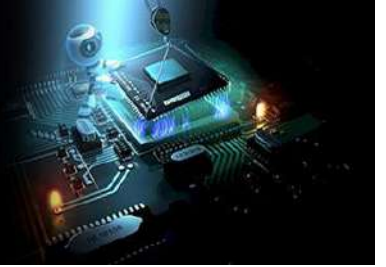


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Social media chat bots

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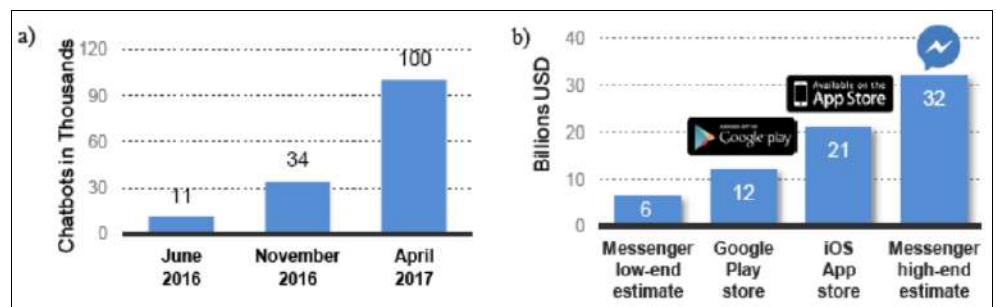
Abstract

Chat Bots as a piece of new information, interaction, and transactional channel allow companies to contact their target group via messaging applications such as "Facebook, WhatsApp, and We Chat". Bots are becoming more popular. Chat bots, as compared to natural chats, are not controlled by actual people, but instead by software that takes users through a series of conversations. The latest breakthroughs in chatbots in sales and marketing are quite astonishing. However, only a small lot of research has been released on chatbots in the subject of public transportation thus far. Travelers may use chatbots to find out about schedules, purchase tickets, and have a personalized, online travel adviser who can provide real-time and contextual information about their journey. Chatbots in public transit systems are able to gather and give a variety of information on customers and their journeys. They comprise information on travel, market, company, and content choices, use trends, as well as demographics and location-based information on individuals. Using chatbots has several benefits for both businesses and mobile consumers. Aside from increasing customer touch points, enhancing convenience, cutting servicing, sales, and administrative costs, new gathering information, and deep learning, these also enable new data collection and transfer learning. Chatbots allow cell phone users to contact with a company at any place and any time by engaging with them on their phones. Individuals who have been asked about a prototypes have demonstrated that they are particularly responsive to new cellular providers and that they would be quick to adapt to new technological developments.

Keywords: Chatbots, chat, bots, messenger services, digital communication, digital customer services, conversational commerce

1. Introduction

1.1 The Rise of Chatbots: Chatbots have seen a significant expansion in both the quantity and type available in recent years. Figure 1a shows that, as of April 2017, and over 100,000 chatbots are accessible only via Fb (see Figure 1a), and that the potential worldwide yearly income produced by chatbot interactions is expected to be up to 32 billion US Dollars (in Figure 1b).



(Source Data: a) Facebook 2017 b) Business Insider 2017)

Fig 1: a) Number of chatbots in Facebook messenger and b) Potential global annual revenue of chatbots transactions

Chatbots, on the other hand, as a personal, engaging, and disrupting information, communications, and transactional channel not only produce significant income, but they also help to cut expenses: Annual wage savings produced by chatbots are predicted to be 12 billion US dollars in selling insurance, 15 billion for financial products and sales agents, and 23 billion for general customer support employees in the United States.

