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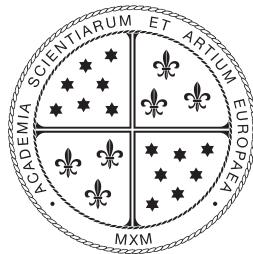
PROJECT MANAGEMENT, STRATEGIC COMMUNICATION MANAGEMENT, WEB AND INFORMATION TECHNOLOGIES

Peer-Reviewed Proceedings Book

Editors: Mladen Radujković, Božidar Veljković, Matej Mertik, Daniel Siter

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International Scientific Conference IT'S ABOUT PEOPLE 2024–2025

PEER-REVIEWED PROCEEDINGS BOOK: PROJECT MANAGEMENT, STRATEGIC COMMUNICATION MANAGEMENT, WEB AND INFORMATION TECHNOLOGIES

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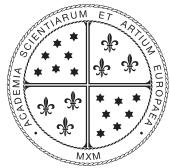
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ALMA MATER — PRESS —

The 12th and 13th Annual Conferences of Europe's Sciences and Arts Leaders and Scholars

International Scientific Conferences IT'S ABOUT PEOPLE

2024: In Service of Sustainability and Dignity

2025: Social and Technological Resilience for Health and Sustainable Development

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Maribor, 2026

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EDITORIAL INTRODUCTIONS

Project management has developed rapidly in recent years. Development is less about further optimising methodology or handling projects more efficiently, and more about improving forms of collaboration and the impact of new technologies, such as artificial intelligence, on projects and project management. This volume of conference papers presents a selection of research conducted at Alma Mater Europaea University and other research institutions. The research here is cutting-edge and highlights key trends and directions in project management that will undoubtedly be of interest to other researchers working in this field.

In the first article, Anna-Vanadis Faix and Stefanie Kisgen discuss the intersection between AI, quantum computing, and social resilience. The second article, by Salik Ram Maharjan, examines a particular phenomenon, namely projectification, and highlights its impact on social enterprises in Slovenia and Nepal. In the third article, Jaroslav Viglaský and Milan Fil'a examine technical solutions in the sharing economy as a tool for sustainable development. In the following article, Mario Protulipac and Jelena Kljaić Šebrek also highlight AI's contribution to sustainable project development, using a specific case study. Senzekile Mofok then discusses the application of AI using the example of a credit verification process. Finally, Reinhard F. Wagner, Karolina Novinc, and Mladen Radujković describe the results of a study on the impact of AI on the training landscape for project managers.

These articles clearly show the extent of AI's impact on our discipline and, at the same time, call for a redefinition of the role of humans in the digital age. This will certainly also be a topic of discussion in the following issues of these conference contributions to "It's About People." We hope you gain valuable insights from reading these articles and that they provide new inspiration for projects and the project management profession, serving the community and society at large in terms of development and well-being.

Assist. Prof. Dr Sc. Reinhard Wagner

Deputy Head of AMEU International Doctoral Study in Project Management

Prof. Dr Sc. Mladen Radujković

Head of AMEU International Doctoral Study in Project Management

The submitted foreword provides an overview of the papers from the programme/section Strategic Communication Management that were successfully presented at the international conference 'It's About People' in 2024 and 2025.

This edited volume brings together diverse research from the field of communication sciences that addresses current challenges of contemporary communication in digital and social contexts. Although thematically heterogeneous, the contributions share a common point of departure: a reflection on the role of communication as a key social process that shapes perceptions, attitudes, behaviours, and levels of trust among various publics.

The papers cover several research areas of communication, including digital and political communication, organisational and internal communication, crisis communication in the healthcare system, sociolinguistics of digital discourse, as well as socially responsible and ethical communication. Particular attention is devoted to communication in the online environment, with analyses of social networks, digital platforms, new media formats, and technologies that simultaneously offer new opportunities while raising ethical and professional dilemmas.

A common denominator of all contributions is the emphasis on the relationship between communication strategies and their reception among diverse groups, including students, social media users, patients, voters, employees, and the general public. The research highlights the crucial role of trust, transparency, and credibility in communication, especially in the context of health and social crises, political processes, media commercialisation, and issues of sustainability and human rights.

Methodologically, the volume combines theoretical analyses with empirical research based on surveys, questionnaires, and qualitative methods, thereby contributing to a better understanding of real communication practices and their effects. In this way, the volume positions itself as a relevant contribution to the development of communication sciences, offering scholarly insights and practical guidelines for improving responsible, strategic, and socially sensitive communication in contemporary society.

