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A Bibliometric Analysis of Publications on Customer Service Chatbots

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Abstract: This study aims to understand the use of chatbots in Customer Service and their potential benefits for companies. The research includes a literature review combined with a bibliometric analysis using the Scopus database as raw data for the usage of the VOSviewer application. The article identifies the important topics on which scholars have focused, in order to serve as a reference for the future research and discussions of chatbots. The first goal was to understand what bots are, how they can be classified and how they work. The second objective was to analyse the specific case of chatbots, know their characteristics in-depth, their operation and some platforms for their creation function without programming. The last objective was based on identifying the development opportunities for bots in the company and the benefits they bring. The results indicated that the main advantages associated with bots in the field of business management are related to the areas of marketing, e-commerce and human resources. The research found that chatbots can offer 24-hour customer service and improve customer satisfaction through natural and efficient interactions. The study also suggests that there are opportunities for chatbots in digital marketing strategies, such as providing personalized recommendations and automating customer service tasks.

Keywords: chatbot; bibliometrics analysis; Scopus; VOSviewer; customer service; conversational agents.

Introduction

With the birth of new technologies and their progressive incorporation into everyday life, human beings have managed to perform tasks much more efficiently that previously which used to require a large number of personnel and time. Nowadays, these tasks, which could be a significant added burden for companies, are considerably reduced thanks to technology and Artificial Intelligence (AI).

It is clear that technological globalization is part of human lives on a daily basis, and it is increasingly incorporated in almost all known sectors. These rapid technological advances have allowed the development of various tools that facilitate some of the tasks of different companies, one of which being chatbots. Chatbots allow the company to offer timeless customer service since they can operate 24 hours a day, while effectively providing answers to the possible concerns of the users with whom it interacts. Artificial Neural Networks (ANN) are one of the foundations on which chatbots start, allowing the AI itself to debug its dialogues, response models, and input processing among many other functions.

We live in a world where technology and its development possibilities take the reins of evolution. Imagine a car that incorporates artificial intelligence, which is able to interact with its driver and maintain a naturally fluid conversation. It can be seen as the KITT, the protagonist of "The Fantastic Car", the famous science fiction series of the eighties, but the

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truth is that today it is a reality. A driver can hop in his car and ask Alexa about the shortest route or find out what the weather will be like at his destination. This is possible thanks to virtual assistants, a specific type of bot. Currently, conversational agents are a common element in many appliances, home automation devices and, especially, in our mobile devices.

In the business field, numerous development opportunities are linked to process automation and customer service, which is increasingly demanding. People currently live in an era where the mobile phone is an extension of their limbs, and social networks are experiencing an unprecedented expansion. Therefore, the fact that a brand manages to sneak into that environment can imply important benefits.

The interest in chatbots as tools to enable mediated communication with users and ensure engagement during the interaction with systems is growing both in the scientific and business communities. The North American and European chatbot market was valued at USD 1,826.3 million in 2020 and it is expected to constantly develop and grow in the next 10 years. Experts have recognized chatbots as systems of communication that can provide a beneficial service to end-users, allowing them to receive support and information all day to enable companies to collect opinions from their consumers for marketing purposes (Hollebeek et al., 2014; Jiang et al., 2022; Verhoef et al., 2007).

Starting from these aspects, the study has three main goals. The first goal of the paper is to understand what a bot is, how it can be classified and how it works. The second objective is to analyze in detail the specific case of chatbots, to examine their characteristics, their operation and some platforms for their creation without programming. The last objective is based on identifying the development opportunities for bots in the company and the benefits they bring. To this end, the research includes a literature review combined with a bibliometric analysis using the Scopus database as raw data for the usage of the VOSviewer application.

Literature review

In this section the paper aims to offer an enlightening approach about what a bot is and for this many different definitions of the term will be assessed to determine what are its main differences with another term with which it is closely related, namely robot. Erickson (1999) cites in his review of the book "Bots: The Origin of New Species" by Andrew Leonard (1997) the definition that this author provides of the term bot as an autonomous software program, endowed with personality and generally providing a service. For Geer (2005) a bot is a program that works automatically and acting as an agent for users or for other programs while for Putchala and Agarwal (2011) bots are software applications that perform automatic tasks through the Internet in an effective way. Yang, Vlajic, and Nguyen (2015) refer to the bot as a software program that is used to automate Web data collection processes. Other authors have recently defined it as "computer programs constituted by sets of rules that are executed on the internet in a repetitive manner performing recurrent actions" (Túñez-López, Toural-Bran, Cacheiro-Requeijo, 2018, p. 752). Therefore, according to all the previous definitions, it can be specified that a bot is a computer program launched on the Internet, which is trained by a set of rules to act autonomously and offer a service.

Traditionally, the terms bot and robot have been used as equivalents interchangeably, as the first is a diminutive of the second. However, in the course of time, the definition of bot has acquired a series of technical specifications that give it its own identity compared to the one of robot. For its part, the word robot is defined, according to Vives-Rego and Mestres (2011, p. 237), as "a machine in its entirety. It may eventually be programmable and mimic human mechanical, cognitive and decision-making functions at the artificial intelligence level." This last definition includes a concept of great interest, namely artificial intelligence, which is a science implemented in different software that allows the creation

and development of entities capable of solving issues by themselves. Generally, these computer programs run on a robotic machine or a computer.

