UNIVERSITY OF MISKOLC
FACULTY OF ECONOMICS

ZOLTÁN SOMOSI

Enhancing and Assessing the Effectiveness of Online Marketing with Consideration of the Relevance of Artificial Intelligence.

Ph.D. Thesis

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1. Justification and Relevance of the Topic

Online marketing has undergone a radical transformation in recent decades, owing to the development of digital technologies and changes in consumer habits. Following the proliferation of the internet, the number of publications related to online marketing increased significantly (Cho and Khang, 2006), and studies post-1994 expanded not only in quantity but also in their investigative direction (Ghorbani et al., 2021). Initially, traditional marketing was merely supplemented by online tools; subsequently, these tools increasingly became dominant. According to the academic literature, new marketing forms are advanced versions of traditional approaches (Montague et al., 2015; Leung and Mo, 2019; Razimi et al., 2021; Morais and Rodrigues, 2024). The emergence of artificial intelligence (AI) has brought about another transformation in marketing (van Esch and Black, 2021; Potwora et al., 2024; John et al., 2024). Influenced by Industry 4.0, AI has been integrated into marketing processes, thereby facilitating personalization, automation, and the enhancement of customer experience (Jindal and Rohilla, 2024; Mohammed et al., 2024). In Marketing 5.0, AI assumes an increasingly significant role (Kotler et al., 2021; Ljepava, 2022; Hassan et al., 2024).

Enthusiasm for new technologies sometimes overshadows their role in effectiveness, making the definition and systematization of the full spectrum of marketing tools challenging (Vinerean and Opreana, 2021; Pura, 2013). One of the most comprehensive frameworks was created by Roy et al. (2017), based on Cho and Khang (2006), who identified the most significant areas through a literature

review. However, this model does not take into account the experiences of practitioners or the specific conditions within Hungary.

The investigation of AI acceptance and intention to use has long occupied researchers (Davis, 1985). One of the most prevalent technology acceptance models is the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), which is suitable for organizational surveys and, owing to its variables, possesses few limitations. As AI has exerted a significant impact on marketing, the question arises as to the extent of acceptance, usage intention, and actual use among Hungarian professionals.

In addition to assessing information on online marketing effectiveness and technology acceptance, the present study employs a hypothesis-based, complex research model to seek an answer to whether marketers who use AI perceive their activities to be more effective compared to their counterparts who reject it.

1.1 Structure and Objectives of the Dissertation

The doctoral dissertation investigates the effectiveness of online marketing and the acceptance of AI as a technology among marketing professionals in Hungarian

organizations. Its objective is to explore whether the use of AI is associated with online marketing effectiveness.

The research addresses four main thematic areas:

- The relationship between technology acceptance and marketing effectiveness in Hungary,
- The factors influencing AI acceptance among marketing professionals,
- The impact of AI on the success of marketing strategies,
- The ethical considerations of AI-based marketing.

The literature review presents the evolution of marketing, the impact of industrial revolutions on digitalization, and the role AI assumes in organizational activities. Among technology acceptance models, a critical evaluation and applicability analysis of the UTAUT model is conducted. This is followed by the conceptualization of online marketing and its effectiveness. Subsequently, an assessment is made of the factors influencing the effectiveness of tools used by Hungarian marketing professionals, enriched in each case by the potential application methods of AI and the presentation of original research results.

The qualitative part of the research is based on interviews with 7 Hungarian marketing professionals, employing thematic and comparative analysis. In the quantitative part, the responses of 497 marketing professionals are examined using Structural Equation Modeling (SEM). The hypotheses focus on AI acceptance and online marketing effectiveness, with the model being evaluated using fit

indices. The aim is to uncover the relationship between AI use and perceived effectiveness.

