

## The impact of Intelligent Virtual Assistants on Buying Behavior

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### Abstract

*The way in which virtual assistants can influence the marketing paradigm through various uses within the interactive media, present on the web, within eCommerce websites, but also through indirect action, starting from social media, is a very complex and interesting process, which is worth studying.*

*From the perspective of virtual assistants, all consumer buying behavior models are a simplification of reality, since there can be many other sub-models which can be derived from the main ones.*

*The objective pursued within this research has been the presentation of the impact of the use of intelligent virtual assistants on the direct marketing activity of the companies, and the correlation with consumer behavior, especially in terms of the different decision levels and the way in which it is being supported.*

**Key words:** virtual assistant, digital marketing, direct marketing, change in buying behavior

**J.E.L. classification:** D83, D91, L15, L21, L22, M15, M31, M37, O33

### 1. Introduction

Nowadays, digital marketing (based on the assimilation of digital technology) offers more diversity, allowing businesses to connect with a very large number of customers, provided that these businesses are adapted to the online environment, by using as many promotional tools as possible on the Internet, the existence of eCommerce-based websites, secure payment systems, email campaigns and social media.

In order to be successful, companies must know the advantages, but also the potential pitfalls of digital marketing. One of the very effective tools of digital marketing is represented by intelligent virtual assistants. They are made available to customers in order to provide useful information about the products offered by the suppliers, being increasingly used on the websites of the suppliers of products and services.

Virtual assistants have a very friendly communication interface, through which the customer can communicate with them, through written questions from the computer or the phone keyboard (Raul from Banca Transilvania, ȘteFAN from Fan Courier, Eliza – the virtual assistant of OTP Leasing, etc.), respectively through conversational interaction in natural spoken language (Siri, Google Assistant, Bixby by Samsung, or Cortana from Microsoft).

The presence of virtual assistants has already caused changes in the buying behavior of customers, and the IT progress will generate new challenges throughout the entire marketing activity.

## 2. Theoretical background

It is considered that each virtual assistant is unique in terms of its mode of operation and in particular in terms of its technical characteristics (its program's parameters). Describing how software agents operate requires first and foremost analyzing the technology which underlies its behavior and determines its intelligence. Intelligence can thus be attributed through three dimensions (Brenner *et al.* 2018):

- knowledge;
- processing (thinking);
- learning.

The knowledge of an intelligent agent, in a virtual assistant, consists of information and rules. Information must be given with precise meanings, such as user preferences or product data. The rules are of the decisional form "if ... then" (if ... then), with the help of which the inference engine relates or represents complex neural networks. Thus, the system structures its database, consisting of prior knowledge and learned knowledge.

The information and rules must be processed, with the results being sent to the virtual assistant so as to be able to respond in the context of the requests, or they are indicated directly by the instructor.

Another category of assimilated elements is learned knowledge (also called dynamic knowledge), which is deduced from the interaction with the environment or from the derived conclusions obtained on the basis of prior knowledge. In order to use this knowledge, the intelligent software agent must have processing capacity (thinking), through which two things are achieved: on the one hand, the agent must assimilate and recognize the events in its environment, provided by sensors (touch screens, web cameras) or interaction interfaces (keyboard, microphone), and on the other hand, the inference mechanism must associate the assimilated and recognized events with its knowledge (memorized in the form of information and rules), within a "thinking process" (Koda *et al.*, 2016).