For the European Engineering Industries Association (2019) a robot is a mechanism programmable in two or more axes with a certain degree of autonomy that moves within its environment to perform certain tasks. In this context, autonomy refers to the ability to perform programmed tasks without human intervention. Thus, based on these definitions we conclude that a robot is a programmable machine with a certain autonomy, capable of performing a series of tasks imitating human functions (Table 1).

Table 1. Features of bots and robots

	Bot	**Robot**
Programming required	X	X
Virtual Support	X	X
Hardware		X
Perform tasks with a certain autonomy	X	X
Incorporates artificial intelligence	X	X

Source: own elaboration based on Erickson (1999), Vives-Rego and Mestres (2011), Túñez-López, Toural-Bran, Cacheiro-Requeijo, (2018) and The European Engineering Industries Association (2019)

At this point, it can be observed that both definitions, both the bot and the robot, reveal remarkable similarities that blur the boundaries between the terms. However, there is a key element that helps distinguish them: the environment in which each one functions. While the bot requires virtual support for its operation, the robot additionally requires physical support.

For the purposes of this work, the definition of bot which will be considered will be the above-mentioned one: a bot is a computer program launched on the Internet, which is trained by a set of rules to act autonomously and offer a service. These software systems are mainly characterized by their autonomy, the ability to offer a service and the possibility of incorporating artificial intelligence. On the market, there are several categories of bots, as there is no general agreement, but in the current paper only three categories are used as follows. Utility bots are a type of bot which fulfills specific functions, it has a goal and is measured based on the function for which it was programmed. A clear example is a bot that answers frequently asked questions (FAQ). To perform this activity, a very advanced staff is not needed, so it is enough to include some simple greetings and mechanisms to answer the questions asked by the user. Next, Sociable bots are more famous and have a more advanced level of personality, so it can be said that their personality is influential. This type of bot is mainly characterized by a good level of conversation because they have a language that allows them to develop their personality. The success of this bot is measured in relation to the user's satisfaction in terms of the level of conversation (Mon, 2017). Further, Assistant bots are usually present in mobile and desktop operating systems. These bots can be asked for execution of some task or they can have a conversation on different topics. An example of this bot type is Cortana (Microsoft), Alexa (Amazon), Siri (Apple) and Google Assistant, with whom it is possible to interact either by text or by voice and act to facilitate some daily tasks (Mendicott, 2017).

In a report by the consulting firm PwC, Cossío (2018, p. 21) defines these conversational bots as "systems that through *deep learning* techniques have been taught to understand natural language in certain contexts in order to interact with the user to solve a problem or answer a question" . Its main characteristics according to (Brandtzaeg & Folstad, 2017) are the following: *autonomy and adaptability* (it refers to the ability of the bot to adapt on its own, without human intervention, to a changing environment based on its experience and its ability to learn), *accessibility* (there is no need to download a new app for the user to interact with the chatbot; these software systems are present in the main messaging applications or on the websites themselves), s*ociability* (ability to establish

Vol.11 (2023) no.1, pp.48-62; DOI 10.2478/mdke-2023-0004

communication with other agents or entities; it is the basis of this type of computer programs), *ease of interaction* (the user can interact with the chatbot via text, links, images or call-to-action buttons; the result is faster and easier communication), *rationality* (it allows the software to act sensibly based on the data it receives and give the user a logical response), *personality* (the developer of the program has the possibility to define its behavior and the tone of the conversation).

Within the variants of bots existing today, a type of bot appears to stand out that we call *chatbot*. This type of bot recently increased its popularity, arousing a special interest. It is enough to analyze the global search trends of the term "chatbot" in Google Trends (see Figure 1) to check the evolution.

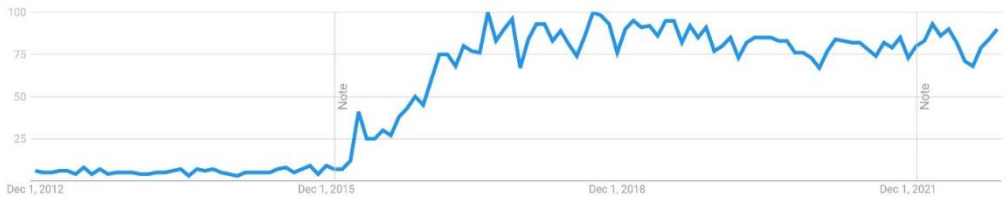

Figure 1. Search trends for chatbot between 11/21/2012 and 11/21/2022
Source: Google Trends (2022)

Chatbot, chatterbot, talkbot or conversational agent are some of the terms that are used when referring to bots specialized in having conversations and offering preconceived answers. For Shawar and Atwell (2007), chatbots are computer programs that interact with users using natural language. The definition provided by Allison (2011) defines them as computer applications that imitate the human personality, that are interactive and that try to respond with sentences meaningful to humans. According to Abdul-Kader and Woods (2015), a chatbot is a computer program that has the ability to hold a conversation with a human through natural language processing.

