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# THE USE OF CHATBOTS AND VOICEBOTS BY PUBLIC INSTITUTIONS IN THE COMMUNICATION PROCESS WITH CLIENTS

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**Purpose:** The purpose of this publication is to identify the opportunities and threats arising from the use of chatbots and voicebots in Polish public sector institutions.
**Design/methodology/approach**: The theoretical basis presented in this paper is the available literature on the subject. Expert research was conducted with practitioners and theoreticians from the Lodz Province about chatbots, voicebots and public institutions. The research technique was a standardized interview.
**Findings:** The results of the research made it possible to identify the opportunities, limitations and risks of implementing chatbots and voicebots in a public institution.
**Research limitations/implications**: The survey conducted with experts indicates the problem and the need for change and identifies a way forward for digitization in public institutions.
**Practical implications:** The results of the expert research can provide a path to the successful digitization of many public institutions and consequently provide inspiration and savings when designing bots that serve clients.
**Social implications:** The quality of customer service of public institutions is a problem identified in this article. By implementing the suggestions resulting from the research, client service can be improved or completely reorganized.
**Originality/value:** The article highlights the possibility of transferring artificial intelligence tools, i.e. chatbots and voicebots, to public institutions, also pointing out the possibilities of solutions and their limitations and risks of implementation. For the purpose of the paper, expert practitioners and theoreticians were invited to express their opinions.

**Keywords:** chatbot, voicebot, artificial intelligence, bots.

**Category of paper:** Research paper.

## 1. Introduction

The 2020s have seen rapid and substantial advancements in artificial intelligence (AI). AI-based solutions have an increasingly important role in business, as more and more companies discover the benefits of using AI tools (PARP, 2022). Already in 2017, the value of

the global artificial intelligence market exceeded $16 billion, and analysts from the research company MarketsandMarkets have predicted that by 2025 the value will grow to more than $190 billion at a factored average annual growth rate of 36.6% (Szewczyk, 2019). An updated 2022 forecast anticipates that the AI market will grow to $86.9 billion in 2022, and with an average annual growth rate of 36.2% will reach $407 billion by 2027 (MarketsandMarkets, 2022). A forecast also made in 2022 by Fortune Business Insights paints a different picture: it estimates that the market will be worth $387.45 billion in 2022 and $1394.30 billion in 2029, with an average annual growth rate of 20.1% (Globe Newswire, 2022). These figures indicate strong growth in the artificial intelligence market.

In 2019, it was predicted that artificial intelligence would have an impact on humanity comparable to the spread of electricity and that it would change the face of how all industries and the job market operate (Infuture Institute). Three years on, vehicles backed by artificial intelligence tools have become the norm, mobile apps prompt us with shopping lists based on our tastes and habits, virtual assistants help us manage our households, and businesses increase revenues while reducing costs. Artificial intelligence, however, is not only about automating processes, but also about generating innovative products and services, creating new revenue streams and better meeting buyers' needs (McKinsey, 2017).

The purpose of the publication is to identify opportunities and threats associated with the use of artificial intelligence-enhanced tools in Polish public sector institutions, i.e. chatbots and voicebots, which are a technology increasingly used by enterprises thanks to its ease of implementation and reduction of organizational costs.

## 2. Chatbots and voicebots – a review

We are living in a time of intense digital transformation, which has altered the ways we communicate. The traditional human-to-human (H2H) communication model has become the foundation for human-to-machine (H2M), machine-to-human (M2H), and machine-to-machine (M2M) communication models (Gwiaździnski, 2019, p. 93). As a result, voice assistants such as Alexa and Siri are used to support our computers, smartphones and other electronic devices, while AI-supported marketing tools known as chatbots and voicebots can be used by businesses and public institutions to facilitate communication. These solutions have an important role in the human-to-machine interaction process (Kaczorowska-Spychalska, 2019, p. 268).

Artificial intelligence is a symbol of the Fourth Industrial Revolution (Industry 4.0), which is an advanced digital transformation of chains whose horizontal and vertical interconnections of units and composite devices permeate each other. Key components in this area are smart factories, cyber-physical systems (linking the physical and virtual worlds via sensors and actuators), the Internet of Services and the Internet of Things (Siuta-Tokarska, 2021, p. 12).