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1.2 Outline and Research Method

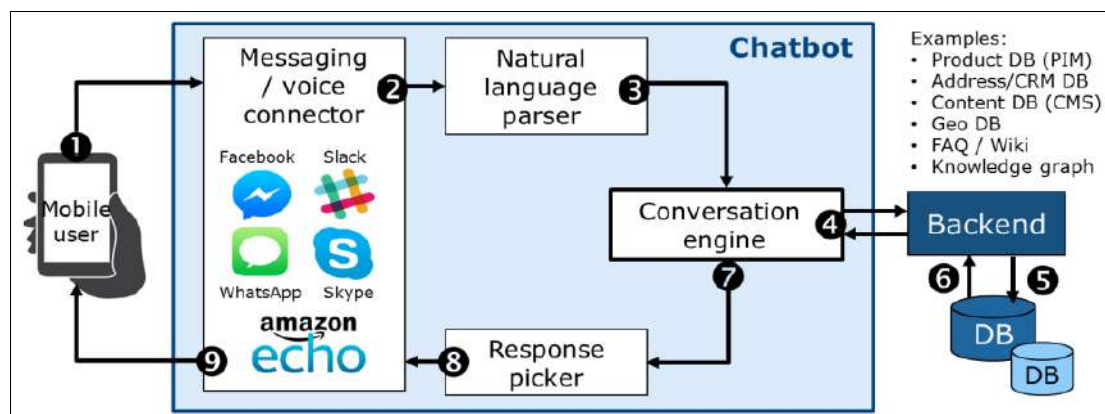
This research study is structured into four parts to help readers get a better understanding of the usage, significance, and problems of chatbots in public transportation: Following a stimulating introduction, the word "chatbot" is established and the actual functioning of a chatbot is discussed in Section 2. Section 3 discusses the advantages and disadvantages of using chatbots. The findings of a study on chatbots in the local transportation sector are reported in the fourth part of the main body of the paper. The empirical investigation was divided into two questionnaires: The first survey was conducted with 134 consumers in the public transportation sector, and it inquired about their overall preferences and behaviors when it came to checking timetables and purchasing transportation tickets. In addition, questions were posted on the benefits of using a digital travel adviser, such as tailored information and offers, among other things. When it came to the second poll, 84 people who had used a version of the new chatbot were questioned about their encounters with it. In addition, the possibility for a travel counselor for a public railway business was investigated and assessed. In the end, Section 5 discusses fresh potential for cross- and up-selling efforts, and it concludes with a forecast and a conclusion.

2. The use of chatbots

2.1 Definition

The phrases "chatbot" or "robot" are formed by combining the terms "chatbot" and "robot." To start, the term "chatbot" had been used to describe to a software application that mimics human speech via using a text-based chat function, which was developed by Google. Chatbots have a text inlet and outlet mask that enables mobile users to connect with the program which is behind them, providing them the impression that they are conversing with a normal human, according to the company (Wang & Petrina 2013) [21]. Since the growth of technology and software devices, sometimes referred to as apps, the word chatbot has been more commonly associated with messaging apps rather than with traditional automated systems (Atwell & Bayan 2015) [1].

2.2 Operating mode of chatbots: In average, chatbots use techniques and architectures that are relatively similar to one another. An illustration of the systems approach that a chatbot passes through from the moment a mobile user asks an inquiry till a chatbot gives the appropriate answer is shown in the following image.



(Source: following Weidnauer 2016)

Fig 2: Operating mode of chatbots

"Starting with an user's request (step 1 in figure 2) made using a chat app such as Facebook, Slack, WhatsApp or We Chat or through a text or voice-input application such as Skype, the process proceeds as follows (e.g. Amazon Echo in step 2). The user's request is captured by a so-called Natural Language Parser (NLP; 3), which then converts it into the programming language of the conversation engine for processing. Next, the conversation engine examines the query and routes it to the backend for further consideration (4). The backend is linked to one or more databases (DB) or information systems (IS), which reply to the request by executing the matching query in the database. The following databases or information systems may be used to get the answers":

- "Product information management system (PIM)"
- "Content management system (CMS), blogs, intranets, or wikis"
- "Customer relationship management system (CRM) or address DB"
- "Enterprise resource planning system (ERP)"
- "Core banking or (health) insurance system"
- "Geographical data, public data or statistics and (local,

national or international) open data"

- "Knowledge graphs from search engines a social media"
- "Data warehouse (DWH), business intelligence (BI), big data or another information system".