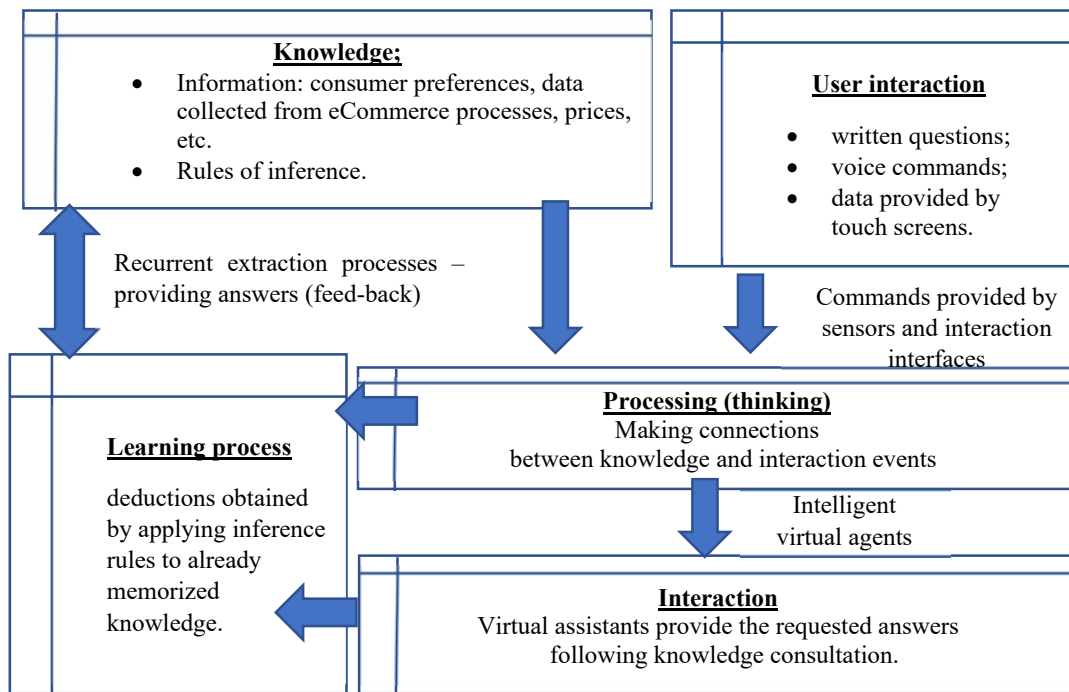
By making these connections the intelligent software agent can draw conclusions. Then, based on these conclusions, the agent can act autonomously, thus without the intervention or the statements of the instructor, through its software mechanisms. In order to perform an action, the intelligent software agent must, in some cases, have authorized access. If access authorization is granted, then the agent can carry out its task by interacting with humans, other computers, or other software agents.

The virtual assistant's intelligence grows by expanding its knowledge database. Thus, by expanding the available information and rules, it can draw better conclusions from the events in its environment. Learning processes contribute to expanding the knowledge database. At the same time, learning can cause a change in behavior as a result of certain experiences.

An intelligent virtual assistant learns to use learning software agents through the following mechanisms:

- from the connection between knowledge and events, the mechanism of the intelligent agent can deduce new conclusions, which enter into the knowledge database via the learning engine;
- the interaction with the environment activates subsequent learning processes - these learning processes are usually oriented towards adding or modifying the rules or information;
- moreover, the intelligent agent can also learn without an interaction or reaction to events, e.g., information is deduced through statistical methods if there are trend hypotheses or not - by using data extraction procedures (*data mining*).

Figure no. 1. Mode of operation of software agents in intelligent virtual assistants



Source: Authors' own interpretation

**Types of intelligent software agents** - they can be classified based on the environment in which they operate, as follows:

- **Desktop agents** – they automatically sort through detailed emails into special topics and create calendar appointments, provide support for users by sending automatic notifications at a specific time reference (e.g., for a report whose delivery deadline is approaching).
- **Network agents** - they access the information distributed within the networks, in order to carry out the actions imposed by the instructor or even by the user.

Network agents are divided into Internet and Intranet agents. The range of Intranet agents is limited to network connections between/within organizational departments or between organizations, whereas Internet agents operate in the field of electronic commerce, and they are specialized in accessing information distributed via the Internet.

Internet specialized agents, depending on their processing capabilities, can be of several types:

✓ *Web searching agents* make it easy for a user to search the Internet. They will mainly be found in the operation of virtual assistants that provide answers to the user's query. They supplement the results obtained from the local query, performed by the agent into the database (or knowledge database) found on physical storage media, with results obtained by the Web searching agent (Crawler), which extracts access links and information content from web pages. The efficiency of the agents is influenced by the correctness of the interpretation of the query phrases formulated in natural language by the client and the identification of keywords, on which the relevance of the results found and provided to the user depends.

✓ *Filtering agents* extract a small subset of information from a large amount of data, characterized by increased relevance to the user, depending on his/her individual preferences. They filter the relevant information and edit it. Filtering agents are mainly used to customize the orders requested by a customer. The specification of preferences is the basis on which the filter is created; it can be a direct one (the keywords in the request are part of the query phrase - filtering) or an indirect one, through which the customer's preferences are suggested by intelligent agents. Thus, the user's preferences are determined by the list of purchases from different eCommerce sessions, his/her web browsing history, topics of interest on Facebook, keywords used in search engines, or support

requests. Upon user requests, the intelligent assistant will provide personalized links for further search.

