, there is a possibility of more difficult adaptation of existing automated systems, for some specific uses. In the continuation of the paper text, when presenting the specific device, the multifunctionality of the device and its use, as well as easy adaptation to various types of services, will be shown.

With the goal of sustainable development, it is important to carefully consider how automation is applied in counter jobs and how it can be balanced with the need to preserve jobs, service quality and environmental protection.

4. BALANCING BETWEEN AUTOMATION THROUGH THE USE OF AI AND SUSTAINABLE DEVELOPMENT

Balancing of automation and sustainable development requires careful strategy and a well-thought-out approach.

Something that comes first is a good and fundamental analysis of the impact of automation on the environment, society and economy. This includes the assessment of potential positive and negative effects and risks. For example, the reduction of harmful gas emissions due to automation can be a positive aspect, while the loss of jobs can be a negative.

When implementing the automation of any business process, one should focus on sustainability. This means considering the long-term consequences and ensuring that automation does not disrupt natural resources or social balance.

Instead of having to lay off workers due to process automation, we should invest in their training and retraining. In this way, they can adapt to new jobs and requirements that an automated environment requires.

Automation should not be the end goal, but a means to achieve sustainable development. It is necessary to encourage innovation and research in order to develop new technologies that are environmentally friendly and socially beneficial.

Governments and regulatory bodies should establish appropriate regulations that encourage sustainable automation. This includes encouraging the use of renewable energy sources, recycling e-waste and protecting workers' rights.

Organizations implementing automation should be transparent about their approach and plans. Cooperation between industry, academia and governments is also crucial to achieving sustainable development.

Automation and sustainable development are not mutually exclusive, quite the opposite. Proper management and informed decision-making can ensure that automation contributes to a more sustainable development and sustainable future.

5. PRESENTATION OF A SPECIFIC AUTOMATED AI DEVICE THAT AUTOMATIZES COUNTER SERVICES – DTM (DIGITAL TELLER MACHINE)

The modern user of counter services wants to be able to choose when and how he/she will receive that services. This actually means that such counters should be enabled to operate in 24/7/365 type mode. It is almost impossible in most cases, with the classic organization of work, with the help of human labour. So, the introduction of automated, robotic devices that completely replace the work of human labour, when providing counter services, is inevitable.

In general, counter services consist of the following steps:

- Client authentication,
- Determination of the client's right to use the requested service,
- Providing the necessary service,
- Charge for the service if the service is charged,
- Issuance of appropriate confirmation that the service has been provided,
- Issuance of a corresponding certificate (receipt) that the service has been charged if it is such a type of service [5].

When that steps are automated, certain advantages of this type of service provision are obviously obtained [6]:

- Costs of providing services have been significantly reduced, which leads to a drop in the prices of those services,
- Because of simplifying of the offer of services, due to the possibility of free choice of time by users and due to the reduction of service costs, it is realistic to expect an increase in the number and types of such services,
- Provision of the service is no longer limited to the working hours of the institution providing the service, and the service is available non-stop (24/7/365 type of operation),
- User of the service can choose, in accordance with his/her needs and other obligations, the right time for him/her to receive the service,
- Organization of service provision and the place from where the service is provided are simplified,
- Number of places where this service can be obtained can be much higher than before,
- User becomes more satisfied with the services due to all the reasons mentioned above.

The device presented in this paper, called DTM (Digital Teller Machine) or DT (Digital Terminal), is actually a universal multifunctional digital terminal/portal device, designed to automate and robotize a greater range of counter services (Figure 1).

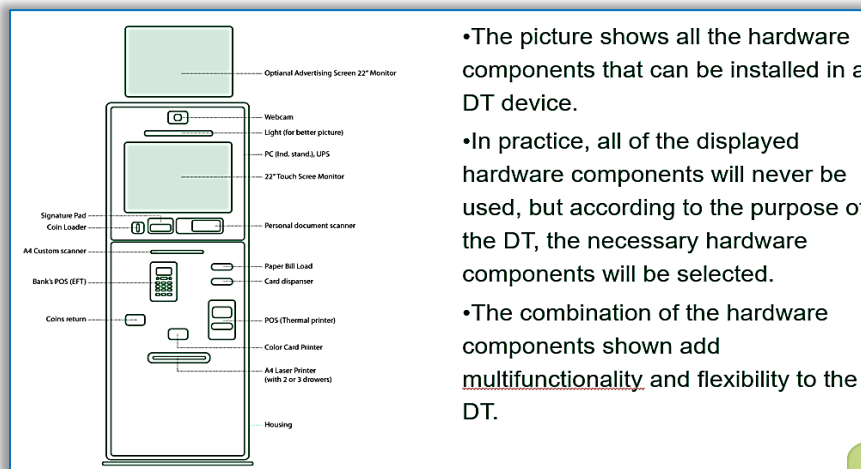


Figure 1. Model and design of smart universal multifunctional digital terminal/portal device [7]

By analysing the used hardware components, shown in the Figure 1, we can come to the conclusion that by combining certain mentioned components, with an adequate software upgrade, the given device can be used in various areas of providing counter services, such as:

- Teller services in the banking sector,
- Certification services for providing variety of certification documents by city institutions e.g., municipalities, or other institutions,
- Automated hotel reception services and similar facilities that rent rooms and apartments,
- Ticketing services, concerts, theatres, transportation tickets,
- Recording the presence and issuance of access electronic/magnetic cards,
- Issuing of mobile phone personalized cards,
- Provision of bill payment services issued by service provider companies, such as power utilities, water utilities, urban cleanliness, mobile providers, etc. [8].