As will be explained later in this article, the BLS case study demonstrates how the chatbot app is integrated with the train company's destination data and ticket buying processes. The chatbot searches the system (s) in the backbone for the answer to the inquiry that was entered. Once the proper result has been acquired from the backbone (6), the translation engine sends it on to the reply picker for processing (7). In the last phase, the response, that's still in the chatbots computer language, is converted into the basic language of the client and transmitted to the user experience for display (see step 8; Dempt 2016, Weidnauer 2016) [9]. Chatbots and linguistic parsers assess client request and alter them as correctly as possible based on semantic trends and phrases that are provided by the customers. Chatbots identify patterns or consistencies in data contained in systems in the backbone and integrate them by comparing

them against databases in the frontend. This is referred to as machine learning in certain circles. Additionally, some chatbots make use of the deep learning model, which is a machine learning method. The chatbot begins by providing an overview of the basic fundamental topics, after which it delves further into the subject matter. The chatbot attempts to evaluate the primary subject of the discussion when the user initiates it with a query. It then applies the funnel concept to filter the topic down even more precisely (Dempt 2016) ^[9]. Conventional and data-driven semantics processes are used by software to attempt to interpret the text user input. Rule-based approaches make an effort to detect data expressions on their own without the need for human intervention. Data-oriented procedures are comparable to content analysis in quantitative social science research in that they are based on numerical data. Deductive classifications are constructed in preparation, and then the words of the customers are coded in accordance with these groups in order to allocate them swiftly to the connected themes.

2.3 Language of a Chatbots

Chatbots have been in use for communications since the 1960s, while Weizenbaum (1966) ^[22] built the world's first communication module for psychiatric purposes. Following that, the social, physiological, and behavioral elements that have an influence on interaction between devices and chatbots, as well as the results on interaction between users as well as chatbots, are discussed.

1. **The chatbot as a team member:** Humans are more willing to trust a chatbot if they view it as a group member instead of as a technological gadget, according to research. The credibility of information is increased when bots employ partnership-oriented presents and interact in a style that is comparable to that of their clients.
 2. **Scope of the messages:** Individuals have come to anticipate certain civility from computers and software, such as a chatbot. Customers do not demand their responses to be put in main points, and therefore do not want to be bothered with excessive amounts of information. In an ideal case, the chatbot would precisely portray the essential facts while being kind. It is critical in this case that the chatbot recognizes and remembers the recurring user over period, and that it develops from prior discussions and search requests as well (Reeves & Nass 1996) ^[16].
 3. **Personality traits:** According to research, the manner in which a person communicates himself and the language he or she employs are influenced by their degree of extroversion (Braun 2003) ^[2]. When compared to introverted personalities, dominant, extroverted personalities need a greater number of adverbs and adjectives, as well as speaking in the first-person plural more often (see Gill & Oberlander 2002) ^[10]. Furthermore, most individuals choose communication partners that have personality features that are comparable to their own. This is often the case when individuals evaluate their own personality qualities as disruptive, one-of-a-kind, or exceptional. Users can more accurately judge their counterparts when they have similar personality features, and information is often perceived as better and more trustworthy as a result (Braun 2003) ^[2]. If these study
- findings are applied to the creation of computer programs such as chatbots, a chatbots phrasing should be tailored to the personality type of the person who is interacting with it. As a result, the chatbots must determine the user's personality throughout the interaction by using particular language codes and then modify his personality to the user by employing certain phrases. Another approach for dealing with the personality issue is for the user to be able to pick the personality of the chatbot. When starting or utilizing a chatbot, the chatbot may offer a variety of personalities, after which the user may choose his or her favorite chatbot personality from the list (Laurel 1997) ^[13].
4. **Specialists vs. generalists:** In accordance with study findings, users see a specialist's response as more trustworthy than a generalist's response. Consequently, it is widely advised that chatbots provide distinct personalities for various themes and that chatbots talk as though they are experts in their field (Braun 2003). The content of chatbots must be written in a highly trained and qualified way, and it should include human characteristics to make it more convincing.
 5. **Gender stereotypes:** In the psychological and sociology books, several gender norms are discussed in detail. These sexist preconceptions may also be taken into consideration while developing computer code or avatars such as chatbots. For instance, when it comes to highly technical enquiries, people have far greater trust in a man chatbot than they do in a woman chatbot. Users, on the other hand, prefer to call customer support centers or helplines for service requirements, with the exception of female supporters. As a result, chatbots in the services, tourist, transportation, style, and beauty industries may seem and interact as if they were real women in these industries. Gender features in Human Computer Interactions (HCI), such as chatbots, have an impact on how people interact with them and what they anticipate from them. More study is needed in order to build gender accurate chatbots in the coming.
 6. **Credibility:** In the event that chatbots deliver incorrect or insufficient responses to consumers, and if they ask the same queries over and over again, they lose trust. Once users see that chatbots are unable to respond to their questions or resolve their problems, they will cease any contact with them and cease using the chatbot altogether. Customers want the chatbot to adapt to new talks, and the bot must avoid asking the same questions again and over, which is a waste of time (Braun 2003) ^[2].
 7. **Emotions:** Finally, when chatbots display emotional responses, they are perceived as more trustworthy. Bots must, in particular, express positive emotions such as pleasure, tenderness, and pleasure in order to increase engagement and build a stronger interface among the client and the chatbot. In furthermore, a chatbot must demonstrate a bare minimum of empathy, act in a contextual and caring manner. In an ideal world, chatbots would be able to engage in light conversation and provide amusement. The same is true for response time: it is more trustworthy if a chatbot often does not answer quickly, but instead incorporates pauses into its responses, just as it is normal for humans to do (Reeves & Nass 1996) ^[16].