All the definitions are very similar; therefore, it is simple to get a global idea of the meaning of chatbot. To summarize and bring all points together, a chatbot is a computer program, capable of recognizing natural language and of maintaining a conversation with a user to solve a query.

Objectives and methodology

The objectives of this study are as follows: O1. Understand what bots are, how they can be classified and how they work; O2. Analyze the specific case of chatbots, understand their characteristics**,** and the benefits they bring; 03. Identify the development opportunities for bots in the company and the benefits they can generate.

With regards to the methodology, a literature review combined with a bibliometric analysis was used. Bibliometrics emerged a few decades ago to statistically measure the scholarly publications in terms of their extrinsic aspects. Those analyses earlier helped libraries to manage their collections and subscriptions. According to Beck and Manuel (2008, p. 166) bibliometrics "is one of the oldest research methods in library and information science," and this field of study is now on fast track with the advent of sophisticated computer technology and tools. Wilson (2012, p. 121) says, "bibliometrics can also be referred to as informetrics, webometrics, scientometrics, and cybermetrics. The different terms basically reflect the types of information to which the analysis is applied". Therefore, these terms, with slightest changes in context or purpose, could represent the same connotation to analyze the metrics of scholarly communications.

The first step was to search and collect the articles to be analyzed, which should represent the field of *virtual assistants* in *relational marketing*. The second stage of the method concerns several bibliometric analyses to map the field and identify its most important themes. Scopus database was used for the bibliometric analyses. Using the AND operator, the author combined the search string for *chatbot* ("virtual agent*" OR chatterbox* OR "virtual agent*" OR chatbot* OR chatterbot* OR chatterbox*) with that for *relational marketing* ("relationship marketing" OR "relational marketing" OR "customer satisfaction" OR "customer experience" OR "customer care" OR "customer service") in the title, abstract and keywords (Figure 2).

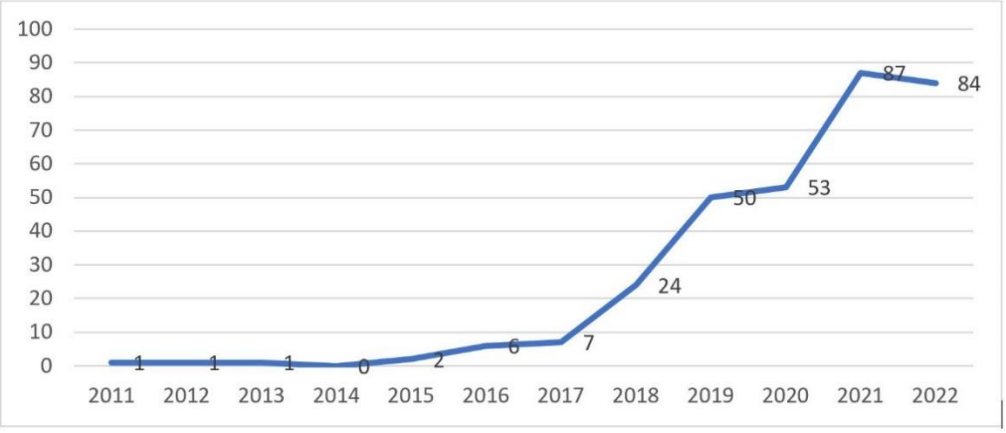

Figure 2. Temporal distribution of the filtered initial data set
Source: own processing

The search was performed in November 2022, and it returned 479 articles. It was followed by a filtering of this initial data, looking for English articles, excluding several subject areas (Mathematics, Physics and Astronomy, Energy, Arts and Humanities, Medicine, Environmental Science, Materials Science, Earth and Planetary Sciences, Agricultural and Biological Sciences, Pharmacology, Toxicology and Pharmaceutics, Chemical Engineering), and excluding duplicates, the final results concluded in 318 articles. These articles ranged from 2011 (1 article) to 2022 (84 articles, available in November).

The articles were analysed using the VOS Viewer software (Van Eck & Waltman, 2010), developed and offered by Leiden University.

Results

Types of chatbots

There can be found several groups of chatbot models depending on the tools used for their creation and the purpose they want to perform when they used by the user. Generally speaking, chatbots are divided into four types based on their technology. The first one refers to simple chatbots or based on linguistic models (Rules). They can also be called TIR (Text Interaction Response) chatbots: This type of chatbots use a simple Software lacking AI and characterized by the development of their tools based on linguistic models or rules. They make use of controls and keywords already arranged and use the "if/then" logic to create conversation flows. It is possible to create language conditions in the software to restructure words, phrases, and create synonyms. These types of chatbots offer control and flexibility that Machine Learning chatbots lack, while they also offer the possibility to be corrected continuously. However, they can be difficult and slow to carry out, because their development is purely by the hand of work. (Brandtzaeg & Folstad, 2017). These chatbots are one of the most common machines that can be found on the internet, since they are suitable for the self-management of the client or user of services in which human intervention is not required, such as FAQs or incidents.