Assoc. Prof. Dr Božidar Veljković
Head of the Doctoral Study Programme Strategic Communication Management

We are living in a period of profound transformation. The rapid development of artificial intelligence represents not merely another technological advance, but a systemic shift with immersive consequences for society, comparable to earlier industrial and digital revolutions. AI increasingly permeates decision-making, healthcare, governance, education, and everyday life, raising fundamental questions about responsibility, trust, and the evolving relationship between humans and technology. These challenging times require not only technical excellence but also reflection, interdisciplinary dialogue, and a strong commitment to human-centred values.

Within this context, the Artificial Intelligence and Digital Technologies Department at Alma Mater Europaea University positions its research and study programmes at the forefront of applied AI development, while remaining critically grounded in ethical, societal, and educational perspectives. Our approach treats AI not as an isolated technical artefact, but as a socio-technical system shaped by human needs and cultural contexts. The contributions presented in these proceedings reflect this direction, presenting applied AI and digital technologies as instruments for responsible, inclusive, and meaningful innovation.

The *It's About People* Conference has grown into a vibrant academic community, bringing together doctoral researchers, students from bachelor's and master's programmes, and experienced scholars from diverse disciplines. This expanding community is clearly reflected in the 2025 edition. We hope that the research collected in these proceedings will not only inform readers but also highlight the importance of education and human-centred technological development in shaping a future where progress remains firmly connected to people and society.

Matej Mertik, PhD
Dean, Department of Artificial Intelligence and Digital Technologies

PROJECT MANAGEMENT

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PEOPLE MANAGEMENT WITH AN EMPHASIS ON RECRUITING EMPLOYEES IN THE POST-COVID ERA IN THE CATERING SECTOR: CASE STUDY CZECHIA AND SLOVAKIA

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ABSTRACT

The paper addresses people management in the catering sector, with a particular focus on employee recruitment in the post-COVID era. Its aim is to analyse the recruitment methods most affected by the COVID-19 pandemic, to identify the negative and positive impacts of the pandemic on people management in this sector in the Czech and Slovak Republics, and to compare the post-COVID situation in gastro businesses with the pre-pandemic period. The paper draws on statistical analysis of a survey conducted among key personnel responsible for people management in a sample of catering enterprises of various sizes and characteristics across the Czech and Slovak Republics. Our main findings highlight several key areas in which approaches to people management differ markedly between the two countries.

Keywords: COVID-19 pandemic, People management, Catering sector, Czech Republic, Slovak Republic

1 INTRODUCTION

The novel coronavirus that causes the disease COVID-19 appeared in early 2020 and has significantly changed global society (Parnell et al. 2020). The hospitality and tourism industry is vulnerable to social and environmental changes (Dube et al. 2021). The impact of the COVID-19 pandemic has demonstrably and most seriously hit the catering sector as it is reliant on close contact between individuals as part of its business model. The COVID-19 pandemic has severely affected the restaurant industry due to enforced closures and limitations on social gatherings, prompting restaurateurs to innovate and adapt to ensure their businesses' viability. The pandemic has also induced changes in our perceptions of safety in public spaces, necessitating the adoption of social distancing and more widespread use of online platforms for purchasing and communication (Chuah et al. 2021, Lo et al. 2023, Macháček et al. 2020). Businesses relying on close physical interactions have been forced to shut down, limit or change the nature of their operations (European Commission 2021). Widespread lockdowns with strict governmental interventions would probably be labelled as a pathological cause of recession (Greene and Rosiello 2020). While crises such as conflict situations have been found to negatively impact entrepreneurial intentions (Bullough and Renko 2013), in some ways, they can lead to resource voids that create opportunities for starting or changing businesses. Both management and employees have come together to craft ways for the business to survive during this long-lasting pandemic. During this crisis, companies found creative ways to utilize their core competencies, stretch the boundaries of their established business models, change the ways human capital relies on and utilize digital communication methods. Windows of opportunities that firms may use for innovating are opened by new basic technologies, such as digitalization, a new type of demand or a major shake-up of existing demand and opportunities created by public intervention (Dannenberg et al. 2020; Lee and Malerba 2017).