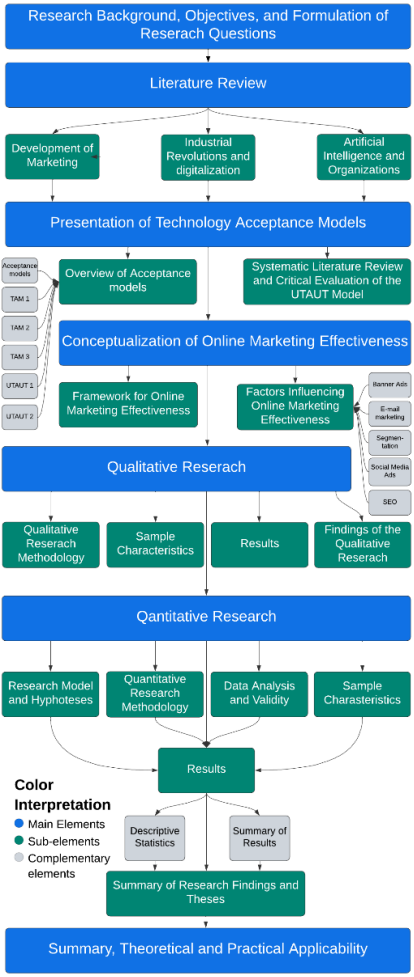

Figure 1.: Structure of the Doctoral Dissertation

Source: Own Compilation

2. Presentation of Hypotheses

Based on the literature review and qualitative interviews, the following seven hypotheses were formulated in response to the research questions.

H1: Facilitating conditions positively influence the use of artificial intelligence in organizations.

Facilitating conditions reflect the extent to which users feel that the necessary resources and support are available for the adoption of a technology (Venkatesh et al., 2003). According to Dwivedi et al. (2019), adequate support can foster a positive attitude and reduce resistance to AI adoption.

H2: Social influence positively affects the intention to use AI.

In their study on the UTAUT model, Venkatesh et al. (2003) defined social influence as the impact of an individual's social environment on their perception of a technology. Van Esch et al. (2019) identified fear of missing out (FOMO) as a component of social influence in technology adoption, while Dwivedi et al. (2019) found a positive relationship between social support and the reduction of resistance, similar to facilitating conditions.

H3: Expected effort positively influences the intention to use AI.

Difficulties encountered during technology implementation reduce the intention to use it (Venkatesh et al., 2003). Factors such as existing knowledge, self-efficacy, and compatibility play a role in this process (Rouidi et al., 2022).

H4: Expected performance positively influences the intention to use AI.

Expected performance refers to the degree to which a technology or system is perceived to meet work-related needs and requirements (Venkatesh et al., 2003). If an individual perceives technology as useful, their adoption level increases accordingly (Dwivedi et al., 2017).

H5: ***Usage intention has a significant, positive impact on actual usage.***

In the UTAUT model, several variables influence usage intention. Tomić et al. (2023) argue that users with a stronger intention to use AI are more likely to adopt new technology sooner than others.

H6a – H6e: The online marketing tool/channel under investigation positively influences the perceived effectiveness of online marketing.

The H6 hypothesis group evaluates the impact of various online marketing tools on effectiveness based on the perceptions of Hungarian marketing professionals. These include: Banner advertisements, email marketing, internet usage, perceptions, and segmentation opportunities, social media marketing, search engine marketing.

North and Ficorilli (2017) found that blue, 300x250 pixel static banners achieve higher click-through rates than red, dynamic ads. Chittenden and Rettie (2003) identified email marketing as effective for customer retention and sales but less so for brand building. Roy et al. (2017) highlighted that segmenting online consumer behavior based on personality types enhances targeting efficiency. Whiting and Williams (2013) noted that 80% of social

media users rely on these platforms for information-seeking. Weideman (2019) demonstrated that search engine optimization (SEO) and paid advertisements influence consumer engagement and conversion rates differently.

H7: AI users (USE) evaluate online marketing effectiveness at their workplace more positively.

By integrating both areas of research, a relationship is hypothesized between AI usage and online marketing effectiveness. This suggests that marketing professionals who use AI perceive their online marketing activities as more effective compared to those who do not.