The next couple of figures (Figure 2, Figure 3 and Figure 4) show the multifunctionality of the device, with the adaptation for the use of issuing certificates issued by municipal counters (Figure 2), the adaptation for automatic reception in hotels (Figure 3) and the block diagram of use at bank counters (Figure 4).

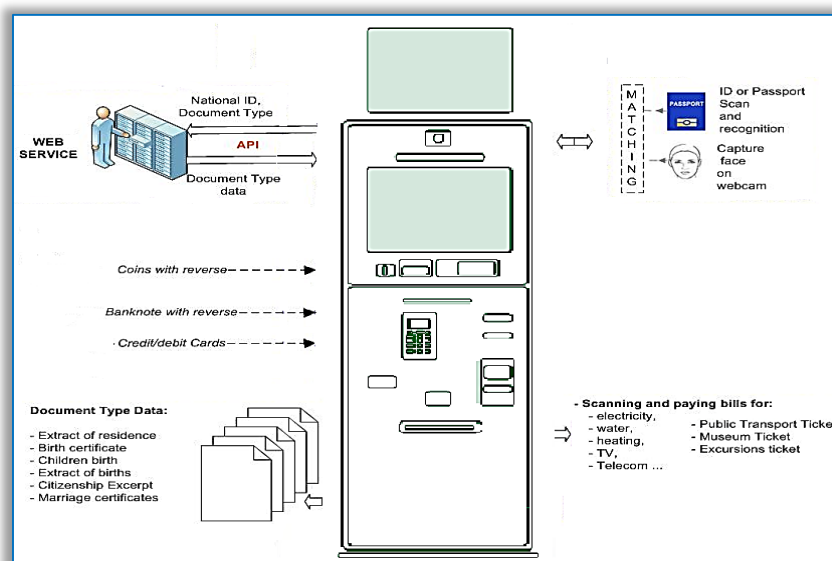


Figure 2. Using DTM in municipalities teller services [7]

Described DTM uses AI in automation of all activities in providing counter/teller services. The use of AI in the automation of the counter/teller services has reached its highest expression in the variant of using DTM with using voice commands. There were developed several variants of applications with speech recognition and speech control that are adapted for operation of the terminal devices in banks. For example, a modification of the application was made to DTM, which has built-in multilingual voice assistance, multilingual speech recognition and multilingual commands for controlling the operation of the terminal device through voice commands. The application recognizes speech commands and realizes all needed activities. For each possible option, the application first gives, by speech information, what is needed to say in order to realize a certain activity. The client then speaks the appropriate voice command (reads corresponding text from the screen), depending on what he/she wants to realize. The application recognizes the spoken command and implements the required activity [9].

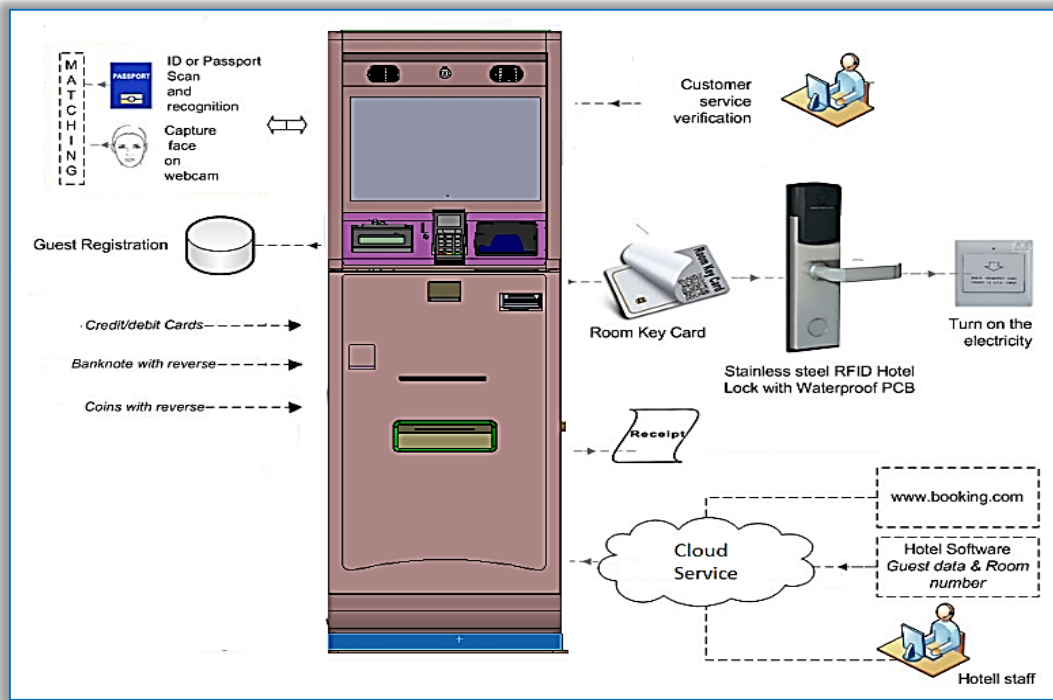


Figure 3. Using DTM in hotels services [8]