✓ *Agents which are resident in the active memory of the system* are systems which are working continuously, they monitor the user's activity, can determine his/her preferences or store important data, such as birthdays of important people for him/her, they can inform about the exchange rate reaching certain values or identify deadlines for the completion of certain tasks and notify of these events in real time.

### 3. Research methodology

The use of virtual assistants and their impact on digital marketing activity should be tackled as a very complex and interesting process which is worth studying.

The starting point, in the analysis of this process, is represented by the customer's buying behavior model, structured into three stages. When a customer wants to buy a product, he/she goes through the following stages:

- *choosing the product* - the customer decides what product he/she would like to buy; at this moment, he/she must realize what characteristics the product should have;
- *the selection of the supplier* - the customer decides where he/she would like to buy the product;
- *the negotiation and transaction* - the customer decides to buy a certain product from a supplier and completes the purchasing process (Kollmann, T., 2007).

Software agents are able to illustrate the buying behavior at different levels of the model and make decisions for their instructor independently. This is achieved, on the one hand, by the individualization of their actions and, on the other hand, by their efficiency in terms of solving independent tasks in eCommerce sessions over a longer period of time.

### 4. Findings

In order to analyze the influence of virtual assistants upon the buying behavior of a customer, an identification of the automation of the interaction processes between suppliers and the applicant is necessary.

Consequently, four scenarios are distinguished (represented in Figure no. 2):

- human-to-human interaction; the Internet is used only as a communication medium, for the digital products used and as a distribution medium (scenario I);
- a software agent at the level of a virtual assistant applicant interacting with a human supplier, who does not use an agent (scenario II);
- a software agent, operating through a support interface provided by a supplier on its website, interacting with a human applicant (scenario III);
- intelligent agents interacting with each other (scenario IV) (Kollmann, T., 2007).

#### ✓ **Scenario I – Interaction between two human subjects (Consumer – Supplier)**

At least in the B2C (Business-to-consumer) area, one can often come to the conclusion that the Internet is nothing more than a digital catalog, with a content increasingly represented by multimedia elements and interactive components. The differences in the purchasing process time compared to "non-virtual" markets are relatively small. The customer must make the selection of the product, then that of the supplier, and if necessary, the negotiation and management of the business. The marketing paradigm currently prevailing on the Internet differs only in terms of the information transfer of non-virtual markets.

In the product selection phase, from the buying behavior model, the customer decides which product he/she would like to buy. He/she achieves this, on the one hand, by searching for possibly suitable products and, on the other hand, by analyzing the information he/she has collected while searching for these products. The Internet makes available all the significant information that exists in digital form, globally, unrestricted by time. However, the fact that the Internet is also a huge and unclear repository of unstructured and unsorted information, of the most different types, should not be omitted. The potential trading partners can be determined by using web searching agents; nevertheless, with a very large number of possible trading partners at his/her disposal, it is very difficult for the user to check all the possible options in order to determine the optimal solution.

The suppliers can influence the choice of products sought by advertising comparable to the non-virtual world, which they place in either online or non-online media. Presentations of product alternatives are usually placed on company websites or in so-called virtual malls (e.g., eMag).

The supplier selection issue can be quite complex if a multitude of different suppliers is available with strongly differentiated conditions for the selected product. Finally, a step back to the product selection level or a synchronous product and supplier selection occurs.

If product selection and supplier selection are settled, the customer contacts the supplier, executes possible purchase negotiations, and establishes, if necessary, the agreed performance contract.

Obviously, with this type of interaction in eCommerce, the buying behavior differs from the non-virtual world, given the fact that the alternative spectrum of the products offered and the number of suppliers of these products is constantly growing.

#### ✓ **Scenario II - Interaction human supplier - virtual agent applicant**

If an applicant uses software agents in the purchasing process, he/she can reduce his/her searching costs. Agents can be used to replace all customer buying behavior models.

The software agent accepts the request at the product selection level by searching for products which match the applicants' preferences. The substantial performance of these filtering agents then lies in choosing one product, or a small selection of products, from a huge amount of possibly suitable products. Nowadays, modern technologies usually originate from the area of artificial intelligence. Agents extract useful information from text documents and web pages and automatically draft documents in the form of reports, plan trips according to the requests of the individualized instructor, recommend CDs or movies or find the appropriate car.

