

RESEARCH PLAN TO ANALYSE AND EVALUATE THE USE OF AI AND THE EFFECTIVENESS OF ONLINE MARKETING

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Abstract

The application of online marketing tools and artificial intelligence is fundamentally changing the way businesses operate. According to some sources, someone who is able to use and leverage artificial intelligence can make their activities even more efficient. With this research plan, the researcher can not only evaluate the use of artificial intelligence and the effectiveness of online marketing tools, but also get an answer to the question of whether artificial intelligence is used by those who develop their marketing activities effectively, or just the opposite? After the introduction, I formulate hypotheses that I illustrate in a research model. I define the method of analysis and sampling so that the study, which follows the positivist research philosophy, can be replicated and conducted by others.

Keywords: *research method, UTAUT, online marketing, acceptance and effectiveness*

1. Introduction

Digital solutions and the application possibilities of artificial intelligence influence the activities of marketers, which has an impact on corporate communications. According to my research, a comprehensive evaluation of the effectiveness and use of artificial intelligence has not yet been conducted in a single study. Based on a review of the literature, this study applies a research methodology based on hypotheses and following a positivist philosophy that can provide a foundation for smaller and larger scale research in addition to the national survey. The hypotheses include an assumption about the relationship between artificial intelligence and online marketing effectiveness that links the models created by several authors (Jain et al., 2022; Roy et al., 2017; Venkatesh et al., 2003).

2. Research methodology

The hypotheses and specific research model were formulated based on a synthesis of literature on the effectiveness of artificial intelligence, technology acceptance models, and online marketing, as well as findings from qualitative research. Although a significant number of dissertations and theses have been conducted to evaluate the tools and effectiveness of online and digital marketing, they have primarily approached the topic with a constructivist philosophy (Lockett, 2018), while those that focused on employees rather than companies used a positivist philosophy (Dharmappa, 2019; Mobydeen, 2021). Since this study aims to evaluate information about employees and marketers of specific companies in Hungary, the research philosophy used is positivist.

Since it is a positivist philosophy, several criteria were established for the research methodology. First, the role of the researcher is limited to collecting data and interpreting it objectively. This form of research has dominated the field of economics and management science for decades, as this philosophy is consistent with empirical views based on human experience. Thus, the researcher is not only independent, but also not guided by particular interests, and it can be said that it is a general rule to use a deductive approach (Crowther and Lancaster, 2008). According to the Summary of Research Methodology (2023), the research methodology based on positivist philosophy formulates hypotheses that are tested based on a detailed review of the existing theory. Researchers intend to verify or reject these hypotheses using a structured research methodology so that the topic can be re-examined in the future. Using Ramanathan's (2008) table, I would like to present the main approaches of positivist philosophy: The researcher must be independent, and human interests are irrelevant. The explanations must have evidential value for the cause-effect relationships you are trying to achieve through hypotheses. The concept is based on operationalisation and quantification, the measurability of which is a basic requirement, suggesting the reduction of units in the analysis and statistical probability calculations. In addition, it is necessary to conduct a random survey based on a large sample, for which Dharmappa (2019) used 74 marketers from 3 companies as a basis. These statements were confirmed by Caldwell (1980) and Alharahsheh and Pius (2020).

The quantitative phase of the primary research, which focused on questionnaires, drew on secondary sources, international and national scholarly articles, and information from the qualitative primary research. The research began with a review of the relevant literature, for the synthesis of which scientific papers and research were consulted that could be found on PubMed, ScienceDirect, GoogleScholar, ResearchGate, KSH, WHO, OECD, etc.

The questionnaire is primarily aimed at Hungarian marketers, although it is addressed to all marketers throughout Hungary, regardless of age and gender. The answers are anonymous, and participation is always voluntary. The questionnaire can be divided into four sections covering general questions such as demographics, aversion to artificial intelligence, technological acceptance of artificial intelligence, and perceived frequency of use and effectiveness of online marketing tools. The primary research questionnaire was created using the Google Form interface.