2.4 Application Fields of Chatbots

The domains of use for chatbots are many, and they include: Calendar helpers (chatbots such as X.ai and Rhonda) and

virtual agents for booking or buying tickets to events are both quite popular right now (e.g. Morph.ai).

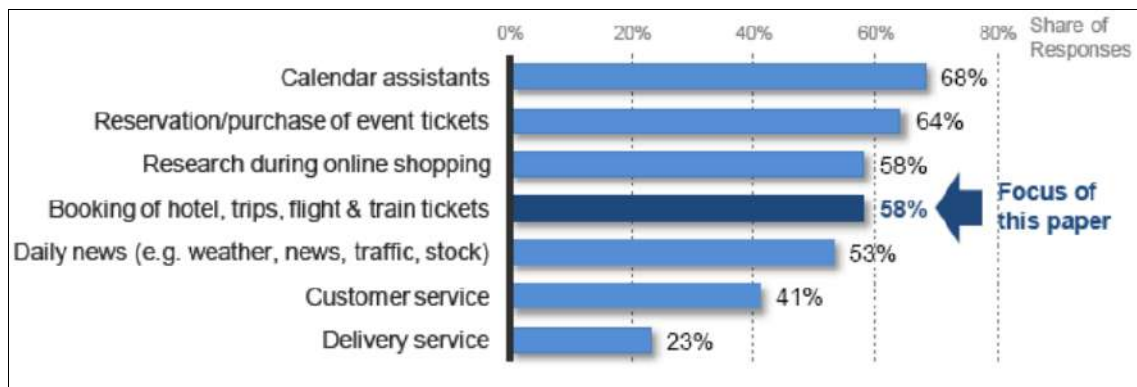


Fig 3: Fields of applications of chatbots (source: Statista 2017b)