Vol.11 (2023) no.1, pp.48-62; DOI 10.2478/mdke-2023-0004

The second category refers to Intelligent chatbots or based on Machine Learning (AI). These chatbots use AI software, therefore their development and testing are much more complex than the previous one. This type of chatbots make use of Machine Learning, so they gain experience by performing various actions and learn through it. In addition to NLP, they are more conversational, interactive and personalized. They have the benefit to be able to store a large volume of data, but provided that they are more complex they need constant training and some supervision that require highly qualified personnel, since with the use of Machine Learning they can also learn from negative traits of the users who consume it (The Guardian, 2016).

The third category covers keyword recognition chatbots or word-spotting. This type of chatbot is intermediate to the previous two. It 'does not use AI, so it 'does not understand neither the context of the phrase, nor the intent of it. This type of chatbot works by identifying keywords in the conversational environment, giving the user an answer which is already configurated in advance. They are also a type of chatbots widely used today by companies and public institutions, since they are simple to program and very useful to employ for simple and frequent issues (Brandtzaeg & Folstad, 2017).

The last category, Cognitive chatbots, are the most technologically complex chatbots on the list. They combine all the models already mentioned and their technologies. These chatbots use AI and Machine Learning, and have the ability to process and understand natural language (NLP), so they are able to understand the text provided by the user and their intentions. They have the ability to save data and learn based on interactions already carried out with previous users. They self-program as each conversation progress in order to improve their dialogues so that they are more precise, coherent, natural and customized for each client (Brandtzaeg & Folstad, 2017). This type of chatbot is very complex to develop, but they are still programmed so that at a commercial level they can be integrated by companies in their business to be used for their customers.

On the other hand, chatbots can be typified according to the expressive medium they use: 1. Text chatbots: It is the most basic chatbot type of all, it interacts with users through chat conversations, only by written words (Aunoa, 2020); 2. Multimedia chatbots: It is the chatbot which is most used today. It is a type of chatbot that in addition to text, it uses images, emoticons, gifs, interactive buttons etc., providing a more satisfactory and entertaining user experience (Aunoa, 2020); 3. Voice chatbots: With this type of chatbot, the user is able to interact through the voice, while being answered in the same way. These chatbots are able to interpret the user's words and respond within the context of the conversation (Douglas, 2020). Voice chatbots have become popular in recent years, since they not only communicate with the user and provide them with any type of information, but they can also o carry out all kinds of tasks within their capabilities, making life easier for the user. Therefore, they are also known as Virtual Assistants. Great examples of this type of chatbots are Alexa, Siri and Cortana.

Finally, Chatbots can also be grouped according to their purpose or application to practice: 1. Support and Customer Service chatbots: The inclusion of chatbots into the internet has been ideal and very competent in this type of tasks, since these are available 24 hours a day, 365 days a year, so they have stood out mostly for their attention and support to users who consume it. These types of chatbots are commonly used in FAQs, answering questions, and queries from users instantly (Jenneboer et al., 2022); 2. chatbots for Marketing or Lead Generation: These chatbots replace the typical forms to collect customer data on a landing page. This type of chatbot is also known as LandBot. It is used for Conversational Marketing, since it provides a more personalized experience for the client, thus being able to collect the information in a more interactive way; 3. Sales chatbots and E-commerce Assistants: They are chatbots responsible for accompanying the customer in the purchase process, facilitating the selection of products and the payment method. This type of chatbot is also known as Virtual Shopping Assistant, since it streamlines customers' purchase process on web pages: 4. Social chatbots: These chatbots are intended to provide, via chat, personalized content on social networks for their

followers. This way, the brand is promoted by showing its values, qualities and ideas, which is commonly known as Branding.

Analysis of keywords

The analysis starts with the term *artificial intelligence* (AI). Artificial intelligence is a science related to software programs that allows the creation of entities, which by themselves, can solve certain issues. According to Goksel-Canbek and Mutlu (2016), AI uses a series of steps called algorithms and advanced techniques of cognitive computer technologies to employ pattern search and matching techniques to provide solutions to the required responses. Related to artificial intelligence are terms such as machine learning, deep learning and natural language processing.

Figure 3 presents the overlay visualization of the keywords' co-occurrence network, where a color scale indicates the average publication year of keywords. The keywords corresponding to the red cluster are the oldest, whereas those in the blue cluster are the most recent ones, showing a very recent academic interest.