Researchers can choose from a wide range of sampling methods, the detailed investigation of which might require a separate study. In general, researchers distinguish between two types of sampling methods, namely random and non-random sampling methods (Taherdoost, 2016). One of the requirements for selecting the sample is that it represents the population in the research aspect. The usual method for this is random sampling (where, according to the sampling rules and regulations, each member of the population has an equal chance of being included in the sample (Bárczi et al., 2017)). The other sampling technique is non-random sampling based on non-probability. In this study, surveys are conducted from different sources, some random and some snowball, which can be classified as non-random sampling techniques. This is justified by the difficulty of reaching the target population.

Since the main purpose of the study is to assess the willingness to use artificial intelligence and its actual use, the concept of the study was developed using the Unified Theory of Acceptance and Use of Technology (UTAUT) model. I rated the variables of the model on a Likert scale from 1 to 5, where 1 means "I do not agree at all" and 5 means "I fully agree". Despite the random selection, the study aims to be representative and, as described in the "Characteristics of the sample", to interview at least 385 people. Statistical analysis is performed using SPSS 22.0 software, while path analysis is performed using AMOS in the case of CB-SEM and SmartPLS in the case of PLS-SEM.

In the following part, I present the quantitative research model, the hypotheses, and the methodology used in modelling structured sameness, followed by other important factors of the research, such as the sample.

3. Quantitative research model and its hypotheses

In accordance with the title of this publication, which examines the factors that influence the effectiveness of online marketing and artificial intelligence, I created my own research model after reviewing the literature by combining the models created by several researchers.

The first part of the model was taken from the section on technology acceptance from the article by Jain et al. (2022). The authors felt that a very important area of artificial intelligence acceptance should also be examined. Therefore, they also considered the dislike of artificial intelligence by including it in the UTAUT model. According to their assertion, the framework and social influence affect the perceived aversion to artificial intelligence, which affects the areas of expected effort and expected performance.

The second part of the model that incorporates aversion to artificial intelligence is the unified model of technology acceptance and use developed by Venkatesh et al. (2003), which incorporates several previously used behavioural and acceptance models. Regarding the newly developed model, Keszei and Zsukk (2017) cited only one drawback in their subjective evaluation, namely that the model is specific to employee technology acceptance. Since this paper focuses on interviewing these individuals and their acceptance of artificial intelligence as a technology, the application of the model becomes clear. The model uses several variables to explain the intention to use the technology in question as well as the actual use. Accordingly, facilitating conditions directly influence actual use, while social impact, expected required effort, and expected performance directly influence intention to use. Intention to use influences actual use. Moderating variables in the model include gender, age, and volunteerism.

3.1. Facilitating conditions

Facilitating conditions express the extent to which the user believes that both support and resources are sufficiently available to use the given technology in organizations (Venkatesh et al., 2003). According to Neslin and Shankar (2009), enabling conditions refer to the availability of sufficient resources and support for individuals. Kamaghe et al. (2020) pointed out that lack of help and support, as well as incomplete information and limited resources, uniformly prevent users from adopting technology. At the same time, older users tend to be more difficult to respond to new and complex information, which affects the technology learning process (Halili and Sulaiman, 2019), which I believe also affects the amount of support needed. Dwivedi et al. (2019) believe that the support and help, which are among the enabling conditions, can create a positive attitude towards a technology and thus reduce the reluctance to use artificial intelligence. In this study, the technical and organizational support of employees required for the use of artificial intelligence as a technology can be considered as a conducive condition.

H1a: Facilitating conditions have an effect on the aversion to the use of artificial intelligence.

H3: Facilitating conditions have a positive effect on the use of artificial intelligence in companies.

3.2. Social effects

Venkatesh et al. (2003) explained in their study of UTAUT that social impact means how the user's technological judgment is influenced by his social environment. That is, depending on the people who

are important to him, he should or should not use the new technology. Important people may include students, teachers, friends, classmates, and family members (Batucan et al., 2022). Some researchers have indicated that women are more sensitive to the opinions of others when adopting technology (Sripalawat et al., 2021). Van Esch et al. (2019) may classify fear of missing out (FOMO) as a social influence in technology adoption, while Dwivedi et al. (2019) discovered a positive relationship between social support and aversion reduction, like facilitating conditions.

H1b: Social influence has an impact on aversion to artificial intelligence.

H4: Social influence has a positive impact on intention to use.