2.2 Measurement Constructs and Applied Methods

The qualitative research is based on expert interviews with seven marketing professionals, aiming to map the adoption of online marketing tools and AI. The quantitative research examines the willingness to use AI and the perceived effectiveness of marketing tools using the UTAUT model and a five-point Likert scale. The analysis was conducted using Structural Equation Modeling (SEM), where due to the sample size and the formulated hypotheses, the CB-SEM method was applied within the SmartPLS system.

2.1 Sampling methods

The sampling was based on the estimated population of marketing professionals-the theoretical target population-(10,780 individuals, based on LinkedIn Sales Navigator and Pécsi, 2017). The minimum sample size (371 individuals) was determined using a standard calculation.

Data collection was conducted via an online questionnaire, which was distributed on professional platforms and through email inquiries. The actual sample size reached from the theoretical target population is 497 individuals, with an average of 10 years of experience and an average age of 37 years.

3. Qualitative and Quantitative Research Results

3.1 Qualitative Results

Seven Hungarian marketing professionals (from small, medium, and large enterprises) participated in the qualitative research; their interviews focused on online marketing tools and the future role of AI. The results confirm that from the perspective of customer acquisition and revenue growth, the critically important tools include display advertisements, email marketing, personalized targeting, social media, and search engine optimization.

According to the professionals' opinions, artificial intelligence has influenced their work in numerous ways. They perceive changes in their marketing strategies and operational activities primarily in the areas of automation and efficiency improvement, hyper-personalization and ad targeting, as well as content creation and optimization. Data privacy and ethical challenges, along with the division of labor and the human factor, were also mentioned in 4 and 5 conversations, respectively, indicating these are also concerns for the majority of respondents. Based on the expert interviews, marketers are paying significant attention to the integration of machine learning, predictive analytics, and automation, while

stricter data handling due to GDPR presents a challenge for them.

3.2 Quantitative Results

The research model examines technology adoption and online marketing effectiveness, based on the UTAUT model (Venkatesh et al., 2003) and the online marketing effectiveness framework (Roy et al., 2017). Online marketing tools were identified through Hungarian expert interviews and a literature review, incorporating only those deemed most effective.

The results indicate that the use of artificial intelligence is associated with the perceived effectiveness of marketing. However, no significant relationship was found between social influence and usage intention, making it justifiable to remove this component from the model.

Descriptive Statistics

The analysis of Facilitating Conditions (FC) indicates that marketers generally have the necessary resources to use AI, but a lack of system compatibility can pose challenges. The availability of support is a divisive factor.

The examination of Social Influence (SI) reveals that marketers are motivated by the expectations of their environment to adopt AI; however, limited support from senior management may hinder its widespread adoption.

Regarding Effort Expectancy (EE), respondents perceive AI as straightforward and learnable, but differences exist in the ease of acquiring the necessary knowledge.

The analysis of Performance Expectancy (PE) shows that AI is considered useful for improving performance, yet

there is uncertainty about whether it would lead to salary increases.

Behavioral Intention (BI) is generally positive, although variations exist concerning AI's daily integration into work processes.

Actual Usage (USE) is widespread, but AI is not considered an indispensable tool for everyone.

In assessing online marketing effectiveness, SEO emerged as the most effective tool, whereas banner advertisements were perceived as less impactful.

Aggregated Statistics

The reliability and validity of the model were assessed using Cronbach's alpha, composite reliability (rho_a, rho_c), and average variance extracted (AVE) values.

Cronbach's alpha measures the internal consistency of constructs; values above 0.7 are acceptable, while those exceeding 0.8 indicate good reliability (Hair et al., 2010). Composite reliability assesses the overall reliability of latent variables; values should be above 0.7 and are considered good if they exceed 0.8. AVE determines whether the variance explained by a construct's indicators exceeds the variance due to measurement error; for validity, AVE values must be greater than 0.5 (Hair et al., 2011; Fornell & Larcker, 1981).