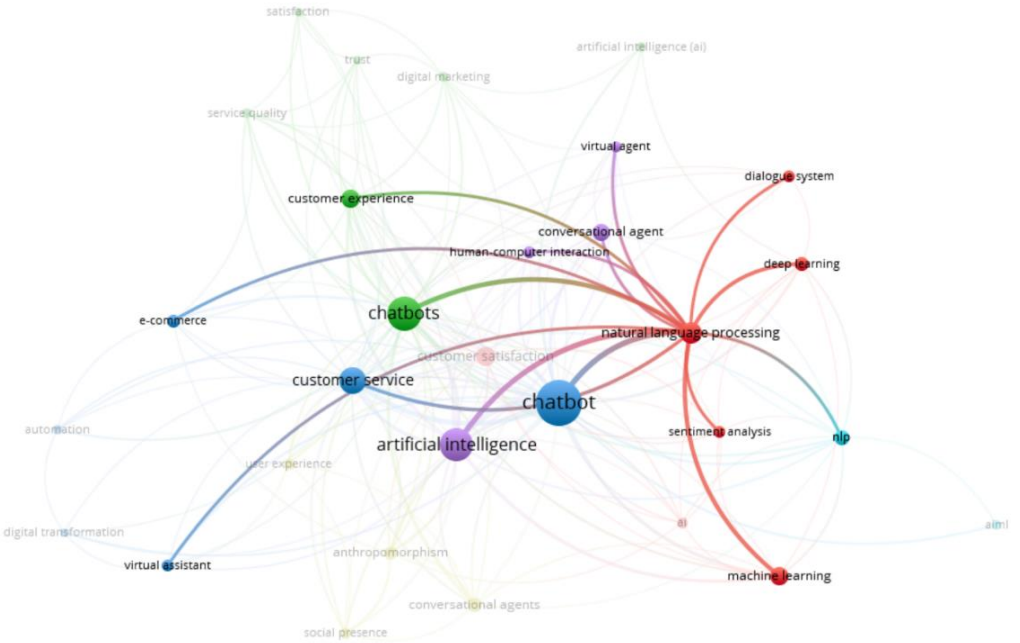

Figure 3. Keywords' co-occurrence network, with a minimum of five occurrences (red cluster)
Source: own processing

Machine learning, according to Vega (2017, p. 1), "consists of developing processes that allow machines to learn on their own from a set of data that an instructor laboriously enters first and corrects manually later". However, machine learning may turn out to be dangerous: as Sandra Wachter, a social professor and lawyer in A.I ethics at Oxford University, argues, "there is no such thing as neutral data" (podcast) (Lewis-Anderson, 2019). Every sample of data is biased because human beings are "historically biased". This is why she says developers should be very cautious when setting up their conversational agent since it could come to understand an example of discrimination and integrate it in its algorithm. This is what happened with Tay, a chatbot designed by Microsoft in 2016. It had to be shut down 16 hours after it was made available on Twitter (Jurafsky & Martin, 2023). The brand wanted to carry out an experiment in conversational understanding and declared "The more you chat with Tay, the smarter it gets" (The Guardian, 2016). Yet this experiment quickly turned into a disaster; Tay became racist, misogynist and adopted pro-Nazi views because users intentionally fed it with hate speech.

Vol.11 (2023) no.1, pp.48-62; DOI 10.2478/mdke-2023-0004

Deep learning, according to LeCun, Bengio and Hinton (2015), allows computational models composed of several layers to learn representations of data with different levels of abstraction, that allows hierarchical learning by layers. These methods are used to identify objects in images, transcribe speeches into text or match products with the interests of users. Vega (2017) comments that deep learning is based on artificial neural networks and it aims to get a machine to learn on its own. These neural networks try to mimic the functioning of the human brain, where all neurons work together to achieve the same goal. The neural network is composed of different interconnected layers that allow recognizing tasks at different levels and are updated with experience.

The idea is that a good chatbot is able to maintain a coherent conversation with users, being smart enough that the user does not perceive that he is served by a program, but believes that he is interacting with another human being. To achieve this, mechanisms must be provided, so that the chatbot is able to learn from the conversations held, connect to external services to make queries or actions that allow access or interaction with other chatbots, generate requests etc., all with the goal of attending timely and truthfully to the interlocutor, helping him find solutions and provide answers on know how to perform required actions (please see Table 1).

Table 2. Occurrences of keywords

Keyword	Occurrences	Total link strength
chatbot	118	155
chatbots	61	91
artificial intelligence	60	119
customer service	36	76
natural language processing	24	48
customer satisfaction	22	25
customer experience	17	35
machine learning	16	36
conversational agent	15	26
conversational agents	13	25
nlp	11	27
anthropomorphism	10	27
deep learning	9	18
ai	8	13
e-commerce	8	15
social presence	7	14
user experience	7	13
aiml	6	5
artificial intelligence (ai)	6	6
automation	6	10
dialogue system	6	6
digital marketing	6	13
human-computer interaction	6	16
sentiment analysis	6	13
service quality	6	18

Source: own processing

Another term we should keep in mind is natural language processing (NLP). Atwell & Shawar (2007, p. 40) defines it as "the ability of a machine to process the information communicated" and the science that studies it is called computational linguistics. What is intended to be achieved with the NLP is that a machine can recognize what a person exposes through a natural language, which can occur in writing, oral or with signs. Finally, it is necessary to name the concept of big data present in the operation of chatbots. Big data is a set of information characterized by such a high volume, speed and variety that they require specific technology and analytical methods to transform it into value.