Although the Czechs announced the largest entrepreneurial support program in Europe (as well as Slovaks did) offering direct aid to entrepreneurs, loan guarantees, interest-free loans and wage subsidies for employees that were forced to reduce their work including a tax break package, the catering sector with its contact intensive-services has suffered a significant outflow of labour to 'less risky' sectors. It has become unattractive to many prospective employees at the expense of other, more stable sectors and attracting those who had been working in the sector for longer. One of the opportunities for re-entry to make the catering industry more attractive as a place of interest for the creative potential of job seekers, and at the same time regain the current high interest in operating of catering establishments, could be, except for change in approach to staff, paying attention to employees' motivation factors (Hitka et al. 2022), quality leader (Lee et al. 2017), attractive company culture, employer branding (Näppä 2023), owner's characteristics and hiring practices (Reda et al. 2010), also the employment of foreigners from Ukraine, who have been looking for almost two-years refuge in the Czech Republic and Slovakia from the war conflict in their country.

2 PURPOSE AND GOALS

The aim of the paper (case study) is analysing the ways of recruiting employees that were most affected by the COVID-19 pandemic, identifying the negative and positive impacts of the pandemic on people management in this sector within the Czech and Slovak Republics, and comparing the post-covidian situation in gastro businesses in terms of people management with the situation before the COVID pandemic. It focuses on methods of recruiting employees for gastro establishments, communication channels and technologies, key aspects of hiring employees, using new channels, reaching out to different generations, and ways of solving the lack of required personnel. Important aspects are preferences when compiling job offers, the preferred profile of applicants, experience with agency employees, and the employment of foreigners.

3 METHODS

The impact of the post-COVID era on people management in the catering sector with an emphasis on recruiting employees survey was conducted simultaneously in the Czech Republic and Slovakia between October 2022 and May 2023. The questionnaire consisted of three main parts - (1)

identification data (year of establishment of the company, number of employees and its operation in the Czech Republic or Slovakia), (2) socio-economic characteristics of the respondent and (3) a part concerning the influence of the post-COVID era on human resource management in companies in the field of gastronomy. The original data contained 317 companies, but not all files could be opened, so in the end, 303 companies were analysed, of which 274 were from the Czech Republic and 29 from the Slovak Republic. The socio-economic factors in the questionnaire included the type of gastronomic establishment and a job position. A basic overview analysis of the ratio outputs of quantitative research was prepared.

4 RESULTS

Regarding the age of the firms, the youngest firm had only one year of existence, and the oldest firm has been on the market for 63 years; the modus of the age of the firms was 8 years, the median value was 10 years, and the average was 12.6 years. The number of employees for firms ranged from 1 to 315. The median number of employees was 11, the modal value was 10 and the average number of employees per firm was 19.8 (i.e., 20).

Socio-economic factors included in the questionnaire included the job position and also the type of catering establishment. In the Czech Republic, most responders came from restaurants (39%), cafés (22%), pubs (10%), then bistros (8%), bars and other catering establishments (each 7%) and hotel premises (5%). In Slovakia, we interviewed mostly restaurants (45%), cafés and bars (17% each), bistros (10%), hotels and pubs (4% each).

In the Czech Republic, members of top management and responsible representatives (each 33%), line managers (13%), "cumulative job positions" (11%) and HR managers (7%) were most questioned. In Slovakia, most responders worked in a position of top management (38%), responsible representatives (31%), line managers and "cumulative job positions" (each 10%) and HR managers (7%).

It is interesting to compare the results of the negative vs. positive impacts of COVID-19 on people management (multiple choice):

- The most negative impacts:
 - More than 30% of Czech firms reported that they had experienced a general shortage of employees (similar to Slovak firms), that they had been forced to combine some positions (more than 40% of Slovak firms) and that they had been forced to use flexible forms of employment (more than 40% of Slovak firms);
 - More than 27% of Czech firms lost key and talented employees (almost 14% of Slovak firms); the same percentage of Czech firms reported that their employees' productivity had deteriorated (almost 50% of Slovak firms).
- The most positive impacts:
 - More than 50% of Czech firms reported that they had tested the loyalty of clients (almost 45% of Slovak firms).
 - More than 40% of Czech companies have taken up the pandemic as a challenge (more than 50% of Slovak companies), they have also started to use more information technology (almost 38% of Slovak companies) and they have found out how they are doing with the loyalty of their employees towards the company (more than 41% of Slovak companies).

The companies assessed the overall change in their human resources situation compared to the situation before the COVID pandemic as follows:

- Almost 45% of Czech companies felt that applicants were not interested in working in the catering sector, considering that it is a risky field for them (the figure for Slovak companies was more than 55%);
- More than 30% of Czech firms reported that there had been no significant changes (more than 41% of Slovak firms);
- More than 17% of Czech firms said they had problems filling some key positions (they felt their business was at risk); for Slovak firms it was more than 3%;
- More than 6% of firms said that they were unable to respond flexibly to the need to cover vacancies themselves (that is why they turn to agencies), for Slovak firms this was not the case for any firms.