3. Benefits and challenges of chatbots

3.1 Strengths and Benefits of Chatbots

Chatbots provide two types of implications for businesses: first, they increase customer service. The use of chatbots, on the one level, alters the manner in which information is communicated, and transactions are conducted between a brand and its consumers or other various customers. Internally chatbots, on the other extreme, have the potential to have a significant impact on and transform the future business, communications, and cooperation inside the institution. Most companies now have new means to communicate with their consumers on a one-to-one basis, thanks to the advent of messaging applications and chatbots. People often use chat applications for private communication among friends and people, rather than for business objectives. Corporations now have the opportunity to participate in this private communications platform for commercial purposes. Individuals and businesses may communicate with each other through the usage of chatbots at any time of day or night, 7 days a week, irrespective of the company's working or trading hours. With the use of this system, businesses may save costs on client service personnel expenses, minimize the risk of not being able to be reached beyond the work time, and prevent losing out on client demands. When it comes to the collecting of customer and use information, the use of chatbots opens the door to new opportunities for service providers. Organizations learn more about their clients and their interests in a different manner. As a result, businesses get direct access to information about users' interests, reactions, and identities in many situations since individuals connect their social network accounts with their messaging profiles. If that's not the scenario, a chatbot may be used to gather any essential information or inquiries from users while they are conversing with the bot. Additionally, depending on the users' demands, previous purchases, and other behaviors, the chatbot maintains specific user interests. As a result of these new data gathering, businesses will be able to engage their clients in a more relevant way, while tailored offers will be able to be targeted immediately and individually to users. The use of chatbots allows consumers to communicate with businesses at any time of day or night, regardless of time zones, operating hours, or waiting periods at call and service centers. Global and digital businesses, such as online stores and web shops, stand to benefit greatly from the use of

chatbots. Customers occasionally purchase things from distant nations because they wouldn't want to be reliant on the local local time or multiple languages while purchasing products. Another benefit is the ability to communicate with one person at a time. So far, consumers have often had to search and explore a website for an extended period of time in order to obtain the appropriate information, such as an item, a price, a services, or contact details. "Chatbots are friendly, direct, and fast when dealing with customer service grievances or other customer support. In the best situation, the chatbot gets to know its users as well as a close friend and can provide them with relevant offers, answers, and resources at the proper moment. He will be notified immediately and proactively on certain requests and requests dependent on the rights the user grants to the chatbot. A chatbots as a travel partner on public transportation is a promising service when compared to other options available today". Customers will be automatically notified via text messages about disruptions and other vital information in the upcoming, which will be sent straight to their cell device. Chatbots, in addition to facilitating communications and interactions with customers, have the ability to open up new opportunities inside the organization. Chatbots, for instance, are used to assist and teach staff in a variety of situations. Another illustration is the use of digital onboarding to welcome new employees. Onboarding fellow teammates, information exchange, standard procedures and duties are all handled by chatbots, which eliminates the need for time-consuming onboarding processes for human employees.

3.2 Weaknesses and Threats of Chatbots

While researchers, programmers, and suppliers of chatbots may be conscious of the numerous benefits of chatbots, they may also be aware of the significant problems and hazards associated with the new devices and services. Customers are highly used to receiving or getting information from businesses via many channels such as (mobile) cellphones, newspapers, e-mails, applications, or webpages. Private interaction among families, friends, and coworkers is mostly accomplished via the use of messengers. Businesses should be conscious, however, that consumers are used to previous modes of contact and that it will take some time for them to get accustomed to new modes of communication and purchasing. The most traditional (offline and online)

methods must still be available throughout the transition period, and consumers must be encouraged and rewarded to adopt new software and strategies during this time period. When it comes to marketing, it is vital for companies to be accessible on social networking sites messaging platforms like FB, and independent applications, in mobile apps such like "Apple and Google". Another important issue to address is data security, which affects both businesses and their consumers. Those that provide a stand-alone chatbot application are accountable for effectively preserving and managing the data collected from their customers. Data is also supplied to providers and venues like as "Facebook, WhatsApp, Slack, and We Chat" if organizations make their chatbot available on a third-party channel. Owners and designers of chatbots should take steps to guarantee both

data protection of personal data. Private, confidential, and financial data are often collected throughout the enrollment and payment procedures, and data security is critical in these situations. When communicating with clients, businesses attempt to acquire as much information as possible, which they then retain and utilize for future business and marketing purposes. Users should be informed that suppliers of chatbots and messaging platforms will acquire personal information about them when they use their services. Moreover, customers may be concerned that they can also miss out on certain relevant offers since tailored offers are limited to those that have been pre-selected. Table 1 outlines the most significant advantages, possibilities, and hazards associated with chatbots.