Use of chatbots in marketing

Marketing, a discipline that has been gaining significant value in organizations in recent years, offers ample possibilities to implement bots in their strategies, and even more, in their digital branch. One of the principles of marketing is the satisfaction of users and consumers and to achieve this, customer service is fundamental. Thanks to the development of artificial intelligence, more and more market professionals are opting for bots to improve their connection with customers and offer something digitally distinctive (Pasquarelli & Wohl, 2017).

According to a survey conducted by LivePerson (2017) on consumers in North America, Europe, Asia and Oceania, 52% of global consumers would not be willing to wait more than two minutes to speak to a customer service agent. Since fast service is a priority for consumers, more and more companies are choosing to include bots in their customer service strategies. According to research by Deloitte (2015), 33% of the customer service centers surveyed planned to invest in automation and robotics processes between 2018 and 2019.

Chatbots are a perfect tool to meet these needs. In addition to facilitating constant attention to customers, they allow people to offer a personalized service, reduce costs and collect valuable information about the behavior of the consumers. The artificial intelligence and learning systems that characterize conversational software make it possible that as you have more interactions with customers, the chatbot learns more (Reddy, 2017. A study by Adlucent, published by Pauzer (2016), reveals that 71% of consumers prefer personalized ads and 44% would be willing to provide their name, address, email and product preferences to obtain them.

An important issue to keep in mind in this aspect is that the chatbot should have the most human appearance possible. Nearly half of those surveyed in Europe and Asia by LivePerson (2017) consider it important that the chatbot has a friendly name and personality.

From the perspective of cost reduction, the use of chatbots serves to free employees from routine workloads, thus increasing their productivity and value they can bring in other tasks (Pazos, 2018). In short, chatbots are postulated as a very interesting alternative for improving performance and reducing costs in customer services (Hollebeek et al., 2014; Jiang et al., 2022; Verhoef et al., 2007). Table below shows a summary of the main advantages associated with its use in this field (Table 2).

Table 3. Advantages of a chatbot in customer service

Immediate and unlimited availability	**Efficiency, flexibility and customization**
Chatbots can handle customer inquiries 24 hours a day, 365 days a year.	They can select content and offer it in a personalized way for individual attention. In the event that they cannot resolve a task, they will direct you to a human agent.
Behavior analysis	**Low cost**
They analyze customer needs and interests. They also allow to know the weak points of the service.	They optimize the relationship with the client and reduce operating costs, labor and time.

Source: own elaboration based on Hollebeek et al., (2014); Jiang et al., (2022); Verhoef et al., (2007)

With an approach similar to that of customer service, the analysis presented e-commerce. The difference, in this case, is that communication with the client does not have as its main objective finding solutions to generic issues, but also it aims to guide a potential client to the final conversion. However, both concepts are closely related and complement each other. There have already been seen previously that chatbots are tools applicable to different tasks and in the case of e-commerce they once again become a relevant element.

Vol.11 (2023) no.1, pp.48-62; DOI 10.2478/mdke-2023-0004

Within this framework, the introduction of chatbots leads to the emergence of a new term, conversational commerce.

In the green cluster, the most common keywords are: chatbots, digital marketing, customer experience, satisfaction, trust. In general, in this cluster, there are keywords bounded to keywords of business activities and practices related to CRM (Figure 4).

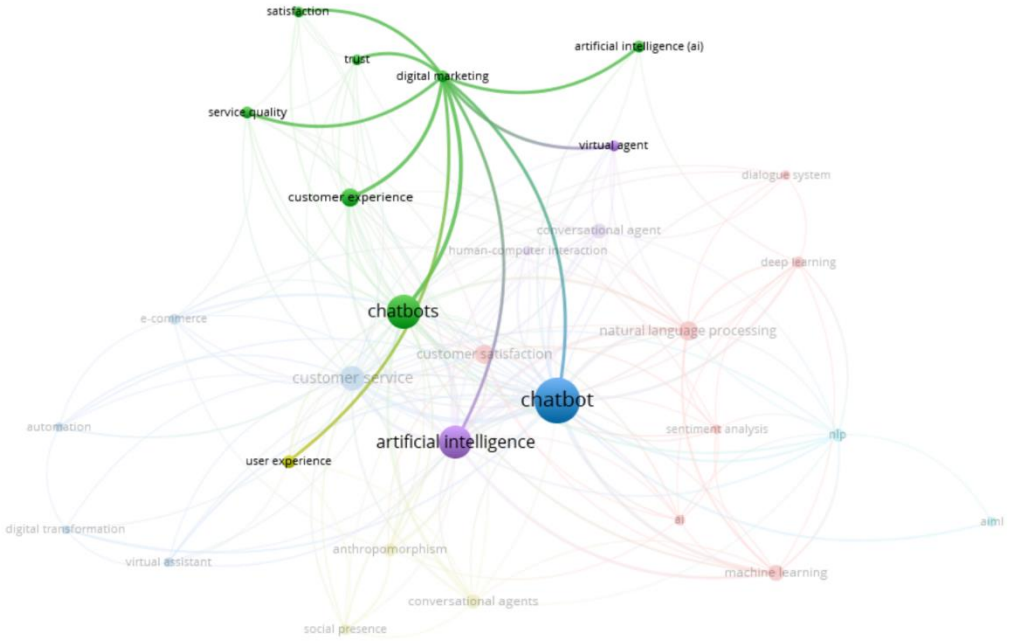

Figure 4. Keywords' co-occurrence network, with a minimum of four occurrences (green cluster)
Source: own processing