Firms rated whether they were forced to change the way they recruited employees as follows (it should be noted that firms could choose more than one answer here):

- Czech firms reported (in order of top 3 by highest number of designations):
 1. That they communicate more on social networks (35.4%),
 2. they rely more on younger candidates (32.12%),
 3. they pay more attention to the opinion of customers (28.47%),
- Slovak companies have indicated (in order of the top 3 by the highest number of indications):
 1. That they pay more attention to the opinion of customers and, in the same proportion, they rely more on younger candidates (37.93%),
 2. they care more about the company's image (34.48%),
 3. they are trying to care more about their employees and in the same proportion they have started to survey customer satisfaction (31.03% recalculated).

It is interesting to see how companies use career portals, 18.61% of the Czech companies and 41.38% of the Slovak companies use them. Furthermore, only 0.73% of the Czech companies participate in job fairs, none of the Slovak companies. Only 16.05% of Czech and 10.34% of Slovak companies co-operate with schools and search for the most skilled graduates. 6.57% of Czech and 3.45% of Slovak companies cooperate with schools and contribute to the education of their future employees by supporting talents during their studies (scholarships, internships). 21.53% of Czech and 20.69% of Slovak companies have incorporated new technologies. Only 4.38% of Czech and 6.9% of Slovak companies use job sharing. Regarding making the company's conditions for attracting new candidates more attractive, 16.42% of Czech and 24.14% of Slovak companies answered positively.

To compare the answers of the surveyed companies from the Czech and Slovak Republics to the question of what they focus on when recruiting employees (again, more answers were possible, so the percentages are converted to the number of companies surveyed) we can obtain:

- Czech companies focus most (top 3) on:
 1. Verbal references/recommendations from friends (47.67%),
 2. recommendations from their employees (46.24%),
 3. they hire and train average employees (30.47%).
- Slovak companies focus most (top 3) on:
 1. Combination of internal and external recruitment (48.28%),
 2. word of mouth references/recommendations from friends and, in the same proportion, recommendations from their employees (44.83%)
 3. they also hire average employees and train them (41.38%).

The services of employment offices are used by 12.9% of Czech and 13.79% of Slovak companies. 16.13% of the Czech companies surveyed introduced a monetary reward for employees who recommended a worker who proved himself and stayed in the position for a longer period of time, in the case of Slovak companies it was 24.14% of companies.

School graduates are used by 20.43% of the Czech companies and 27.59% of the Slovak companies. Employment agencies are used by 10.75% of Czech firms and no Slovak firms. Headhunting is used by only 3.23% of the Czech companies and 17.24% of the Slovak companies. Czech companies use mainly advertisements in regional press (13.14%), advertisements in local radio (8.76%), printed job offers distributed to people's mailboxes in the area (6.57%). Slovak companies use advertisements in the regional press, advertisements in the national press and national TV stations (6.90%), advertisements in local press, advertisements on local radio and billboards (3.45%) and other forms are not used by the Slovak companies. Interestingly, 27.01% of the Czech firms surveyed use electronic submission of applications; in Slovakia, it is 31.03% of firms. Czech firms use the least national TV stations, video questionnaires (1.82%) and advertisements in the local press (0.36%, only one Czech firm responded positively). Regarding the use of social networks for recruiting employees, 24.09% of the Czech and 13.79% of the Slovak companies answered negatively.

Next, the questionnaire focused on the question of recruiting employees by generations X, Y and Z. From the results, it is clear that most of the surveyed companies focus on Generation Z (born in 1996-2010) when recruiting their employees, namely 48.54% in Slovakia, which is exactly 50% of

the companies. Only 9.85% of Czech and 5.56% of Slovak companies focus on the oldest generation, i.e., Generation X (born in 1961-1981) when recruiting employees. Generation Y, i.e., those born between 1982 and 1995, is targeted by 37.23% of Czech and 25% of Slovak companies. A total of 31.02% of Czech and 19.44% of Slovak companies said they target all generations.

Lack of required personnel the Czech firms try to solve by employing foreigners (17.88%), by using the services of employment agencies (14.6%) and other ways (7.3%). Slovak companies by using employment agencies (17.24%), employing foreigners (13.79%) and by conducting their own recruitment (3.45%). Considering the analysed data, it is clear that 57.66% of Czech and 65.52% of Slovak companies did not answer this question.