Table 1.: Data Validity Analysis

	Cronbach's alpha (standardized)	**Cronbach's alpha (non-standardized)**	**Composite reliability (rho_c)**	**Average variance extracted (AVE)**
FC	0,860	0,859	0,770	0,546
EE	0,910	0,910	0,876	0,692
PE	0,846	0,834	0,984	0,687
BI	0,874	0,872	0,924	0,743
USE	0,806	0,802	0,668	0,502
OME	0,873	0,872	0,824	0,548

Source: Own Compilation

The Cronbach's alpha coefficient exceeds the minimum threshold in all cases. For facilitating conditions, a value of 0.860 indicates very good internal consistency. Among the other elements, the expected required effort reaches a value of 0.910, which corresponds to an excellent level of reliability. Both the reliability coefficient and the composite reliability level meet the desired minimum, with the lowest values observed in both cases for the effectiveness of online marketing. The expected required effort and the intention to use indicate particularly high reliability. The convergence variables also reached the minimum threshold, ensuring model fit.

To improve the level of fit, covariances between the measurement variables associated with the latent variables

were allowed during model development. The fit indices were determined based on the criteria outlined by Hooper et al. (2008) and Hair et al. (2010), with their acceptance ranges presented in Table 2.

Table 2.: Model fit indexes

Indicator	Threshold Value	Fit of the empirical model	Interpretation
χ^2 test p value		470,090	
χ^2 test statistic	≥0,05	≤0,01	Nem felel meg
CFI	≥0,90	0,967	Megfelel
GFI	≥0,90	0,922	Megfelel
NFI	≥0,90	0,947	Megfelel
RMSEA	≤0,08	0,055	Megfelel
TLI	≥0,90	0,956	Megfelel

Source: Own Compilation

During the analysis, multiple standard indicators were applied to assess model fit, serving as measures of model validity. One of the most widely used fit criteria is the Chi-square (χ^2) test statistic and its p-value. In this case, the p-value of the χ^2 test is ≤0.01. Additional indicators, such as the Comparative Fit Index (CFI), Goodness-of-Fit Index (GFI), Normed Fit Index (NFI), Root Mean Square Error of Approximation (RMSEA), and Tucker-Lewis Index (TLI), provide further insights into the quality of model fit (Hu & Bentler, 1999; Schumacker & Lomax, 2010).

Based on alternative fit indices beyond the χ^2 test (CFI, GFI, NFI, RMSEA, TLI), the model demonstrates an adequate fit.

The independent samples t-test examined the difference between genders (270 men, 227 women). The analysis did not show a significant difference for any of the variables tested (e.g., Performance Expectancy).

The one-way analysis of variance (ANOVA) examined the effect of professional experience (Junior, Medior, and Senior groups), the results of which establish that professionals with at least 4 years of experience perceived the capabilities and use of AI significantly more positively compared to their colleagues with less experience.

Results

During the model development, my goal was to achieve the best possible fit for the structural model. In the case of behavioral intention (BI), the R^2 value is 0.848, indicating that the independent variables in the model explain 84.8% of the variance in behavioral intention. This result suggests a very strong explanatory power.

Furthermore, for the effectiveness of online marketing, the R^2 value is lower at 0.712, meaning that the explanatory variables in the model account for 71.2% of the variance in online marketing effectiveness. In the case of actual usage, the R^2 value reaches 0.973, reflecting exceptionally strong explanatory power, with adequate stability and fit (Hair et al., 2017).

Figure 2.: The result of path analysis

Source: Own Compilation

3.3 Hypothesis Testing

H1: Facilitating Conditions (FC) Positively Influence the Use of Artificial Intelligence (USE) in Organizations

The study analyzed responses from Hungarian marketing professionals, where the facilitating conditions included resources (FC1), the availability of necessary knowledge (FC2), compatibility with existing systems (FC3), and the possibility of seeking assistance (FC4). The results indicated that the majority of marketers felt they had the necessary resources for using artificial intelligence (FC1). However, while the knowledge factor (FC2) scored lower, it still maintained a positive average. Compatibility with existing systems (FC3) received the lowest average score, suggesting that this area may require improvement. In contrast, the possibility of seeking assistance (FC4) had a high average value, though with relatively high variance. Based on the results of the quantitative analysis, H1 was accepted. The findings demonstrate that facilitating conditions positively impact the adoption of artificial intelligence (regression weight: 0.220, t-value: 4.720, p-value: ≤ 0.01) among the marketers in the sample. This result aligns with the findings of Venkatesh et al. (2003), who also identified a significant relationship between facilitating conditions and technology usage.