Conversational commerce, according to Messina (2016), consists of the incorporation of chats, messaging other natural language interfaces in the context of two-way communication, to enable interaction between people, brands or services and robots. Conversational commerce relies on messaging with consumers to allow them to make purchases through platforms such as Facebook Messenger or Google Assistant. He also adds that conversational commerce opening a new channel for companies where convenience and personalization are prioritized in a world where consumers demand immediate answers and tailored recommendations.

Today, e-commerce websites contain a wide variety of products classified into different categories, resulting in a complex database that can make it difficult for a web visitor to search for a particular product. Search tools use concordance and keywords to offer the best result to the user, however, sometimes the result may not be as desired due to the lack of precision or ambiguity of the terms entered. Chatbots can address the above problem by offering a more intuitive way of interacting with the website, interacting with the user and recommending the products that best suit their preferences (Gupta et al., 2015).

In addition, conversational agents also have a place in the planning of conversion funnels, that is, the set of phases that a visitor to the website has to complete until reaching a certain objective. There are four main advantages of applying chatbots in inbound marketing strategies (set of techniques aimed at attracting potential customers and educating or maturing them into customers by adding value) compared to traditional tools such as email.

The first one is a more personalized treatment. The fact that people use messaging applications (which are normally used to communicate with friends and acquaintances)

and the possibility to give personality to the chatbot make many users have the feeling of being conversing with a human assistant. The second is improved engagement. A study by HubSpot (2018) reveals that the response rate to a chatbot is higher than that of email. In terms of numerical terms (taking chatbots hosted on the Facebook Messenger platform as an example), the open rate stands at 80% for Facebook Messenger messages and 30% for emails and click-through rates at 13% and 2.1% respectively. The third advantage is immediacy. The response time to a chatbot is much lower, messages are read instantly. Last, but not least, the last interactivity. The chatbot offers more possibilities for interaction and makes it possible to have a live conversation between the company and the user.

Belton (2018) considers that chatbots can be applied to the four phases of a conversion funnel: awareness, interest, decision and action as follows. *Awareness* is the first phase of the conversion funnel that begins when the customer has the first contact with the product or brand and knows its existence. This awareness can occur through different communication channels (television, press, email). Bots can be programmed to wait a certain time before interacting with the customer and the interaction is done in a personalized way. For this purpose, the data of the pages or products you have visited and their references will be used (Belton, 2018). Creating a relationship with the potential customer is vitally important to guide them along the funnel.

The second phase is *interest*. If the potential customer demands additional information or shows interest in the product or service offered, the second phase begins. At this point the customer service we saw previously is very important. Here, availability and immediacy of response will be key for the potential customer to maintain their interest and this has a positive impact on their purchase decision (Belton, 2018). The third phase is *decision*. At this stage the potential customer decides whether to make the purchase or not. Chatbots, based on data collected from previous conversations and frequently asked questions, analyze the user's needs, and send them additional related information to help them make the purchase decision. This data collection allows bots to rank potential customers, identifying those who are most likely to convert. This information is very valuable for the marketing team to target their resources to potential customers with a real interest in the brand (Belton, 2018).

The final phase of the funnel – *action* - culminates with the purchase of the product. At this point, the purchase can be made directly through the bot or can be referred to a human agent (Belton, 2018). Although in the description of the phases of the conversion funnel we have referred to the purchase as the objective of it, this does not have to be so. Signing up for a newsletter, filling out a form, or downloading a catalog could be the ultimate goals of converting a funnel. The key to encouraging chatbot is to create a system that can be put into the consumer's mind by gathering information. In this way it will add value to the user, personalizing their experience and offering the products that best suit their interests.

Main advantages over the use of chatbots

The use of chatbots in companies generates plenty of benefits, since using these systems for customer service is not only a streamlining and improvement of time and type of response, but also improves customer satisfaction. Generally, following the article by Zumstein and Hundertmark (2017), the benefits that we could be experienced when implementing a chatbot in a company are: 1. Availability of customer service 24 hours a day, 7 days a week, plus a new way of direct customer contact. That help users in such a way that, through a chatbot, they can contact the customer directly, and their questions, even in non-business hours, quickly and efficiently; 2. This in turn provides method of saving money for the company, since the use of this assistant implies requiring less hiring of personnel for customer service; 3. In addition, you also save with respect to response

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time to users compared to real agents, which in turn improves customer satisfaction and their user experience.