Filtering agents, used in the product selection stage, can be divided into content-based and non-content-based agents.

Content-based product agents require the existence on the market of product ranges with characteristics similar to the searched product category.

Non-content-based systems are used in domains where an objective product description is based on subjects or topics (e.g., film or music).

Price agents are the simplest type of content-based agents. They search for price information, for a given product, from all its known suppliers and they compare prices extracted from the Internet, a procedure performed in a few seconds and without personnel expenses.

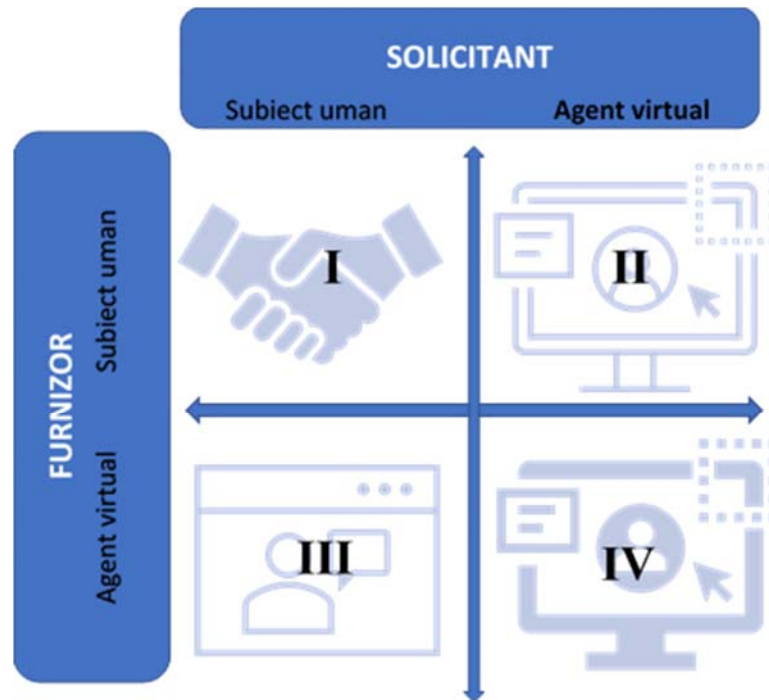
For a supplier which allows access to price agents, the advantage is that it will find out, via these smart mechanisms, that it offers the best price, while also identifying suppliers of similar products which have higher prices.

By using filtering agents, customer preferences can be stored in the applicant agent's knowledge database. This aspect has consequences for the suppliers' offers, since classic advertising no longer works in this case; therefore, with the use of content-based agents, promotion will only be successful if the product has really advantageous features for its consumers.

#### ✓ **Scenario III – Interaction between a software agent and a consumer - human subject**

We now consider that the supplier uses software agents in order to optimize the marketing mix for each individual customer. Supplier agents may be used during the product selection phase for advertising, product policy and pricing.

Figure no. 2. Automation of interaction processes between applicants (consumers) and suppliers



SOLICITANT	APPLICANT
Subject uman	Human subject
Agent virtual	Virtual agent
FURNIZOR	SUPPLIER
Agent virtual	Virtual agent
Subject uman	Human subject

Source: Authors' own interpretation

Advertising agents can control advertising in such a way that the inefficiency of marketing activities is minimized, and they can often be combined with product agents, which are able to determine individual user preferences.

For example, the product selection process can be influenced by content-based advertising within search engines. Entering the search term "mobile phone" into any of the search engines will lead to the advertisement of a mobile phone company in a banner above the search results (Figure no. 3).