Although the term artificial intelligence is often used interchangeably with the terms robotization and automation, or is confused with machine learning and the application of algorithms, it is actually a branch of information technology (Jarek, Mazurek, Hałas-Dej, 2018, p. 193). The Oxford Dictionary defines AI as "the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages" (Oxford Reference). However, this description does not specify the complexity of the issue, as defined by Dave Gershgorn: "Artificial intelligence is software, or a computer program, with a mechanism to learn. It then uses that knowledge to make a decision in a new situation, as humans do. The researchers building this software try to write code that can read images, text, video, or audio, and learn something from it. Once a machine has learned, that knowledge can be put to use elsewhere" (Gershgorn, 2017). Artificial intelligence is divided into two categories according to its application. Narrow AI (ANI - Artificial Narrow Intelligence) performs its tasks in a predefined area, while General AI (AGI - Artificial General Intelligence) has intellectual capabilities comparable to the human brain (Jarek, Mazurek, Hałas-Dej, 2018, p. 193). In other words, Narrow AI performs a specific task based on specific rules (e.g. Alexa, developed by Amazon), while General AI is geared to perform any task of which a human is capable (McKinsey, 2017). As of today, it has not been reported that an AGI exists; nevertheless, such a creation would be a machine capable of understanding any human and the world with an improved ability to learn and act (Chaber, Skowrońska, Zakrzewski, 2019).

Artificial intelligence is based on five key areas: voice, text and image recognition, decision-making, and autonomous robots and vehicles (Jarek, Mazurek, 2019, pp. 49-51). Voice recognition technology processes a voice sample and provides expected solutions. Text recognition technology analyzes a source text and provides a result based on it. Image recognition technology analyzes an image and compares it with the materials available to it and consequently delivers the desired result. Decision-making technology brings together technologies that present available solutions based on the information provided. Autonomous vehicles and robots perform predefined tasks autonomously (Jarek, Mazurek, Hałas-Dej, 2018, pp. 194-195).

The use of intelligent robots to automate processes in organizations (Robotic Process Automation) has been a trend of the past few years, and it is a dynamically growing technological area (CCNews.co.uk, 2021). RPA uses a predetermined algorithm to imitate human behavior, thus avoiding the need for human involvement in routine tasks. The goal of RPA tools is to streamline such mundane processes using applications that are not subject to fatigue (Kaczmarski, 2020, pp. 44-45). RPA tools using NextTech (next-generation) technologies mimic not only human behavior, but also competencies. Implementing these solutions into marketing has allowed the creation of a new generation of marketing technologies called MarTech, which is based on marketing automation using artificial intelligence informed by marketing strategies. These technologies are designed to increase the efficiency of planned

activities (Panasiuk, 2022). Many organizations still do not use the above solutions, so the potential for reducing costs associated with contact center staff or administrative staff is large (CCNews.co.uk, 2021).

The application of some of the above technologies is exemplified by chatbots and voicebots. The task of a chatbot is to mimic humans while having an interactive conversation with any caller, to support social media communication and relieve the burden on customer service center employees. The tool is an application (algorithm) that communicates in the form of a dialogue. Used to contact people, it employs technology to interpret and then respond to user queries (Szymanski, Jóźwiak, 2018, p. 78). However, simulating human behavior in customer interactions is not the best solution in every case. Younger audiences, who soon realize they are talking to a bot, force the bot to quickly solve their problem and provide the right answers. However, the speed and accuracy of the response is influenced by the size of the information resources the chatbot has access to (Szymanski, Jóźwiak, 2018, p. 80).

Chatbots are used in many industries and uses range from providing information on first aid, acting as the initial point of contact in cases of psychiatric consultation, to training employees (Szymański, Jóźwiak, 2018, p. 80). A chatbot is a conversational interface with a specific knowledge base, and can therefore also perform a consultation function in administration, such as receiving and processing requests from users seeking information (Filipczyk, 2018, p. 64). Because of its ability to automatically record data acquired during a conversation (Dahyia, 2017, p. 160), a chatbot is also a useful tool in the sales funnel.

Research in Poland has shown that users are generally positive about the help they have received from chatbots, but are aware that these tools are not advanced enough to solve complex queries (Schneider, Nawrocki, 2022). By using a chatbot, both the organization and the consumer receive a benefit. The former saves money, as it does not need to hire multiple people to handle simple inquiries; moreover, the bot is capable of responding to multiple people at the same time, at any given moment. Customers, on the other hand, will appreciate the immediate response and time-saving benefits afforded by this solution (Szymański, Jóźwiak, 2018, p. 78). Chatbots are frequently used by global businesses, as evidenced by the value of the global chatbot market at $525.7 million in 2021 with an interim growth rate of 25.7%. It is estimated that this value will grow to $3.99 billion by 2030 (Grand View Research, 2022).

