

RESEARCH ON THE DEVELOPMENT OF DIGITAL SIGNAGE SYSTEMS AND THE FACTORS THAT INFLUENCE THE EFFECTIVENESS OF THE MESSAGE

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Purpose: This paper aims to research of the methods of communication in the public sphere, which will provide a better understanding of the reasons and development of digital signage systems. This will allow to understand where digital signage systems came from and improve the effectiveness of communication.

Design/methodology/approach: The objectives have achieved through a review of the literature and focus on the growth of digital signage systems. The factors influencing the effectiveness of the message were also analyzed.

Findings: In the course of the work was analysis digital signage systems development which are the basic type of systems used for communication in the public sphere. Moreover, presented factors influencing the effectiveness of the message will contribute to development tailored digital signage system.

Research limitations/implications: Worthy of investigation in future research would be the impact of individual digital signage solutions on audiences as well as users.

Practical implications: This research is great starting point for researchers who want to learn more about digital signage systems. This research can also be useful for software development enterprises during the process of developing a digital signage system.

Social implications: This research can contribute to people's understanding of the reality around them and, more specifically, the systems that present them various content. It will also help make the messages more effective.

Originality/value: This article is valuable for researchers studying digital signage systems, especially their development, as well as for the digital signage industry. The research can be a great starting point for future research on these systems, and can help make the message more effective. Despite frequent use of digital signage systems in everyday life, there are rarely addressed topic in the scientific sphere. What makes taking up this topic innovative and very important for future development of digital signage systems as well as effective communication in the public sphere.

Keywords: digital signage systems, communication in the public sphere, communication tools, effective communication, mass communication.

Category of the paper: Research paper, General review.

1. Introduction

Through the ability to communicate, people began to build communities, which in turn supported technological development and the growth of civilization. Over time, new ways of communicating appeared, more complex, allowing information to be transmitted over longer distances. The more our technology developed, the faster new solutions to the problem of data transmission appeared.

Nowadays, a lot of technology, equipment, various types of software assist us in communicating content to others. In order to make the message more attractive, easier to receive and thus make a better impression on the recipient, multimedia content is used. The message is not just text, but often the evocation of appropriate emotions or actions in the recipient.

This message can be an advertisement for a product or place, important information to be conveyed, such as, a cancelled meeting, train or bus schedules, college or school hours, an emergency, or information about a sudden event that requires the response of those close to you, such as a fire or the need to evacuate. It can also be information about current events, holidays, etc. Often multimedia content is a supplement to various events such as fairs, lectures, concerts, meetings. Then they perform the function of complementing the full experience of the event. Videos with computer animation and stage lights enhance the reception of music at concerts, as well as the presentation of a new product at a trade fair. Infographics and charts support the message of content presenters at lectures and company meetings.

All this information is conveyed to people in different ways. During demonstrations using monitors, TVs, projectors, you can also take care of the right atmosphere using other devices such as blowers, smoke generators, etc. It all depends on what kind of impression we want to create, what kind of information to convey, whether it is to be during an event and what the nature of the event will be.

2. Flow of information through digitization

There is a lot going on around us these days. The need for information flow between people is huge and greater than ever before. The ability to transmit information to a specific group of people in a specific location is also of great importance. Throughout history, the way information is transmitted has changed. From gestures, speech, through the appearance of various types of writings. In order to achieve certain goals, for example, to make the message secret or to make it transmitted over a greater distance it was changed into another form, for example, Caesar code, Morse code. With the development of civilization and the construction of new devices and technologies, as well as the development of education,

the transmission of information was increasingly improved. Technology began to allow the expansion of the audience to a large extent when devices such as radio, television and finally the Internet were created (ZPE – MEiN, 2021).

Over the past 20 years, the Internet has become an indispensable part of our lives. It's hard for us to imagine a day where we don't read a new blog post, a new article on our favorite website, browse social media, chat with friends using instant messaging, or listen to a new episode of an interesting podcast. The multitude of content and forms is overwhelming, and everything is at our fingertips.