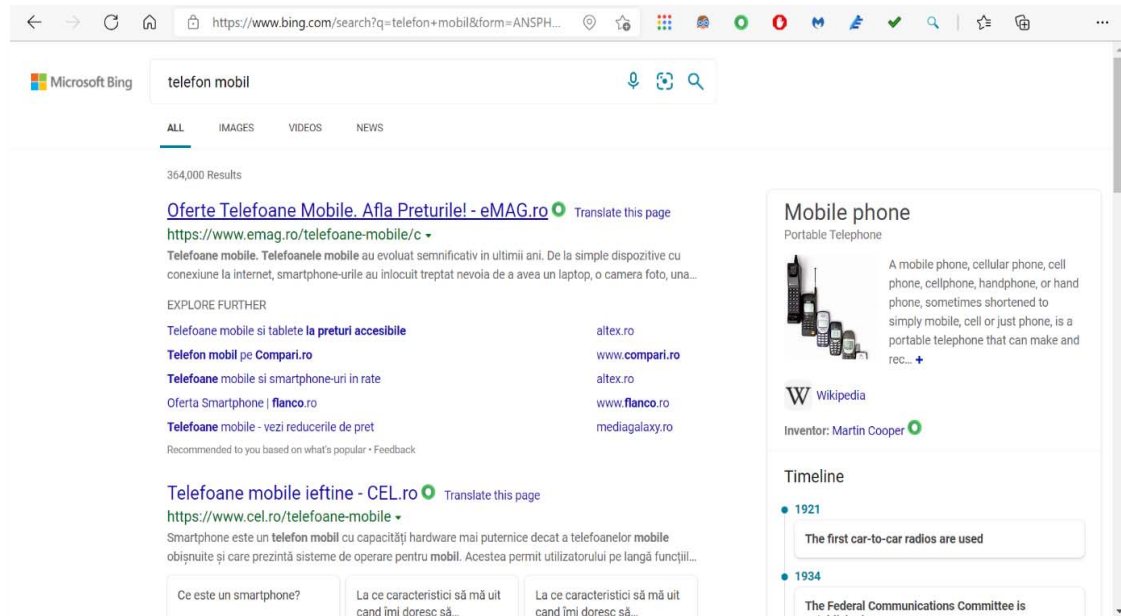
Individualized advertising can also be favorable to the user, as it has a targeted informational character and it is less intrusive, since it largely corresponds to his/her interests. The advantages for the supplier are obvious. Already nowadays, major Internet advertising suppliers place targeted advertising based on the time of day (e.g., promotional emails or text messages with offer announcements will not be sent at night) and the user's transaction profile, through which "click rates" of up to 25% are obtained (Figure no. 4).

In addition to this, advertising software agents can configure new parameters targeting directly interested people in order to select the right advertising message. For an advertising campaign, a series of different advertising messages will be displayed, the effectiveness of which can be measured, among other things, based on "click rate". After a short time, the advertising agent already knows with great certainty which advertising message is the most effective, without needlessly

placing many ineffective ads. Another differentiation of individualized advertising is possible if socio-demographic data of the user are present.

Customers who respond positively to emotional ads may receive one type of promotional message, whereas another type of customers who respond to informative advertising receive another type of message. Selecting the right ad is, therefore, highly individualized based on the customer's profile.

Figure no. 3. Search results provided by a searching agent at the level of the "Bing" search engine



Source: Authors' own interpretation

The intelligent agent determines in a very short time, which advertisement achieves the best results for a certain type of people, at what time of day.

Advertising agents may be used in particular in combination with the filtering agents used by the suppliers. Online stores, such as Amazon ([www.amazon.com](http://www.amazon.com)), determine based on transaction data whether a particular customer is only interested in Apple mobile phone products. In this case, on this consumer's search pages or in his/her social media newsfeed, Apple promotions (products or accessories which the customer has not yet purchased) will be prioritized.

Software agents from the suppliers' applications can also be used in order to achieve individualized product promotion tailored to the profile of the customer being addressed. For example, computer manufacturer Dell, depending on customer preferences, can offer more than 10,000 possible hardware configurations of PCs or laptops ([www.dell.com](http://www.dell.com)).