Chatbots can be incorporated into instant messaging applications, websites, social networks within what is the world of the Internet. In addition, from a user perspective, those also known as virtual assistants are also in devices such as Smartphones, smart speakers such as Amazon's Alexa, or even in smart TVs or Smart TVs. Therefore, anyone with a smart device can make use of this technology and experience all its benefits. On the other hand, following the previous article, Chatbots make it possible for the company to have access to the personal data of customers with whom conversations have been established, such as their profiles, interests and tastes. This data is stored in order to use it to improve the marketing of the company, which provides the opportunity to create highly personalized offers for those customers.

Chatbots are an innovative tool for today's businesses. The fact that the company uses one, either on its website or from a messaging application, makes it build more prestige, improving the image of the company's brand.

Limitations of chatbots

Under general terms, on one hand, using a chatbot in the company does not have to cause any problems. However, chatbots that require a more professional use and therefore in turn must incorporate AI, they are more difficult to manage, since it requires a lot of maintenance and updating by professional labor in the sector, in addition to a higher monetary cost. Although a chatbot is a great tool for companies, there are times when they do not work as expected, they may have errors or they are not "intelligent" enough to answer questions or carry out the requested tasks of users, being able to generate an uprooting towards them or towards the same company that manages them. In addition, the most complex chatbots that make use of Machine Learning, that is, those that learn and acquire knowledge as they have more conversations with users, can develop an inappropriate functioning, with inappropriate behaviors and responses due to misuse and control of this. Therefore, this type of chatbot requires a lot of maintenance since they tend to generate a large number of errors that need to be corrected according to their use.

On the other hand, taking into account the article by Zumstein and Hundertmark (2017), data protection must be taken into consideration when using chatbots in companies. The collection of data by these must be protected and treated appropriately by the company. In addition, it also mentions the time of adaptation of customers to these new methods of communication, especially in instant messaging applications, since these have been used to communicate privately with family and friends and not usually with companies. Likewise, chatbots lack emotions, so they cannot interpret the emotions or forms of expression of the users with whom they converse, thus causing the possibility that they are not accepted by users and prefer to interact directly with a human agent to answer their doubts.

As Budiu (2018) argues, the bot might be unable to grasp the actual meaning of the request, which will consequently often lead to misunderstandings and irrelevant answers. Instead of being a fast way of reaching a business, it will have the opposite effect and have the client waste his time. The latter could feel frustrated because his/her question was inappropriately answered and could end up looking for another competing company. Folstad and Skjuve (2019) highlight this idea by demonstrating that when the chatbot reveals itself to be unhelpful, this does not ultimately result in a bad experience for the customer and a loss of trust in the company as long as there is a possibility for a follow-up with customer service employees. Human-to-human interactions and human-to-AEA (Artificial Embodied Agent) interactions in service encounters have been compared by Salomonson et al. (2013) and one of the features of communicative interaction they discuss is “communicative relevance”. They distinguish two types of relevance: global and

local relevance. They discovered that while both of them are always present in H2H interactions, only global relevance (and not local relevance) was essentially found in H2AEA interactions. This means that the artificial embodied agent is in most situations able to comprehend the general category relating to the request, but cannot really give a specific answer to the question, as shown in the following example. The authors of the article fear that chatbots are still too poorly developed in order to fulfil our need for specific information and that they have too many limitations.

Conclusions

The first goal of the paper was to understand what a bot is, how they can be classified and how they work. With the information provided, it can be concluded that bots are computer programs operating on the Internet, which are trained by a set of rules to act autonomously and offer a service. Regarding their classification and operation, it was said that, depending on the variables that we decide to choose for their segmentation, they can be grouped in different ways. Then it can be distinguished between good and bad bots (depending on their use), between transactional, informational, productivity, generalist and collaborative bots (depending on their purpose), between bots that use natural language processing and those that use a specific language (depending on their interaction model), between bots that require a command to start the conversation or those that do so by default (in function of the type of interaction) and between those with different levels of adaptation, reasoning and autonomy (depending on their intelligence). Among all of them we have highlighted and given special relevance to chatbots, those that we included within the group of good bots, and on which we have established our second objective.

Therefore, the second objective was to analyze in detail the specific case of chatbots, know their characteristics, their operation, and some platforms for their creation without programming. With this work we have managed to determine that chatbots or conversational agents are computer programs, capable of recognizing natural language and maintaining a conversation with a user to solve a query. In addition, it has been known that its operation revolves around three basic pillars: artificial intelligence, natural language processing and machine learning. Since their invention, in the early sixties, they have undergone an evolution both in terms of interaction (from using only text to being able to communicate through images and voice) and in terms of utility (from being a mere entertainment to supporting human tasks). And to complete this objective, it was stated that it is not necessary to handle codes or know how to program to launch a computer program of this type.

The last objective was based on identifying the development opportunities for bots in the company and the benefits they bring. We have expressed that the main advantages associated with bots in the field of business management are related to the areas of marketing, e-commerce and human resources. This aspect is especially relevant in an era where consumers have an excess of information and are saturated with massive offers. Being able to offer personalized treatment and tailored attention to the customers can be the key to the development of the business and an effective way to achieve what great results, while, differentiating from the competition. Therefore, the author's paper believes that they are tools with a wide business potential, which are still developing, but which will be decisive for companies in a few years.

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