3.3. Expected level of effort required

Simply put, expected effort indicates how difficult it will be to use a technology or system (Venkatesh et al., 2003). Rouidi et al. (2022) pointed out in his study that expected effort and perceived ease of use of the technology acceptance model (TAM 1) can be examined with the same predictors. These include existing knowledge, self-efficacy, compatibility with additional systems, etc. Accordingly, aversion to artificial intelligence affects all test factors.

H2a: Aversion to artificial intelligence has an impact on the expected effort on intention to use.

H5: Expected effort has a positive impact on the intention to use.

3.4. Expected effort

Expected effort is a measure of how well users believe that the given technology or system will help meet the needs and requirements related to their work (Venkatesh et al., 2003). Expected performance is the effect of the functional benefits of the given technology, even under uncertain conditions (Sewandono et al., 2023). Dwivedi et al. (2017) indicated in his study that a person who perceives a new technology as useful positively influences his or her attitude toward adoption.

H2b: Aversion to artificial intelligence has an impact on the effect of expected performance on intention to use.

H6: Expected performance has a positive impact on the intention to use.

3.5. Intention of use

In the UTAUT model, intention to use is indicated by several variables. Tomić, Kalinić, and Todorović (2023) believe that users with higher intention to use are more likely to adopt a new technology earlier than other users. They also pointed out that in most studies the effect of intention to use on usage behavior is reported as a positive and significant relationship.

H7: Intention to use has a significant, positive impact on actual use.

The second part of the paper, and thus the research model, examines online marketing tools and their effects on efficiency. Based on Cho and Khang (2006), Roy et al. (2017) created a framework for online marketing effectiveness that defines a total of 8 main areas that include additional sub-areas. These main areas include online marketing matters that can be interpreted as part of banner advertising, e-mail marketing, online sales promotion, and many other factors. Since the foundation of the framework was

established through a systematic literature review, the areas were defined based on the amount of research conducted. Thus, following the research of Teo (2005) I selected the online marketing tools within each domain on the basis that they fit some part of the AIDA model.

3.6. Online marketing issues

North and Ficorilli (2017) studied 22,978 banner ads and found that blue, 300 × 250 pixel, static banners performed better than red, larger, dynamic ads. They were able to demonstrate this based on click-through rate (CTR). White et al. (2021) looked at measuring attitudes and willingness to buy in relation to the ad – also taking into account the colours used in the ad. According to marketers, e-mail marketing as an online marketing tool helps the company on several levels. On a 5-point Likert scale, its effectiveness was rated as 4.5 for customer loyalty, 4.4 for sales promotion, and only 2.7 for brand awareness (Chittenden and Rettie, 2003). And Rahardjo (2022) proved that e-mail marketing can also be used to improve customer loyalty programs due to its individualization. Chang (2017) confirmed the hypothesis that there is a positive correlation between online sales incentives and purchase intentions. Shihab et al. (2022), using a questionnaire from the triad of sales promotions, advertising, and corporate image, found that the vast majority of respondents (85%) believed that sales promotions were the most appropriate tool to encourage repeat purchases. According to Johnson and Bharadwaj (2005), online marketing channels as the fourth highlighted tool make salespeople's work more efficient and improve overall customer satisfaction.

H8a: Online marketing tools have a positive impact on the effectiveness of online marketing.

Internet use, perceptions and attitude

Roy et al. (2017) approached online consumer behavior and willingness to buy online in practice in a way that examines the business-related activities of consumers with different behaviors and purchase intentions and personalities. Underpinning this information requires segmentation-based solutions from the online marketing toolkit, as new online marketing segmentation and targeting systems allow consumers to be grouped based on the criteria already listed Somosi et al. (2023).

H8b: Tools located in the thematic area of Internet use, perceptions, and attitudes have a positive impact on the effectiveness of online marketing.

Online shopping and e-commerce

In the case of e-commerce and online shopping, the online marketing effectiveness framework not only directly affects efficiency, but also the resulting business outcomes such as satisfaction, repeat purchases, and sales growth. This occurs through dynamic pricing in addition to customer feedback and purchase abandonment cited by the author. Hasan's (2013) study on e-commerce includes both challenges and solutions. Among the latter, he notes that e-commerce is not the same as a website, but rather a form of business that may have requirements for personalized advertising, discounts, integration capabilities with other marketing systems, and notifications, which is consistent with Roy et al. (2017) with factors that affect efficiency.