If firms are making a job offer to fill a desired job position (considering the possibility of multiple answers, percentages are converted to the number of firms contacted for the Czech Republic and Slovakia), then:

- Czech firms place the most emphasis on the positive overall impression that the candidate forms on the basis of the offer (47.81%), clear expression of all necessary requirements from the bidder (41.97%) and presentation of all the necessary requirements related to the nature of the job (36.5%).
- Slovak companies place the greatest emphasis on the positive overall impression that the bidder forms on the basis of the offer (51.72%), clear expression of all necessary requirements from the bidder (44.83%) and the bonuses (employee benefits) offered with the job (37.93%).

The results of the analyses show that the biggest difference between Czech and Slovak companies in this area is the transparency of the selection process, which is emphasized by only 7.66% of the Czech companies, while in Slovakia it is 27.59% of the companies.

The most important for Czech firms as a potential employer are: We prefer the youthfulness, vitality and creativity of the employee, whom we are happy to train (51.82%), we prefer expertise and professionalism (29.2%) and professionalism is supported by the number of years of experience (does not have to be expertise) and we value long years of experience, seniority, reliability and experience. Age is not a key criterion in the selection process (13.87%). The most important for Slovak companies is: We prefer the youthfulness, vitality and creativity of the employee, whom we are willing to train (68.97%), we prefer expertise and professionalism (27.59%), professionalism, which is supported by the number of years of experience (does not have to be expertise) (10.34%).

Czech and Slovak companies do not make much use of online interviews when selecting employees – 88.32% of Czech companies and 96.55% of Slovak companies. On the other hand, Czech and Slovak firms make the most use of unstructured, unprepared, authentic, intuitive face-to-face interviews when selecting candidates – 65.33% Czech and 58.62% Slovak firms. On the contrary, a structured, carefully prepared personal interview, allowing comparison of individual candidates, is used by 24.09% of Czech and 31.03% of Slovak companies. A surprising finding in the surveyed set was that the quality of available documents from applicants (such as CV and cover letter) is rated as important by only 0.73% of Czech firms (only 2 firms reported this) and none of the Slovak firms. The telephone interview is used by 12.41% of Czech and 10.34% of Slovak companies. Firms do not use psychological tests much either; only 1.46% of Czech and Slovak firms use them. Behavioural interview questions are used only by 3.65% of Czech and 3.45% of Slovak firms, and firms do not use stress situations much in interviews - only 3.28% of Czech firms and no Slovak firms use them. Concrete practical situations are then dealt with in the interview by 15.69% of Czech and 17.24% of Slovak firms. A practical test day is applied by 28.83% of Czech companies and 48.28% of Slovak companies.

The disparity of the survey results between Czech and Slovak companies can be seen in the approach to employees, whether employers have noticed in the post-COVID era the need to listen more to their employees - here 87.23% of Czech companies and only 3.45% of Slovak companies mentioned this need.

Agency workers are used by 83.94% of Czech and 79.31% of Slovak companies. If firms indicated that they use collaborative employment agencies, they encountered the following barriers/issues: Lack of information about employees, unreliability of employees, unsuitable candidates (not always competent candidates), agency staff are not willing to work and make excuses for the language barrier, they do not want to be accepted in a team. Only four Czech and three Slovak companies

reported no problems with agency applicants. One Czech firm said it is critical to set parameters for new employees so that no serious problems arise. The questionnaire showed that 36 (31 Czech (13.13%) and 5 Slovak (17.24%)) firms were satisfied with agency workers, 27 firms were not (25 Czech (9.12%) and 2 Slovak (6.89%)) and the rest of the firms did not answer this question.

Interestingly, 83.94% of Czech and 79.31% of Slovak firms use agency workers, and only 33.58% of Czech and 20.69% of Slovak firms confirmed their experience of employing foreigners, suggesting that not all agency workers are foreigners. The majority of foreign workers are Slovaks and Ukrainians, while companies employ Russians, Poles, and Indians; some companies also employ Italians, Ecuadorians, Nigerians, Japanese, Mexicans, and Spaniards. 58 firms (55 Czech and 3 Slovak) had a positive experience with employing foreigners - Ukrainians, 10 firms (9 Czech (3.28%) and 1 Slovak (3.44%)) had a negative experience. Regarding firms' experience with employing Ukrainian workers, 46 Czech (16.78%) and 2 Slovak (6.89%) firms reported that the most common problems and barriers included language barriers. Firms reported that they had to pay for language courses in order to adapt and integrate them into the work process (9 Czech (3.28%) and 2 (6.89%) Slovak firms), while firms also reported a longer adaptation process, communicating as much as possible, or arranging accommodation.