A voicebot is not much different from a chatbot. It too works on the basis of an artificial intelligence algorithm by recognizing voice input and processing it. Virtual assistants can call customers and inform them about the current status of payments or remind them to pay (Chaber, Skowroński, Zakrzewski, 2019). In medical institutions, voicebots communicate with recipients by providing information, booking appointments or giving reminders (Bartusek, Kulawik, 2021, p. 126). Modern solutions in voicebots can help a doctor, for example, to analyze diagnostic images and, consequently, make a diagnosis (Pochrzęst-Motyczenska, 2019). A bot can talk to a user for many minutes, gradually obtaining the necessary information from the user (the collected data can be saved in the system) to be used by a salesman, for example

or to conclude the interaction without recourse to another employer. Additionally, a voicebot's artificially generated voice can be adjusted if necessary. Modern algorithms can address the user by name and, after analyzing previous interactions, select the tone and form of the conversation to optimize the customer's experience during a phone call (CCNews.co.uk, 2021). Bots can reduce companies' customer service costs by up to 30%, but are required to be tailored to the needs of a specific user (Schneider, Nawrocki, 2022).

The "Polski Ład" (the so-called Polish Deal) proposes a plan that will allow all official matters to be carried out online without the need to pay stamp duty from 2024 (Schneider, Nawrocki, 2022). To achieve this, it may be necessary to prepare virtual assistants with advanced artificial intelligence technologies which will be the first line of support in public sector institutions. Various efforts have already been made to use bots in public administration in Poland, with some of the first bots, introduced by the Ministry of Development and the Prime Minister's Office, answering questions about coronavirus (Dębkowska et al., 2020). Bots have also been implemented at the local government level, for example by the City of Wroclaw (Jurczak, 2020). Following the outbreak of the COVID-19 pandemic, bots were also adopted by the WHO, illustrating the global use of this technology by public institutions.. Among other things, the bot answered basic questions about the course of the disease (Miner, Laranjo, Kocaballi, 2020, pp. 1-2).

## 3. Empirical research

For the purpose of the article, an expert survey was conducted, in which a standardized interview technique was used to collect data. The survey involved five experts from the Lodz Province who have knowledge and experience of the subject matter, either as specialists providing academic input in determining the scope of the study, or those familiar with it in their daily professional work. Representing the University of Lodz, the Lodz Provincial Office and the Regional Chamber of Legal Advisors, the respondents were selected on the basis of their familiarity with the use of artificial intelligence, including text and voice assistants, and/or their working knowledge of the functioning of public benefit institutions, including customer service.

Personalized emails were sent to the experts in October 2022, along with standardized open questions on the use of chatbots and voicebots by public policy institutions. The questions focused on their knowledge of currently implemented chatbot and voicebot tools and the process of their operation, areas where they could benefit the institution and the client soliciting information and details of these benefits, as well as the risks and limitations of their use from the perspective of the public institution and its clients.

An expert from the Provincial Office in Lodz had not encountered the use of chatbots and voicebots in his professional work, while a respondent from the District Chamber of Legal Advisors noted that voicebots were already being used by courts and prosecutors' offices. He noted, however, that they were primitive: "In several courts, by typing a case reference using a smartphone, one can receive information about the current status of the case or the last event that took place in the case (e.g. the scheduled hearing date). The fact remains, that for the daily work of an attorney, such solutions cannot and do not replace contact with an employee of the court/prosecutor's office, who can check the content of a particular document or furnish information on various informal issues, such as when to expect a ruling in a particular case or on what days the judge has hearings scheduled (which can speed up the recognition of an application, for example)". Experts from the University of Lodz detailed that in city offices, marshal offices, hospitals, health clinics, museums, the Ministry of Development, the Ministry of Entrepreneurship and Technology, or the WHO, such solutions, although often primitive, do exist. One of the above experts noted the regular and natural crossover of these digital solutions from the business sector to public administration.

An expert from the Provincial Office in Lodz pointed out that chatbots and voicebots could provide an alternative to office consultants, thus reducing their workload. The respondent from the Chamber of Legal Advisors noted that these tools could provide basic information (e.g. details of the status of a case) or enable the automatic transmission of information to those responsible for a case. In addition, virtual assistants could provide information about a clerk’s absence (including his/her scheduled return), the date of receipt of correspondence, deadlines, fees and instructions related to the proceedings, which would eliminate the need to search for this data on multiple websites. Experts from the University of Lodz disagreed on the above process of chatbots and voicebots. One said that their actions should be limited to "speech recognition, identifying a user’s problem and connecting them to the appropriate person." Another expert believes that voicebots and chatbots could solve a problem on their own, without being connected to a consultant, but in the absence of such an option, they could be directed to the person dealing with the issue: "If it was the Social Security Institution, then the chatbot could connect to the system, e.g. PUE (a digital service platform), and in the event that it was not able to help, it could offer, for example, to arrange an appointment at the facility". In addition, it was noted that should these solutions be invested in and implemented, they should be technologically and intuitively standardized in such a way as to make it easier for users to resolve issues.