H8c: Tools that deal with online shopping and e-commerce have a positive impact on the effectiveness of online marketing.

Online communication issues

As described in the previous point, online brand equity, content, and communities impact not only efficiency but also the website, as they also manifest in its structure and associated interactivity. Customer loyalty, positive word-of-mouth, and resistance to negative corporate publicity depend on consumer behavior (Brogi et al., 2013), which is why online brand community has become a discipline that has been studied in depth. Chiang et al. (2008) explain the increase in the value of online brands by the reduction of physical connection due to the limitations of the electronic space and the more difficult control of product or service quality. The summary table of Charmaine (2022) points out the marketing-related effect of the content of different authors manifested in consumer behavior. For example, building a relationship, buying decision for a brand, increasing brand loyalty, increasing engagement, direct positive impact on sales, etc.

H8d: Web design, content, and perceptual tools have a positive impact on online marketing effectiveness.

Web design, content and perception

Everything that falls under the topic of online communication also applies to web design and content creation, because the effects in content marketing mentioned by Charmaine (2022) exist regardless of content placement. Sinha et al. (2020) approached the effect of websites on buying behavior with the trinity of colors, usability, and esthetics and suggested ways to optimize them. Saleem et al. (2022) discovered a positive relationship between website quality, satisfaction, and word of mouth in their research.

H8e: Web design, content, and perceptual tools have a positive impact on online marketing effectiveness.

Evolving online marketing tools

Roy et al. (2017) included among the evolving marketing tools those whose use in marketing is relatively little known. However, their development is undeniable. Among them is viral marketing, in which the company attracts the attention of consumers without using paid advertising. This is a significant change, because previously the media bought by the company did not interrupt the activity of consumers with advertising. Second, the value of viral marketing is perceived by consumers to such an extent that they change from passive readers to active disseminators (Golan and Zaidner, 2008). Hummel et al. (2012) examined the effectiveness of viral marketing using several key indicators: Follower growth, increase in number of visitors, click-through rate, interactivity rate. User-generated content helps achieve business goals on multiple levels. Gardan et al.'s (2022) study showed that they have a positive impact on purchase intent. As a result of their tourism-related article, they reported that consumer-created content has an impact on the destination selection process and destination image.

H8f: The tools used in the development of online marketing have a positive impact on the effectiveness of online marketing.

Social media marketing

Whiting and Willimas (2013) showed that 80% of social media users use it as a primary platform to search for information, be it deals, products, events, work, or personal motivation. According to Cahyani, et al. (2022), social media marketing has a positive impact on perceived quality, which also has a positive impact on purchasing decisions. Zheng et al. (2022) studied consumer engagement (watching, liking, commenting) in the context of live broadcasts and confirmed their hypothesis that users who show activity are positively associated with higher purchase intentions and customer acquisition.

H8g: Social media marketing tools have a positive impact on online marketing effectiveness.

Search marketing

One of the most researched topics is search engine marketing, after Google, the leader in Internet search, was visited 89.3 billion times per month (Oberlo.com, 2023). Traditional search engine optimization and paid search ad comparison were also covered by Weideman (2019). Among other things, he pointed out that these marketing tools have a different impact on consumer click intent and thus on click-through rate, bounce rate, conversion rate, revenue, and customer acquisition costs.

After discussing the framework, I will also briefly discuss the areas that impact efficiency and support them with literature sources, in addition to the same structure, the understanding of which will facilitate the successful conduct of qualitative and quantitative primary research.

H8h: Search engine marketing tools have a positive impact on online marketing effectiveness.

To reconcile the two domains, I assume a simultaneous, symmetrical relationship between the use of artificial intelligence and online marketing effectiveness. Accordingly, marketers who use artificial intelligence perform more effective online marketing activities, and those who perform effective online marketing activities are more likely to use artificial intelligence. The double arrow means correlation, but we cannot be sure which variable induces which variable or which variable occurs before which variable.

Correlation is used to measure the strength of the linear relationship. Accordingly, the correlation value is 1 if the two variables are directly proportional, 0 if there is no relationship, and if the two variables are also perfectly matched but the nature of the relationship is inversely proportional, then -1 (Schober et al., 2018).