Table 1: Advantages and risks of chatbots for providers and users

	Strengths & Opportunities	Weaknesses & Risks
For providers companies	- 24/7 customer service (anytime/anywhere)	- Malfunctioning chatbots & unanswered questions
	- New & direct customer contact points	- Investments in IT infrastructure & chatbot tools
	- New method & types of data collection	- Extension of IT & analytics architectures
	- High amount of personal user/usage data	- Lack of awareness & acceptance by users
	- Personalization & automation of communication	- Information security & data protection
	- Reduction of service & support costs	- Image & reputation risks
For users/ customers	- 24/7 customer services & support	- Privacy
	- One-to-one communication on personal device	- Data protection of personal & sensitive data
	- High convenience & ease of use	- Lack of experience & understanding
	- Time- & cost-savings	- Biased personalized information
	- Reduction on relevant information & services	- Artificial/non-human conversation
	- Relevant offers based on user preferences	- Social isolation & ethical concerns

4. Conclusion

Currently, traditional communications and transactional methods do not provide these types of extra services, but chatbots and smart applications have the potential to include these features and advantages into their operations. To make the most of special offers supplied by chatbots, it may be wise to restrict the coupons to certain time frames, specific geographical locations, and appropriate target groupings or responding people. Cooperative arrangements involving public (or private) transportation corporations and other businesses do not yet existed in many jurisdictions. The possibility for cross-industry collaboration gives opportunities for public transportation organizations to gain important new partners, drive consumers to use chatbots (apps), and encourage passengers to use the general rail or bus system. It is possible that public transportation organizations may reap the benefits of their collaboration with other entities in the users and the service industries. The supply of their goods and services by chatbots and applications will almost certainly result in a negotiation between transportation firms for provision-based pay. Another industry will benefit from the creation of a new sales channel that will be primarily overseen by a transportation firm. These sectors include cafés, hotels, stores, supermarkets, recreational activities, and many others. Third-party sectors and businesses do not need extra sales staff in this situation, but instead get another appealing and successful distribution platform through which to contact their target audiences. Furthermore, if a chatbot for public transportation incorporates a large number of other items & services, it may be possible to eliminate the use of third party applications from other sectors. As a result, chatbot systems may profit from the facts and

communication that they have about the client. Chatbots and machine intelligence systems must gather as much information about their users' preferences in order to offer the most relevant information to the most appropriate user at the most appropriate moment. However, in online digital marketing commerce, it is essential to guarantee that chatbots are capable of understanding and editing the vast majority of customer request without the assistance of a person. A customer advisor should be accessible in the meantime to provide assistance to the client if this is not practicable. The existence of native applications and (mobile) webpages will remain in the future, despite the rising popularity of chatbots. Several of the app's features and capabilities will most likely be taken by chatbot and some other artificial assistants, such as Siri or Amazon Echo, in the future. So yet, however, there has been no evidence of applications, websites, or online stores being replaced. The majority of consumers are still used to and reliant on conventional methods and commercial channels such as mobile applications and websites. This configuration will most likely be maintained for a number more years. Due to the fact that existing chatbots are currently unable to effectively cover all characteristics, academics, the computer industry, and digital enterprises should collaborate to create and enhance chatbot technology applications. In the case of social media networks, the same applies: However, they provide numerous services that chatbots do not now do and it is uncertain whether or not they will supply them in the foreseeable future. So commercial social networking and chatbot will survive and be utilized by digital users in the same way as they are now. In spite of this, chatbots and their marketplaces are expanding in popularity, and new domains of technologies

and utilizations are rapidly emerging. Companies and academics must continue to invest in, test, and create chatbots in order to be successful. Robotic conversational agents (or chatbots) are the next phase of intelligent information exchange technologies that (will) improve our lives more comfortable and easy.

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