The Internet allows one person sending a message to reach many recipients regardless of geographic location. It has allowed an easy way to communicate and to read the message at the moment it suits us. However-that said, we have no control over how quickly the message will be presented to the recipient and whether it will be the right time. We do not, also, know for sure if the person in the location will check the messages provided for them or if they will have an application that will notify them.

3. The course of the communication process and the effectiveness of information transfer

In order for the communication process to take place, there must be such elements as the recipient, the sender and the message that passes through a given communication channel. The information, that is, the thought we want to convey, is encoded into a message, e.g. in the form of text, graphics, video. This message is passed through the communication channel, accompanied by so-called noise that interferes with the message reaching the recipient. Once the message reaches the recipient, it still needs to be decoded correctly, i.e., well understood by the recipient. An important fact is that the communication process can be two-way or one-way (Ober, 2013).

Whether the message will be read correctly by the recipient is influenced by a number of factors that generate the previously mentioned noise, perhaps outside noise, an underexposed room or such things as the recipient being tired and distracted. In order for a message to be received by the recipients according to our intentions, it must also have the right context. The stories to which the sender refers should be familiar to the recipient so that he or she can understand the message well. The influence of the other person's perception or the way the message is presented also has a huge impact on its reception, as does the cultural background (Sypniewska, 2015). Context can also be the time and place in which the message is received. If it is received too late or too early, the message read by the recipient may not be understood or received as we would like. Therefore, it is important to properly synchronize the display of the message to the recipient at the right time and in the right order.

Nowadays, a lot of technology, equipment, various types of software assist us in communicating content to others. To make the message more attractive, easier to receive, and thus make a better impression on the recipient, multimedia content is used. There are many factors that affect the effectiveness of the message (Walędziak, 2014):

- **Brevity** - Using more words does not increase the effectiveness of the message, and a long message can tire the recipient and reduce their focus on the content. Sometimes one clear argument can be better than many.
- **Suggestiveness** - It is important that we are convinced of the value of our message, if we want it to intrigue others. To make the message more suggestive we use various techniques such as communicating benefits, emphasizing uniqueness. The best example of messages using these techniques are advertisements, where we always hear that the advertised product is always the "the most": "the best", "the highest quality", or "the cheapest". It happens that these messages miss the truth, but the intensity and certainty with which the creators of the advertisements present their products makes recipients grasp the hook. Although the things just described are important, the most important element of an evocative message is to define the purpose of the message, we must clearly determine what action our message is intended to encourage.
- **Consistency** - Even the best message, can prove unreliable to the recipient. People by nature are distrustful and inquisitive, if something sounds too good they begin to analyze it and look for hooks. All it takes is one inconsistent sentence, for them to delete the entire message. Here we see the advantages of brevity, it is better to use fewer arguments than to reach for ones that may prove incomprehensible.
- **Understanding** - Another key to effective communication is the ability to empathize with the recipient. When building a message, pay attention to: views, education and mindset of the potential audience. This allows you to be constructed so that it contains content of interest to its addressees. Empathy also helps to create direct relations and makes communication more personal and therefore also more effective.
- **Context** - There are factors that the creator of the message did not anticipate and even factors that are beyond his control:
 - Place and time - the willingness to transmit a message does not mean that others are ready to receive it.
 - Events preceding or following the message.
 - The recipient's experience.
 - Messages accompanying a given message.
 - Mood of the recipient.