5 DISCUSSION

On average, companies from the catering sector from the Czech Republic and Slovakia that took part in our research were about 12.6 years old with an average number of employees of 20 per firm which is indicative of the fact that Slovak and Czech gastro firms are predominantly small in nature and fall into the category of small firms (up to 50 employees).

In the Czech Republic and Slovakia, the largest number of gastro establishments was represented by restaurants, while the smallest number of respondents were from hotels, pubs and bars. More than 30% of those responsible for HR are members of management and persons in charge; we asked the least about HR managers, who in the Czech Republic and Slovakia accounted for only 7% of respondents for people management.

The most negative impacts on people management were reported similarly by the Slovak and Czech companies - more than 30% of them had experienced a general shortage of employees. They had been forced to combine some positions, and they had been forced to use flexible forms of employment; more than 27% of Czech firms lost key and talented employees (almost 14% of Slovak firms); the same percentage of Czech firms reported that their employees' productivity had deteriorated (almost 50% of Slovak firms). 27% of Czech and Slovak firms surveyed had to resort to employee benefits.

As for most positive impacts, more than 50% of Czech firms reported that they had tested the loyalty of clients (almost 45% of Slovak firms), more than 40% of Czech companies have taken up the pandemic as a challenge (more than 50% of Slovak companies), they have also started to use more information technology. They have found out how they are doing with the loyalty of their employees towards the company (more than 41% of Slovak companies).

The most significant overall change in human resources situation of the Czech and Slovak gastro establishments compared to the situation before the COVID pandemic is that they felt that applicants were not interested in working in the catering sector, considering that it is a risky field for them (45% of Czech firms, 55% of Slovak ones). More than 6% of Czech firms said that they were unable to respond flexibly to the need to cover vacancies themselves (that is why they turn to agencies), for Slovak firms this was not the case for any firms.

As for changing the way the companies in gastro recruited employees, more than 35% of Czech ones communicate more on social networks and about 32% of them rely more on younger candidates. Slovak companies pay more attention to the opinion of customers and, in the same proportion, they rely more on younger candidates (almost 38%) and in almost 35% of them, they care more about the company image.

Using career portals is popular with more than 18% of the Czech companies and about 42% of the Slovak companies use them. No Slovak companies participated in the job fairs and more Czech (16%) than Slovak companies (10%) cooperate with schools and search for the most skilled graduates.

About 20% of Slovak and Czech companies have incorporated new technologies. Slovak companies (24.14%) try to make their corporate environment more attractive than Czech ones (16.42%).

When recruiting people Czech companies focus most on verbal references (recommendations from friends) – more than 47%, recommendation from their employees and they hire and train average employees. In case of Slovak companies during a recruitment process they focus most on combination of internal and external recruitment (in more than 48% cases), word of mouth references / recommendations from friends and also from their employees; and they also hire average employees and train them. The service of the employment offices is used in both countries at the same level (almost 13% of companies). More Slovak companies (more than 24%) than the Czech ones prefer a monetary reward for employees who recommend a worker who proved himself and stayed in the position for a longer period of time. School graduates are used more in the Slovak companies (almost 28%). Almost 11% of Czech firms use employment agencies, no one Slovak firm. Headhunting is much more popular in Slovakia (more than 17% compared to Czech 3.23%).

As the recruitment channels, Czech companies prefer advertisements in regional press (more than 13%), advertisements in local radio, printed job offers distributed to people's mailboxes in the areas, billboards and advertisements on local TV. In Slovakia the gastro companies prefer these recruitment channels: advertisements in the regional press, in the national press and national TV stations (almost 7%), then advertisement in local press, on local radio and billboards and other forms. Gastro companies in Slovakia use more electronic submission of applications than in Czechia (31% to 27%) and this positive trend also causes use of social networks for recruiting people.

Although a total of 31% of Czech and almost 19.5% of Slovak companies said they target all generations when recruiting employees, from the results it is clear that most of the surveyed companies focus on Generation Z (born in 1996-2010) when recruiting their employees (exactly 50% of the companies). Generation Y (born between 1982-1995) is targeted by 37% of Czech and 25% of Slovak companies and generation X, the oldest one (born between 1961-1981) is targeted by only 9.85% of Czech and 5.56% of Slovak companies.

Lack of personnel required the Czech companies solve by employing foreigners (almost 18%), by using the services of employment agencies and other ways. Slovak companies use employment agencies (more than 17%), employ foreigners and realize their own recruitment.