H9: There is a relationship between the effectiveness of online marketing and the use of artificial intelligence.

The unified model of these variables and the relationships between them can be seen in Figure 1 below, which corresponds to the research model of this study.

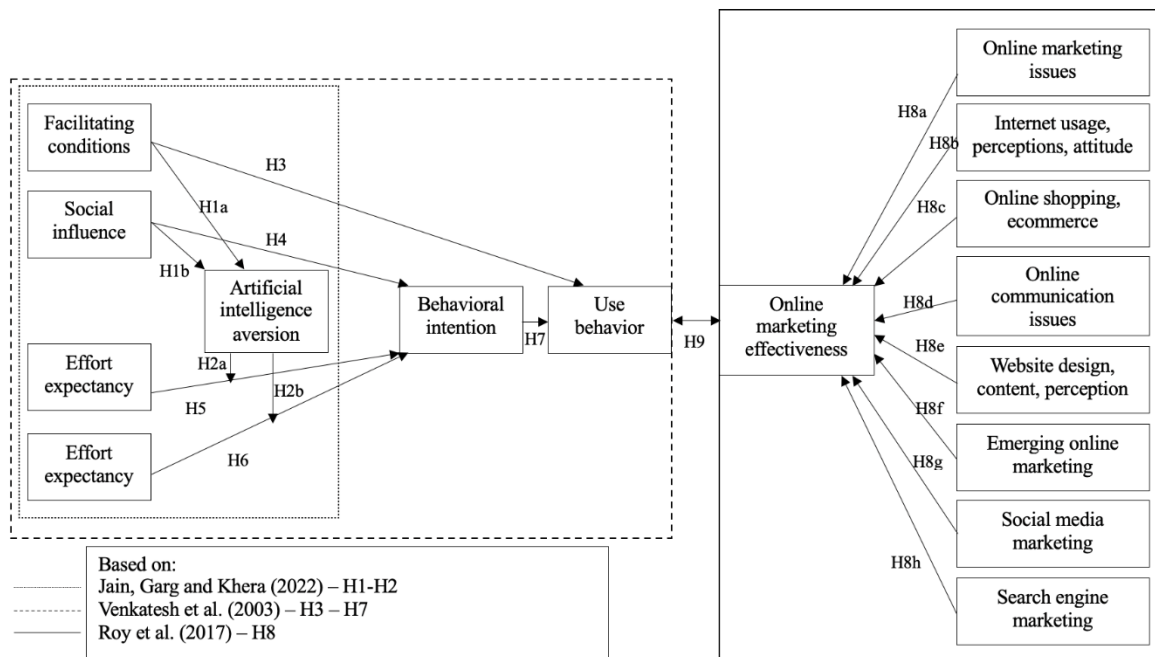


Figure 1. Research model
Source: Own editing

As Suhr (2017) puts it, the second step in structural equation modeling is to build the model. I reviewed relevant theory and research literature to support the specification of the model, which led to the formulation of hypotheses. The result of the level modeling of the second step can be seen in Figure 1. The model is based on three widely used and referenced studies that have examined aversion to artificial intelligence, acceptance of artificial intelligence technology, and factors that influence online marketing effectiveness. This study evaluates the intention and actual use of artificial intelligence by Hungarian marketers based on the perception of the effectiveness of tools in the areas of online marketing effectiveness. The result of the adoption and effectiveness study is the actual use and marketing effectiveness, between which I would like to determine the effect on each other by examining the correlation coefficient: does the use of artificial intelligence affect the effectiveness of online marketing? And do effective online marketers use more artificial intelligence?