H2: Social Influence (SI) Positively Affects Behavioral Intention (BI)

An analysis of the various dimensions of social influence revealed that the opinions of important individuals (S1) and the group of people influencing marketers' behavior (S2) played a relatively minor role in technology adoption. Furthermore, support from senior management (S3) had

an even lower average value. Workplace support (S4) exhibited significant variance, indicating heterogeneity in organizational cultures and attitudes. The study did not confirm a significant positive relationship between social influence and the intention to use artificial intelligence. The regression weight was merely 0.006, with a t-value of 0.140 and a p-value of 0.889, indicating a non-significant relationship among the marketers in the sample. This result differs from the original UTAUT model's conclusions, where social influence was identified as a key factor in technology adoption.

To improve model fit, the latent variable for social influence and its associated explanatory variables were removed, as this factor did not exhibit significant explanatory power regarding behavioral intention. Additionally, the model did not demonstrate an adequate fit. After modification, the adapted UTAUT model showed appropriate fit indices, and the measurement and latent variables included in the model displayed strong explanatory power.

H3: Expected Effort (EE) Positively Influences Behavioral Intention (BI)

Respondents' feedback suggested that the use of AI was clear and comprehensible (EE1), with low variance, indicating that most marketers found AI applications easy to understand. The opportunities for learning artificial intelligence (EE2) were similarly well-rated, suggesting that the learning process is manageable. Ease of use (EE3) received uniformly positive feedback. The ease of acquiring knowledge (EE4) showed high average values, with slight variations. Based on the study's results, H3 was

confirmed. The findings indicate that expected effort has a significant and positive impact on behavioral intention (regression weight: 0.241, t-value: 4.540, p-value: ≤0.01) among the marketers in the sample. This result is consistent with Venkatesh et al.'s (2003) UTAUT model, in which expected effort was identified as a key factor influencing technology adoption intentions.

H4: Expected Performance (PE) Positively Influences Behavioral Intention (BI)

An analysis of the expected performance (PE) dimension in this study revealed that most marketing professionals strongly agree that artificial intelligence can be beneficial for their work, particularly in enhancing performance. Respondents indicated that AI usage could significantly contribute to faster task completion (PE2), although opinions varied slightly. The performance improvement aspect (PE3) also received a high average score with relatively consistent responses, suggesting that most professionals recognize AI's potential to enhance efficiency. However, regarding salary increase opportunities (PE4), respondents were more skeptical, reflected in a lower average score and higher variance, indicating that not everyone perceives direct financial benefits from AI usage.

H4 was confirmed, as expected performance emerged as the most influential factor affecting behavioral intention (regression weight: 0.676, t-value: 15.172, p-value: ≤0.01) among the marketers in the sample. This result fully aligns with the UTAUT model developed by Venkatesh et al. (2003), where expected performance was also one of the strongest predictors of technology adoption intention.

Behavioral Intention (BI) Analysis

Based on responses from Hungarian marketing professionals, it was found that the future use of artificial intelligence is widely intended in the industry. Most respondents agreed that they plan to continue using AI in the future (BI1). However, responses related to usage frequency (BI2) showed a slightly lower average score and higher variance, indicating that a smaller group of respondents is less inclined to integrate AI into their daily workflows. Despite this, the majority still plans to use AI frequently, with relatively low variability in their responses.