If firms are making a job offer to fill a desired job position, then Czech firms place most emphasis on the positive overall impression that candidate forms on the basis of the offer (almost 48%), clear expression of all necessary requirements from the bidder and presentation of all the necessary requirements related to the nature of the job. In Slovakia, positive overall impression that candidates forms and clear expression of all necessary requirements from the bidder are on the same level comparing to Czechia, but the third most important condition are bonuses (employee benefits) offered with the job (almost in 38%). The results of the analyses show that the biggest difference between Czech and Slovak companies in this area is the transparency of the selection process, which is emphasized by only 7.66% of the Czech companies, while in Slovakia it is 27.59% of them.

The most important things for the companies as potential employers are consistently in both countries: prefer youthfulness, vitality and creativity of the employee, whom they are happy to train (almost 69% in Slovakia to 52% in Czechia), preferring expertise and professionalism (27.6% in Slovakia to 29.2% in Czechia). The answer considering preferences of professionalism is supported by the number of years of experience (13.87% in Czechia to 10.34% in Slovakia). The biggest difference is between the value of long years of experience, seniority, reliability, and experience (13.87% in Czechia to 6.9% in Slovakia).

Czech and Slovak firms use unstructured, unprepared, authentic, intuitive, face-to-face interviews when selecting candidates (65.33% Czech to 58.62% Slovak firms). A structured, carefully prepared personal interview, allowing comparison of individual candidates, is used by 24.09% of Czech and 31.03% of Slovak companies. The quality of available documents from applicants is rated as important by only 0.73% of Czech firms and none of the Slovak firms! Concrete practical situations are dealt with in the interview by 15.69% of Czech and 17.24% of Slovak firms. Practical test day is applied by 28.83% of Czech and 48.28% of Slovak companies.

Agency workers are used by almost 84% of Czech and about 79% of Slovak companies. The most frequent barriers to using collaborative employment agencies were noticed: lack of information about employees, unreliability of employees, unsuitable candidates (not always competent), agency staff are not willing to work and make excuses for the language barrier, they do not want to be accepted in a team. 13% of the Czech and 17% of the Slovak firms were satisfied with agency workers; 9% of the Czech and almost 7% of the Slovak firms were not. Not all agency workers are foreigners. The majority of foreign workers are Slovaks and Ukrainians, while companies employ Russians, Poles, Indians, Italians, Ecuadoreans, Nigerians, Japanese, Mexicans and Spaniards. More Czech than Slovak firms have a positive experience with employing foreigners. In terms of the firm's experience with employing Ukrainian workers, the most common problems and barriers included language barriers. The firms paid for language courses in order to adopt and integrate them into the work process, which caused a longer adaptation process, intensive communication and arranging accommodation.

6 CONCLUSION

In many areas, the solutions to the problems related to the impact of the COVID-19 pandemic on the catering sector in the Czech Republic and Slovakia are similar, which confirms the proximity of these now two independent republics and, at the same time, the similar corporate culture of their catering sector. Nevertheless, it is clear from our survey results that there are significant differences in this area, which point to the trends that the catering sector in both republics is following in the post-COVID era.

Our results show a more positive attitude of Slovak gastro entrepreneurs towards the impact of the COVID-19 pandemic on their business. Using career portals is much more popular in the Slovak companies than in the Czech ones. On the contrary, participating in the job fairs is more popular among the Czech firms. More Czech companies cooperate with schools and more Slovak companies try to make their corporate environment more attractive than Czech ones. Lack of personnel required the Czech companies solve by employing foreigners, but Slovak companies use more employment agencies. The biggest difference between Czech and Slovak companies according to our results is the transparency of the selection process, which is much more emphasized in Slovakia. A quality of available documents from applicants is rated as important less than 1% of Czech firms and no one of Slovak. Next area with a significant difference is the most important thing for the companies as potential employers – Czech companies value more long years of experience, seniority, reliability and experience than Slovakia. We hope these results will serve as a foundation for educators, business owners – employers, employees and other stakeholders involved in doing business and people management in catering sector and are able to influence their plans, strategies and trends in the coming period.

Although this study provides valuable insights into post-COVID developments in the Czech and Slovak catering sectors, several areas merit deeper investigation. Future research could examine longitudinal data to track how recruitment practices and employer-employee expectations evolve over time, particularly as both labour markets continue to adjust to demographic and technological changes. Qualitative studies – such as interviews with managers, employees, and vocational schools – could enrich understanding of the cultural and organisational drivers behind the identified differences. Comparative research with other Central European countries would also help determine whether the observed patterns are unique to the Czech Republic and Slovakia or part of broader regional trends. Finally, future studies could explore the role of digitalisation, employer branding, and changing employee preferences in shaping the competitiveness and resilience of the catering sector in a post-pandemic economy.