4. Data analysis and validity

Münnich and Hidegkuti (2012) pointed out that a recurring problem with many studies from the field of psychology is that causal relationships cannot be established or cannot be established unambiguously. Structural equation-based models (SEM) provide a particularly good solution to this problem, as it is possible to model and study causal relationships between variables in a flexible and complex manner. Two variants are most commonly used, one is covariance-based structural equation modelling (CB-SEM) and the other is variance-based (partial least squares structural equation modelling – PLS-SEM)

(Kazár, 2008). In recent years, the importance of PLS modelling, which otherwise tends to take a back seat, has also increased, and both types are now regularly used by researchers (Kemény et al., 2023). Babin et al. (2008) and Hair et al. (2022) pointed out that the structural equation modelling method promotes reviewers' positive opinions of their respective publications because the method requires sound theory, and that SEM type methodology is increasingly represented in journals with a marketing theme, both approaches. Münnich and Hidegkuti (2012) examined the structural equation model, and, surprisingly to me because it is still helping to establish the research and modelling method, Fishbein and Fishbein and Ajzen (1975) chose the intended action model to introduce the method, which serves as the basis for technology acceptance models. The variables included in the model can be measurable and non-measurable or directly measurable variables. The former, where the measurement and unit of measurement are fixed, are called manifest variables, while the latter are latent variables. In the modelling process, a figure is created on which so-called path diagrams appear, expressing the relationship between cause and effect and showing the relationship between variables. The relationships between variables can be expressed in two ways, represented by arrows. Typically, the arrow pointing in one direction indicates a cause-effect relationship, while the latter expresses a symmetric correlation where variable A and variable B act in both directions (Chin, 1998; Kazár, 2008; Münnich and Hidegkuti, 2012; Fan et al., 2016; Deng et al., 2018).

Although the basic principles of the two methods, such as covariance and variance-based modeling with structured equations, are similar, it can even be said that their scope is relatively the same to determine many small particles, which is necessary and useful in the study for which Mohideen (2017) also summarizes the table. On this basis, I would like to present PLS and CB-based SEM as well as the differences between them in Table 1.

Table 1. Representation of the structured equation model

Statistical technique	PLS-SEM	CB-SEM
Criterion	Variance-based modelling	Covariance-based modelling
Software	Smart PLS	AMOS, LISREL
Model type	Forward indicator	Parameters
Distribution	Not parametric	Parametric
Sample size	30–100	100–800
Complexity	Above 5	50 indicators
Distortion	Possible distortions	Stable
Indicator for construction	1–2	3–4
Statistical test	Bootstrapping	Assumption
Measurement model	Formative and reflective	Only reflective
Quality of fit	SRMR and NFI	Many

Source: Mohideen (2017)

As the table of Mohideen (2017) shows, there are many differences between the two methods. One of the most important of these concerns sample size. According to this, a sample of less than 100 people should be approached with PLS, while a sample of more than 100 people should be approached with the CB-SEM method. Kemény et al. (2023) published his study on PLS-SEM to solve the methodological limitations and listed important changes and new approaches. The first approach aims to correct the

literature regarding sample size immediately. In the following list, I would like to present the appreciation of the modelling capabilities of variance-based systematic equations, highlighting some points: 1) Although PLS performs exceptionally well for models with a small number of elements, the standard error increases as the number of elements decreases, so this model alone cannot be uniquely evaluated. 2) In the case of PLS, it is also necessary to identify the model, whether the researcher uses a latent or a composite model. 3) Due to the improvements, a fit test can be performed not only with a bootstrap-based test, but also with the creation of specific indicators used in the covariance approach, using the SRMR method. 4) PLS approach can be used not only for latent constructs but also for established constructs. 5) PLS can also be used for reflective models, which is in line with Mohideen (2017). Further innovations and novel approaches show that both modelling solutions meet expectations in the context of study preparation and their selection can still be based on sample size. I came to this conclusion because although PLS has been freed from many limitations, the requirements and criteria related to CB-SEM have not been relaxed. Therefore, I can complete the method in the research phase if I can answer the number of responses received with a certain number after cleaning. If this number is below 100 responses, I use PLS-SEM, if it is above 100, I use the covariance-based approach CB-SEM.

5. Characteristics of the sample

The sampling procedure can be optimally carried out along predetermined steps. Several researchers have drawn attention to this and support the work of other researchers with descriptions (Nyitrai, 2009; Molnár, 2010). Defining the population has been identified as one such step. Since there is no quantified data on the number of marketers involved in this research in Hungary, an estimate of the population is needed. Among the different ways of estimation, the most effective method is a query within the LinkedIn Sales Navigator platform, which is used by many marketers. Pécsi (2017) wrote that the number of LinkedIn users in Hungary is 671,000, of which 10,780 work in marketing. To make a first estimate, I also performed the search that I present in Figure 2 below.