H5: Behavioral Intention Significantly and Positively Affects Actual Usage

The study results indicate that behavioral intention (BI) has a significant positive impact on actual AI usage (USE), as evidenced by a regression weight of 0.637, a t-value of 14.298, and a p-value of ≤ 0.01 among the marketers in the sample. This finding is fully consistent with the research by Venkatesh et al. (2003).

H6a – H6e: The online marketing tool/channel under investigation positively influences the perceived effectiveness of online marketing.

According to the H6 hypothesis group, the effectiveness of online marketing can be significantly enhanced through the application and use of various marketing tools. These include banner advertising, email marketing, segmentation and personalized ads, social media marketing, and search engine optimization (SEO). The data indicate that all these tools positively impact the success of marketing

campaigns, although their effects vary in magnitude and dimension. The results show that banner ads were perceived as the least effective, with an average score of 3.63, followed by email marketing with a slightly higher rating. Segmentation, social media marketing, and SEO scored higher, indicating greater perceived effectiveness.

H7: AI Users (USE) Have a More Positive Evaluation of Online Marketing Effectiveness at Their Workplace

The findings suggest that the use of artificial intelligence has a significant and positive impact on the perceived effectiveness of online marketing, as supported by a regression weight of 0.636, a t-value of 20.619, and a p-value of ≤ 0.01 among the marketers in the sample.

Summary of Hypothesis Testing Results

Table 3 presents the hypotheses of the dissertation, the decisions regarding their acceptance or rejection, and the theses associated with each hypothesis.

Table 3.: Results of Hyphotesis Testing

Hypothesis	Decision	Thesis
H1: Facilitating Conditions (FC) Positively Influence the Use of Artificial Intelligence (USE) in Organizations	**Accepted**	**T1.** In the sample of Hungarian marketing professionals studied, Facilitating Conditions-such as the availability of resources, the possession of adequate knowledge, system compatibility, and the opportunity to seek help-have a positive, significant relationship with the use of artificial intelligence within organizations. The more these conditions are met, the more probable the acceptance and actual use of artificial intelligence becomes within the surveyed sample.
H2: Social Influence (SI) Positively Affects Behavioral Intention (BI)	**Rejected**	**T2.** In the sample of Hungarian marketing professionals studied, Social Influence-defined as external pressure or influence on the individual-does not show significance in the acceptance of artificial intelligence within organizations. Based on the research findings, social pressure

		has less influence on use intention, particularly in environments where individual decision-making is dominant.
H3: Expected Effort (EE) Positively Influences Behavioral Intention (BI)	**Accepted**	**T3.** In the sample of Hungarian marketing professionals studied, Effort Expectancy-defined as the comprehensibility and ease of using artificial intelligence, as well as the simplicity of the learning process-exerts a significant and positive effect on Use Intention. The more straightforward the surveyed marketers perceive the use of AI to be, the more likely they are to use it.
H4: Expected Performance (PE) Positively Influences Behavioral Intention (BI)	**Accepted**	**T4.** In the sample of Hungarian marketing professionals studied, Performance Expectancy-that is, the utility and performance-enhancing potential offered by AI-exerts a significant and positive effect on Use Intention. The more aware the surveyed marketers are of AI's usefulness in their tasks, the more likely they are to use it.
H5: Behavioral Intention Significantly and Positively Affects Actual Usage	**Accepted**	**T5.** Use Intention exerts a significant and positive effect on the actual use of artificial intelligence among the sample of Hungarian marketing professionals studied. The stronger the professionals' intention to use AI, the greater the

		probability that they will actually apply it in practice.
H6. hypothesis group (H6a, H6b, H6c, H6d, H6e) The Examined Online Marketing Tools/Channels Positively Influence Online Marketing Effectiveness	**Accepted**	**T6.** Based on the perceptions of the surveyed Hungarian marketing professionals, the examined elements of the online marketing toolkit-such as banner advertising, email marketing, segmentation and personalization, social media marketing, and search engine optimization-were all positively associated with the perceived effectiveness of online marketing. Although the perceived impact of individual tools varied in this sample, every element studied contributed to a higher perception of effectiveness.
H7: AI Users (USE) Have a More Positive Evaluation of Online Marketing Effectiveness at Their Workplace	**Accepted**	**T7.** Based on the responses of the surveyed Hungarian marketing professionals, the use of artificial intelligence positively influences the assessment of online marketing tool effectiveness among the marketing professionals in the sample. Within this group, those who apply AI technology typically judge their online marketing activities to be better, particularly in the areas of personalized advertising and search engine optimization.