- **Credibility** - It depends on various factors, such as:
 - Sender - if the sender is a credible, sincere, knowledgeable person relevant knowledge then his statements will be more credible than those coming from a person who has failed our trust, or is a layman in a given subject.
 - Introduction - our statement is more credible if we start it with a brief analysis of the situation before sharing our insights. In this way we show that we understand the problem and our solution is well thought out.
 - We should be careful about our relationship with our audience, their trust is difficult to gain, and even one slip-up can affect the credibility of subsequent messages.
- **Concreteness** - A message containing concrete examples and figures is better received than when it refers to hypothetical events. Using figures from a reliable source is always a strong argument. It is also a good idea to use statements that clarify goals, they carry a commitment that we are more likely to believe.
- **Massiveness** - The more often we hear a piece of information, the more likely we are to accept the statement as true. This is one of the reason why long-term and repetitive advertising campaigns are more successful than short-term and one-time campaigns. Additionally, if we hear a given statement from multiple independent sources, it is us more credible than one announced from a single source.
- **Originality** - Unfortunately, even the best message can eventually get boring. That's why it's important to change the way you present information from time to time. In order to attract the attention of the recipient, it is necessary to be inventive, unconventional approach. For example, sometimes it's enough to change the label of a product to stimulate our curiosity and ultimately get us to purchase.
- **Completeness** - It is important to give the recipient a complete set of information, answers to his additional questions. When doubts arise on his side, and he does not receive answers to them we may not convince him of our product. Everyone needs a different range of information to make a decision. Some act spontaneously, needing little to make a decision. Others require a complete set of information before they make up their minds otherwise they may later regret a hastily made decision.
- **Political correctness** - It is very easy to offend or upset someone, something that was supposed to be material for an expressive and interesting message can turn out to be a cause for attacks and boycotts. Therefore, it is important to be able to empathize with the recipient and try to anticipate how the message might be received.

In order to make communication more effective, more and more new viewpoints on this issue have been created. One of them is visual communication, which, according to the Encyclopedia of Management, can be defined as communication through images, the transmission of information in visual form between the sender and the receiver by means of media (Gieracka, 2020). The visual form in this case can take various forms, they can be images,

videos, animations, photos, infographics, illustrations (Kawka, 2015). In this way it is much easier to attract people's attention, especially when our message is to reach many recipients.

4. Evolution from signage to digital signage

Mass communication is a rather specific type of communication that differs from typical interpersonal communication. Appropriate ways of such communication using signs have been developed. Further evolution and technological development led to the creation of systems that allow centralized management of the transmitted content.

4.1. Mass communication

Communication to a wide audience has not always been as easily accessible as it is now. Classifying communication by the reach of its participants, it turns out that the highest level is mass communication. But in order for it to be possible, appropriate means of communication were needed. Mass communication became widespread with the development of mass media. It began as early as the mid-15th century, when the first printed book was written. About 200 years later, the press was established and other mass media were developed, i.e. cinema, radio, television, until the second half of the 20th century saw the emergence of new media, i.e. the Internet, cable and satellite networks, etc. (Dobek-Ostrowska, 2007).

An example of reaching a wider audience is the printing and hanging of posters. The first posters in the world were created as early as the first half of the 19th century, but the main development took place in the 1980s and 1990s. Posters cover a variety of topics and are made using different methods. According to the dictionary of the scientific publishing house PWN, a poster is defined as "an artistic genre of graphic design that fulfills the functions of information, advertising, propaganda and political agitation" (PWN, 2003, p. 317).

4.2. Signage

Another interesting example of informing a wide audience is the creation of signs and symbols to convey important information. This process is called signage. On chemicals there are signs describing the substances inside, while a road sign system informs and warns drivers about various traffic incidents, indicates the correct route, etc. Thanks to the fact that the symbols are simple, clear, and school education has content on the subject in the core curriculum, the signs are clear and understandable to most people. Information is conveyed to many people at the right time when they need it, for example, signs indicating the direction leading to a particular city at an intersection.

4.3. Electronic signage

Advertising signs were also created to encourage people to visit a place, for example. With the passage of time and the development of technology, signs in electronic form - electronic signage, were invented. These signs were usually luminous to make them more visible and attractive, and were made up of electronic parts, e.g. using light bulbs, or even using fluorescence.

There were many positive aspects of using electronics for signage, the signs became more visible, one could say that they were more interactive than traditional ones. The downsides of such a solution were certainly the need to provide electricity, the higher cost of purchase and the cost of operation, such as replacing the bulb.