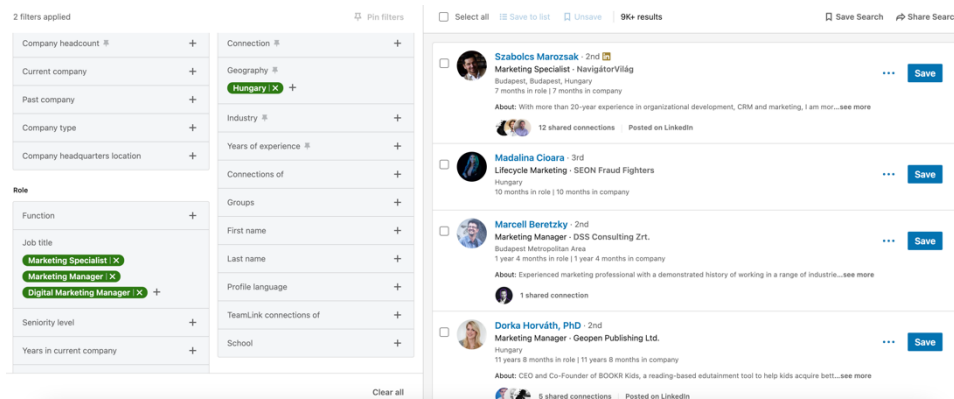


Figure 2. Number of social media marketers in LinkedIn

Source: Own editing (LinkedIn.com)

With the filtering options I chose, according to which the analysed person works in Hungary as marketing specialist, marketing manager and digital marketing manager, the population was more than

9,000 people. In accordance with the data of Pécsi (2017), his statements are correct, so this number represents the size of the population from now on.

The second step is to determine the sample size. There are many factors to consider when calculating the sample size, such as the size of the population, the purpose of the study, the characteristics studied, and the sampling method. The two most important factors affecting the sample size are the desired confidence level and the margin of error. In general, the higher the desired confidence level and the lower the margin of error, the larger the sample size. Following the methodology for the calculation of the sample frame, 385 respondents need to be interviewed with 95% confidence and 5% margin of error to maintain representativeness.

The questionnaire consists of four parts. The first part deals with the dislike of artificial intelligence, the second part with the acceptance of the technology, the third part examines the effectiveness and use of online marketing tools, and the fourth part is used to collect demographic data.

6. Resources (cost and schedule)

There are several costs associated with the research, which are listed below.

- Catering for the interviewees – Catering: 10 * 10,000 HUF
- Questionnaire survey:
- Purchase of databases: HUF 100,000
- Cost of personal contact – in case of subsidized interview: HUF 200,000
- Travel expenses: HUF 50,000
- Administrative costs: HUF 50,000

Thanks to the grants from the Miskolc College, some systems and programs are available free of charge, such as Microsoft Office, including Teams (for consultations), Word (for text editing), Power Point (for preparing presentations). The sole bearer of the costs is the author of the research.

7. Summary

The study, following the dissertation research criteria, highlights the research method that can and should be used to capture the factors related to the effectiveness of online marketing as well as the use of artificial intelligence. This article hypothesises based on the processing of the literature, which it attempts to clarify by presenting a model. The model adopts the work of three authors based on the framework of UTAUT model (Venkatesh, 2003), aversion to artificial intelligence (Jain et al., 2022), and online marketing effectiveness (Roy et al., 2017). The research methodology follows the structured equality model, which can use PLS-SEM or CB-SEM analysis depending on the number of respondents.

In the case of the research conducted in Hungary among Hungarian marketing professionals, the representative sample is 385 respondents out of a population of almost 10,700 respondents. The sampling is random and based on the snowball principle, as it is difficult to reach the target group, but the research can be conducted with a relatively small budget, even if several other methods are used.

The research model outlined is not complete. The following factors can be cited as limitations:

- The original models used for the research have additional limitations (for example, the UTAUT model is only suitable for interviewing employees).
- Moderating factors of the UTAUT model (age, gender, etc.) were not used.
- The online marketing framework of Roy et al. (2017) is based on a literature review and therefore does not necessarily reflect the online marketing tools used by practitioners.

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