4. Answering the Research Questions

1. *The combination of technology adoption and online marketing effectiveness, particularly in the Hungarian context.*

A review of the literature indicates that technology adoption has primarily been examined from the consumer perspective, especially concerning the impact of AI-powered tools. However, in Hungary, limited research has explored the relationship between technology adoption and the effectiveness of online marketing. This dissertation addresses this gap by introducing a comprehensive model, which confirms a significant positive correlation between the application of artificial intelligence and the success of online marketing (regression weight: 0.636, t-value: 20.619, p-value: ≤0.0) among the marketers in the sample.

1. *Factors influencing AI adoption among marketing professionals, particularly in the Hungarian context.*

The literature review reveals that only a few studies have examined AI adoption, particularly using the UTAUT model in Hungary. International research (Kelm & Johann, 2024; Weber et al., 2024; Iyer & Bright, 2024) suggests that all factors of the UTAUT model play a crucial role in AI adoption. However, the findings of this dissertation indicate some deviations: while qualitative in-depth interviews highlighted that social influence is a key factor due to ethical and data security concerns, quantitative research did not support this claim (regression weight: 0.006, t-value: 0.140, p-value: 0.889). As a result, this factor was excluded from the final model. In contrast,

expected effort (regression weight: 0.676, t-value: 15.172, p-value: ≤0.01) and expected performance (regression weight: 0.241, t-value: 4.540, p-value: ≤0.01) remained significant influencing factors among the marketers in the sample.

2. *The impact of artificial intelligence on the effectiveness of marketing strategies, particularly in the Hungarian context.*

Artificial intelligence has a substantial transformative impact on marketing strategies, particularly in automation, predictive analytics, and decision-making (Razia et al., 2024; Ljepava, 2022). It facilitates the analysis of consumer trends and the development of personalized marketing solutions (Olena et al., 2024; Sherly et al., 2024). Although most studies examine this impact in a European context, this dissertation assessed the perspectives of Hungarian marketing professionals through qualitative interviews.

Experts indicated that AI has made marketing strategies more agile and data-driven, enabling faster decision-making. Its efficiency-enhancing role has led to cost reductions and campaign optimization, while targeted advertisements and personalized recommendations have improved conversion rates. However, opinions varied regarding the necessity of human oversight: some professionals support full automation, while others argue for strong human control. Overall, AI is playing an increasingly significant role in Hungarian marketing strategies, and marketing professionals anticipate long-term benefits.

3. *Ethical considerations of AI-driven marketing based on the perceptions of marketing professionals, particularly in the Hungarian context.*

Research indicates that AI-based marketing systems require large volumes of data, including personal information, raising data protection and GDPR concerns (Benjelloun & Kabak, 2024; Singh & Mishra, 2024). The risk of unauthorized acquisition and processing of sensitive information is also a critical issue (Altinigne, 2024). Additionally, biases in AI input data can distort outputs, potentially leading to discrimination and prejudice (Naz & Kashif, 2024; John et al., 2024).

While most studies examine these ethical issues from a consumer perspective, there is a lack of Hungarian publications focusing on the perceptions of marketing professionals.

4.1 Conclusions and Recommendations

According to the results of the qualitative research, the surveyed Hungarian marketing professionals agree that the human factor remains irreplaceable in marketing, particularly due to emotional intelligence, cultural sensitivity, and the formation of personal relationships. AI-supported tools are primarily used to replace routine tasks, while human control remains crucial in decision-making. They highlighted the rapid development of technology as the greatest challenge, which places pressure on organizations to adapt new technologies as quickly as possible, even amidst data privacy risks. The tightening of data protection regulations is generally evaluated as a disadvantage by professionals, as it may

limit AI effectiveness and the development of the consumer experience.