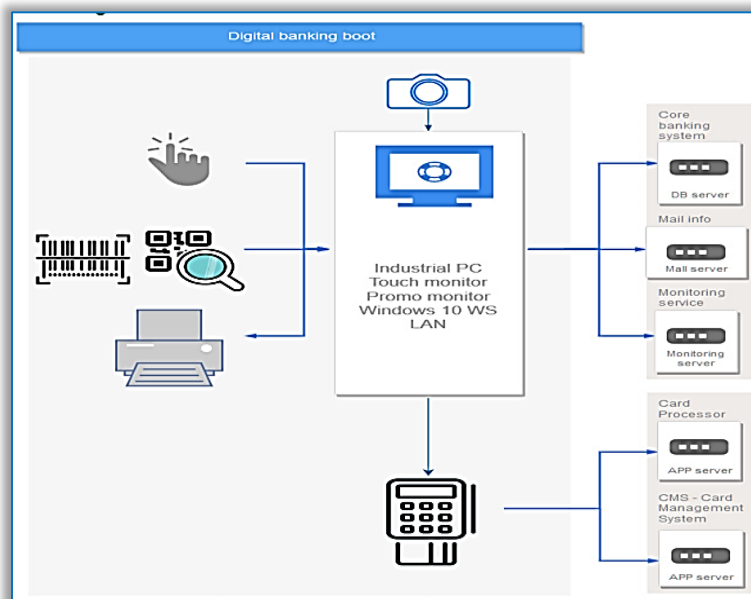


Figure 4. Block diagram of proposed model of modern digital bank organization for teller/counter services [7]

By using a device, such as DTM and the like, it is clear that certain improvements are being made in terms of sustainable development, which have been mentioned as good sides of using AI automation. Energy saving is obvious. The spaces in which these devices are placed are smaller, there is no need to provide additional energy resources that would have to be provided in a classic organization, using human labour. From an ecological point of view, in addition to saving energy, there is also a saving in paper consumption and similar resources consumption. The greatest progress was achieved in business efficiency and user satisfaction.

Because of some disadvantages, with the use of AI automation, the most important thing to take care of is about the workers, who would be redundant in that case. But, with the correct use of ethical codes, and if the legal regulation regarding the use of automation of counter operations is well created, then this problem would be reduced to an acceptable level. For example, in addition to complete automation, the mandatory participation of human labour in the validation of automatically performed work is required. In that case, the use of AI and automation of counter operations would only facilitate the work of workers, and not eliminate workers as technological redundancy. Also, performing high-quality retraining is one of the useful activities that could be performed. It is known from the past that some professions died out due to technological progress and that people had to be retrained for new professions and jobs. A very good examples for the described case are the former scribes, who either no longer exist or are very rare, used for some special cases. But there are many new created professions.

6. CONCLUSIONS

Based on the previous explanation and description on the sustainable development and use of automated AI counter devices, certain conclusions can be drawn.

One of the key tasks is to find a good balance between sustainable development and the use of AI automation, which implies that automation and sustainable development are not mutually exclusive. It is only necessary to carefully balance between business efficiency and resource conservation and protection. Proper management of automation can contribute to a more sustainable development and future.

Also, it is very important to perform an adequate analysis of the impact of automation of the counter business process. This analysis is performed before the automation implementation itself. It is important to determine the impact on the environment, society and economy through the analysis. Positive effects, such as reduction of harmful gas emissions, efficiency of business processes, higher productivity, reduction of activity execution time, simpler management of data and documentation, standardization of processes and customer satisfaction, should be maximized, while negative effects, such as job losses, should be minimized.

Despite automation, human interaction and knowledge remain an important factor in the overall process. Training and retraining of workers enable them to adapt to new jobs and preserve their jobs.

It is necessary to encourage innovations in the field of automation that are directed towards sustainability. It should not be forgotten that regulatory authorities should establish appropriate guidelines to ensure the sustainable application of AI and automation. Organizations should be transparent about the application of AI and automation. Collaboration between industry, academia and governments is essential to achieving sustainable development.

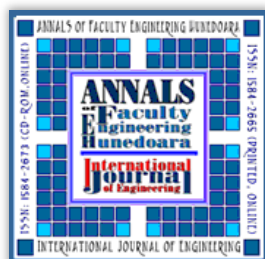
The code of ethics should be satisfied. It should be a basic condition for the wide application of AI technologies and automation in the context of sustainable development.

With all this in mind, AI and automation can be a powerful tools to achieve sustainability, but only if are used responsibly and consciously.

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