The experts identified areas in which chatbot and voicebot tools would be useful from the perspective of public institutions and stakeholders, with some dividing their use into external and internal communications. The former would relieve the workload of officials by reducing duties related to handling users’ queries. Quickly verifiable questions could be answered, for example those referring to "opening hours, ticket prices, explanations of procedures, e.g. for applying for funding, assistance in finding certain forms or helping to fill them out,

support for tourists, crisis alerts with information updated in real-time, e.g. in the case of flooding, which streets are flooded, current safe evacuation routes." As a result, they could devote more attention to any remaining substantive conversations. One expert pointed out that virtual assistants could resolve issues that do not require processing sensitive data. In the case of internal communication, these solutions would facilitate contact within institutions or between branches of the same institutions.

By using chatbots and voicebots, respect and trust in officials could increase, as they would only answer questions that require a human presence. This would free up time to carry out statutory tasks, which demand accuracy, and the internal communication process would be shortened allowing more efficient work. In addition, there could be a reduction in number of users who become frustrated with officials, for example when an inquiry takes a long time to process. According to the experts interviewed, the quality and speed of services provided would be improved, resulting in cost reductions for institutions. Virtual assistants would also be of benefit to inquirers, reuducing call waiting times and providing new digital convenience.

In addition to opportunities, the implementation of the tools in question also presents limitations and risks. From the perspective of the institution's human resources, these technologies could compete with those employed in institutions, as the software might replace multiple full-time positions. In addition, these solutions could result in the exclusion of a social group that does not want, does not understand, or is unable to use modern digital technologies. There is also uncertainty among the experts about the protection of inquirers' personal data, including verification by the bot, and subsequently the security of personal data, which could be subject to theft through a cyber-attack. Some of the experts note the technological limitations of communicating with a virtual assistant, such as the problem of asking complex questions or nesting multiple questions within a conversation. Mistakenness stemming from a misunderstanding of the subject matter on some issues could result in factual misrepresentation, which could then be liable to legal action and potential damages. Experts also pointed to the problem of the intuitiveness of the software and the need to constantly update it, both legally and in relation to its specific activities, including data. The respondents also mentioned the issue of implementing such services and in the case of public institutions, public procurement, which can impede the selection of the best available solution, and, after its implementation, its subsequent updating in the long term. One expert concluded that the technologies in question should be available in addition to, rather than instead of, traditional communication methods.

## 4. Conclusions

Artificial intelligence, is one of the hallmarks of human progress in the 21st century, and is a key element in cutting-edge digitization. AI-based solutions generate a wealth of benefits for organizations and their customers. Virtual assistants such as chatbots and voicebots implemented in customer service-related departments offer companies opportunities, but their use also comes with risks. Furthermore, digitization technologies have been adopted by Polish public administration institutions, where the first chatbots and voicebots have been implemented.

The experts in the author's study noted that though often primitive, the first chatbot and voicebot solutions are available in courts and prosecutors' offices, but their operation is limited to typing in specific data to receive the expected response. Virtual assistants are also found in public institutions such as city and marshal offices, hospitals, clinics, museums, as well as on the Ministry of Development and Ministry of Entrepreneurship and Technology hotlines. The operation of chatbots and voicebots would provide an alternative to front office staff in institutions. These solutions could provide basic information to answer routine inquiries. Other experts said that virtual assistants should redirect calls to a competent person or resolve the issue using an algorithm. It was noted that these solutions should be standardized across all institutions.

Virtual assistants would provide an opportunity to facilitate both internal and external communication between institutions. In the case of the former, they would shorten the communication process between departments, for example. Bots' support of external communication would reduce employees’ workloads, allowing them to work on statutory tasks. Respect for and trust in officials could increase, as inquiries would be addressed immediately, and contact with officials would be limited to matters requiring at least initial contact with a human. For this reason, bots could displace many full-time consulting positions. These solutions might not, however, be easily assimilated by a certain segment of society that is unwilling or unable to understand or use such technologies. There are also issues related to protection of personal data (including the threat of cyber-attacks), technological limitations (and consequently the fallibility of the software), the need for constant updates, and the requirement to implement public procurement of these solutions, which could result in the selection of less than ideal technology.

Studies have shown that despite being fraught with manifold technological, legal and social challenges, implementation of the digital solutions in question is needed. The "Polish Deal" law mandates Polish public institutions to implement similar solutions by 2024, so soon it will be possible to observe if virtual assistants are at least as helpful and efficient as human employees.

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