The research pointed out that the AI acceptance of the Hungarian marketers in the sample is primarily determined by Performance Expectancy, Effort Expectancy, and Facilitating Conditions, whereas Social Influence is not a determining factor. This contrasts with previous findings in the literature (e.g., Iyer and Bright, 2024), which suggest social support is crucial in managing ethical dilemmas. The effectiveness of the combined application of the identified online marketing tools and AI-based systems was confirmed by both the subjects of the qualitative interviews and by literature case studies, which also reported concrete ROI improvements. This relationship was supported by the quantitative data at the level of perception: the research verified that professionals in the sample who use artificial intelligence (USE) evaluated the perceived effectiveness of their online marketing activities significantly more positively.

The novelty of the dissertation lies in its examination of the relationship between AI and the evaluation of online marketing effectiveness using a complex model, verifying that marketers in the sample who utilize AI perceive their own activities as more effective. Its results not only serve to expand theoretical knowledge but also provide practical assistance to those working in HR and recruitment for considering AI knowledge as a selection criterion, as well as for supporting the implementation of AI systems. Significance and Practical Applicability of the Research Findings

The study of online marketing effectiveness and the adoption of artificial intelligence (AI) is a crucial topic in the current era of digitalization, holding significance not only for the academic community but also for industry professionals. The dissertation aims not only to address research gaps and support the Hungarian research community but also to provide valuable insights for organizations operating in Hungary and the professionals working within them. This knowledge is particularly relevant in a time when online marketing practices are continuously evolving, with new AI-based or AI-assisted systems emerging at an increasing pace. Within the framework of the Unified Theory of Acceptance and Use of Technology (UTAUT) model, the dissertation explores the factors influencing technology adoption, demonstrating under what conditions marketing professionals are more willing to accept and utilize AI.

The research findings offer concrete applications for integration, particularly for marketing experts, business executives, developers, and human resources professionals:

- **Marketing Experts:** Professionals should prioritize systems with a relatively low learning curve, allowing for easy knowledge acquisition and maximizing performance improvement with minimal effort. AI-based tools, such as automated email marketing systems or personalized communication platforms, can save time, energy, and costs while enhancing campaign effectiveness.

- **Business Executives:** The extent to which AI is adopted depends on the level of support provided within the organization. Beyond establishing the necessary infrastructure, offering training and development opportunities can significantly improve the acceptance of AI-based technologies.
- **Developers:** Insights from the UTAUT model suggest that maximizing user experience and expected performance is critical for system adoption. Thus, during development, emphasis should be placed on designing simple interfaces, intuitive functionalities, and real-time data visualization.
- **Human Resources Professionals:** AI adoption can positively impact online marketing performance, making it worthwhile to assess candidates' attitudes toward AI during the selection process. Furthermore, during implementation, effectively communicating both the benefits and the ease of use to employees can facilitate successful adoption.

Beyond these applications, the research findings indicate that AI-based systems enhance efficiency, leading to higher ROI. This aligns with the opinions of surveyed marketing professionals, who recommend early adoption to gain a potential competitive advantage.

5. References

The primary limitation of the research is the non-probability (convenience and snowball) sampling procedure, which, due to potential biases (e.g., self-selection, coverage error), precludes the generalizability of the results to the entire population of Hungarian marketers. A theoretical limitation is that the standard UTAUT model's "social influence" construct proved too general to measure the specific ethical and data security concerns identified in the qualitative interviews. Furthermore, the quantitative model was unable to measure the "human factor"-such as creativity, empathy, and strategic thinking-which was deemed irreplaceable during the qualitative interviews. These shortcomings, such as the lack of segmentation by region and company size, the neglect of the consumer perspective, and the cross-sectional data collection, designate the potential directions for development in future research.

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