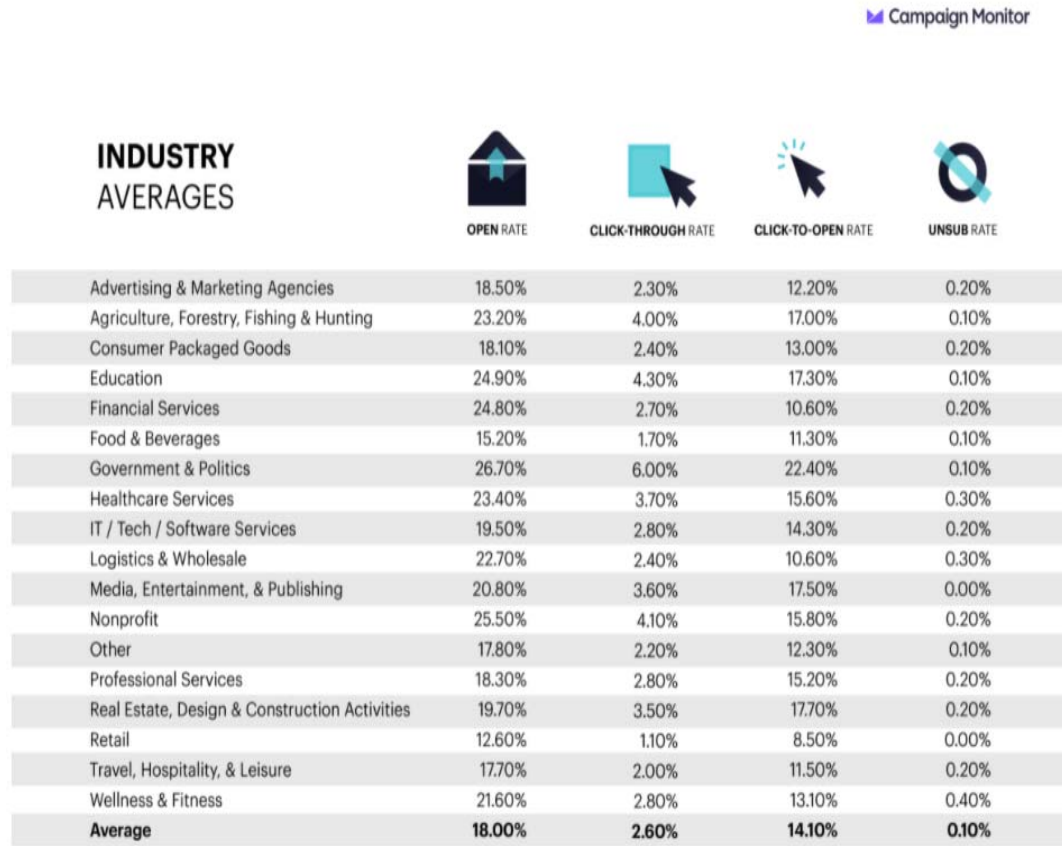
From the perspective of online deliveries, individualization can be profitably used by intelligent agents given the fact that, based on user preferences determined by the previously detailed extraction mechanisms, targeted advertising and product placement can be done substantially more efficiently.

#### ✓ Scenario IV – Interaction between two software agents (supplier – consumer)

This is the case with quite a large number of online auction sites, e.g., e-Bay or OnSale ([www.onsale.com](http://www.onsale.com)), where the trading interaction is done through automated intelligent agent mechanisms used by both categories (suppliers and customers).

The use of software agents, by both sides, brings a clear benefit in terms of lowering transaction costs, while developing a fully automated market process in which supplier agents and applicant agents negotiate with each other and execute transactions on behalf of their customers.

Figure no. 4. Statistics of click rates recorded in email marketing campaigns in the year 2022



2021 Global Email Benchmarks data

Source: Campaign Monitor – Guides Ultimate Email Marketing Benchmarks for 2022: By Industry and Day

Virtual assistants with high-performance intelligent mechanisms will learn and assimilate as many inferential rules as possible over time, related to how they should act within virtual markets, whereas agents which do not have a similarly well-developed intelligence will become victims and will be withdrawn very quickly from the virtual markets.

A critical point regarding the use of software agents can be summarized under the frequently used term "confidentiality", represented by all the information protection mechanisms related to the coordinating customer and the trading rules imposed by the customer, one of their main operating objectives being that of protection against unwanted espionage by potential transaction partners. Therefore, an applicant agent will not disclose the same information about its customer's preferences and personal data to every supplier agent. On the contrary, a supplier agent can use personal preferences to the advantage of the applicant by making individualized purchases. Data security thus becomes, apart from a matter of trust, also an object of negotiation, and therefore a typical application for software agents that will act on this in order to protect the customer's interests.

## 5. Conclusions

In the online market, suppliers of products and services interact with their customers through various communication channels, such as telephone, e-mail, websites and social media platforms.

Nowadays, customers, through access to the Internet, can identify what they want and can purchase the chosen product in a few seconds, without much effort.



A company will have more time and will better manage its financial resources by using intelligent virtual assistants that interact with the users (24 hours a day and 7 days a week) through natural conversations, via a wide variety of communication media.

Intelligent virtual assistants are only accepted if there is a perceptible advantage compared to the conventional transaction mechanisms. This trust must be earned, on the part of users, through a gradual authorization of the agent for the functions which are deemed necessary.

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