4.4. Digital signage

With the improvement of electronics and the emergence of more technologies, the digital age has arrived. Digital circuits, calculators, telephones, portable music players, digital cameras, computers, tablets, LED monitors, LED TVs, etc. were created.

The next evolution bore fruit in the form of Digital Signage. The definition of Digital Signage is best encapsulated in the document "Digital Out of Home - A Primer-Section 1 - Introduction", written in cooperation with companies dealing with these issues. "Digital signage is a network of digital displays that is centrally manageable and addressable for targeted information, entertainment, merchandising and advertising" (Abrons et al., 2019, p. 3). In simple terms, it is any digital screen that is not in a private location. It could be a video screen in front of a supermarket, screens displaying menus at fast-food restaurants above the cash registers, screens displaying train or bus schedules at a bus stop, screens presenting content at a university or school, or even screens or projectors displaying animations during a concert.

The evolution process from signage to digital signage is shown in Figure 1.



Figure 1. The evolution process from signage to digital signage.

Source: Own study/Photos taken from pixabay.com

4.5. Digital technologies outside the home

When digital information visualization technologies, such as TV in the home, began to be used outside the home retreat, they also began to be referred to as Digital out of Home (DOOH). DOOH belongs to Digital Signage, but it is a more specific division of Digital Signage, as it refers to screens outside the home that display advertising content and whose content can be changed remotely using digital technology (Abrons et al., 2019).

4.6. Capabilities of digital signage systems

Digital signage offers a great deal of advantages over its predecessors. There is the ability to quickly change content remotely, which helps save time and costs. It is possible to tailor the content displayed to the location and personalize the content, and it is also possible to conduct interest surveys using additional devices, such as using Microsoft's Kinect motion sensor to make the content change according to the data coming from the device, or connecting to sensors in the ceiling that will create a map showing how customers move around the store (Abrons, 2019). Digital signage systems consist of hardware and software components. The upfront costs of building a system can be high because of the hardware and software needed, but what you get in return is a lot of capabilities and a long life. The right software, the so-called Content Management System, or CMS for short, usually allows us to have many options for scheduling and managing the content we display, and some even allow us to directly create content from any location, even from home, without having to hire professionally trained staff to do so. The simplest example is the ability to quickly change the prices displayed in a restaurant, rather than having to print new ones and replace them, or change the breakfast menu to lunch evenly at 10:30 am. A good example is also the ability to quickly change the time of a train's arrival at a station, or to inform everyone in a building about a fire or bomb alarm and the need to evacuate quickly.

5. Discussion

During the research, it was noted that the development of digital signage systems is very interesting. These systems were developed with the rise of digitization in response to the need to communicate messages to a wide audience. Through an in-depth study of the subject, it was found that digital signage systems originated from signage. Signage allowed for easy and fast mass communication, and digital signage type systems have greatly facilitated the management of information transmission and displayed content using the latest technologies. In practice, carrying out this study allows us to understand the reality around us, to better shape the future by making more informed decisions about the design of digital signage systems, as well as to communicate information more effectively.

Through the research, it can be noted that it is not only the content of the message itself that affects the effectiveness of the message. External factors such as the noise surrounding an addressee or the context should also be taken into account. By context we can also mean the place and time of transmission of the message to an addressee. It can be concluded that when creating digital signage systems, the location of the screens is important, as well as the time at which the content is displayed.

6. Conclusions

In summary, the ability to communicate to a wider audience has come a long way. Nowadays it is widely used, but this required technological development, as well as proper education. Mass communication is used for a variety of purposes, whether to convey information, entertainment or, as is already being used extensively, for marketing. In addition, not only text or sound alone began to be transmitted, but many types of media at one time. Multimedia is widely used during mass communication, and with further development, information systems began to emerge to support the mass communication process and allow much more than before.

Nowadays, in order to be able to easily manage the information message and presentation of multimedia content, a suitable information system of the digital signage type is needed.

When creating messages intended for a wide audience, it is worth considering the factors mentioned that affect the effectiveness of the message. This will allow to increase the effectiveness of message.

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