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2025

FROM 'DIGITAL FIRST' TO 'DIGITAL FOR PEOPLE': LEADERSHIP AS AN INTERFACE BETWEEN AI, QUANTUM COMPUTING AND SOCIAL RESILIENCE

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ABSTRACT

The world we live in is becoming increasingly fast-paced. New (technical) innovations are constantly creating competitive pressure on the market and for organizations. New technologies, such as AI-systems, are already having a far-reaching impact on our lives. And we have barely entered the digital age when the quantum computer (QC) will soon have a lasting impact. At the same time, humanity is facing key challenges such as the climate crisis and political instability. In our presentation, we want to focus on the interface between the technical innovation of QC, AI and leadership. After all, technical innovations offer a wide range of possible applications and are a tool for meta-innovation. However, not every 'novelty' is necessarily a blessing. Our main thesis is therefore: Technological innovation and its potential for meta-innovation requires more innovation quality and therefore leadership. Leadership therefore is always determined by normative aspects and should place an increasing focus on ethical aspects to drive (technological) innovations forward in a right manner. This quality should be determined by the well-being of individuals and the creation of value in society (not purely profit or GDP). An increase of normative (and ethical) aspects of leadership can thus lead to an increase in social-technological resilience.

Keywords: Technological revolution, Meta-innovation, Disruptive innovation, (Ethical) Leadership, Social welfare

1 INTRODUCTION

The world we live in is becoming increasingly fast-paced and is characterized by technical innovations and advances. Above all, artificial intelligence (AI) systems and applications are changing our everyday lives but also markets and business structures (Carbon et al. 2021, 175). This effect will be further amplified in the near future by the quantum computer (QC). These developments are already leading to increasing pressure for technical innovation and faster market response. Companies that use AI are already achieving a significant competitive advantage over those that do not (Mainzer 2020). Corresponding forecasts can be made for the application of QC and its intelligent combination with AI (*ibid.*). Any company that wants to hold its own must be able to keep up in the long term.¹ This process is self-sustaining because AI and QC are not only highly disruptive innovations but also serve as tools for meta-innovations. Within a company, executives are crucial for the application, implementation, and utilization of technical innovations (Oke et al. 2009; Hagedorff 2020). Corresponding effects arise solely from market processes and directly impact the area of leadership. For example, Smith and Green (2018) consider AI as a new follower of a leader, as well as workplace shifts and new challenges that arise from them. Huchler et al. (2020) question the human-centered design in this context. In contrast, Pfeifer et al. (2022) examine the influences of AI on leadership in a holistic approach. Delponte (2018), on the other hand, integrates AI directly into a vision-centered approach to leadership (conceptually defining).

Bourton et al. (2018), Hougaard and Carter (2024) hypothesize that AI can produce better leaders by making them more creative, innovative, and transformative – AI thus contributes to significant advances in the field of leadership. However, the question remains as to how this opportunity can be best utilized by leaders in the light of AI and QC, and what this means in the field of leadership. In other words, when will leadership become "better" in the context of current technological developments, and what demands will have to be placed on leadership in this regard? Because it is precisely in the context of meta-innovation and the enormous potential associated with it that more and more problems arise. Contrary to the usual market paradigm, innovation does not always promote prosperity and is not associated purely with positive effects.² Rather, a consideration of industrial revolutions shows that they are also associated with negative external effects (see Nasrudin 2011; Faix 2023). With increased pressure and potential for innovation through technological developments, the question of the quality of an innovation in terms of the choices of action of leadership in the company becomes central. For example, approaches such as those of Qwaider et al. (2024) and Malti (2024) raise the question of ethical leadership in the light of AI, but not against the background of decisions to act on innovation. They argue that AI at least suggests the possibility of increased normative aspects of the task of leadership. However, more in-depth analyses with regard to normative specifications are lacking. So the question remains: What normative requirements arise from AI, QC and their potential for meta-innovation with regard to innovative action decisions in the leadership area of businesses? The central thesis of this article is that, in the age of AI and QC, the quality of innovation depends crucially on the normative orientation of leadership, which must integrate ethical considerations and the creation of social values in order to ensure sustainable technological progress and the resilience of society.

2 PURPOSE AND GOALS

The aim of this paper is to analyze leadership at the interface of AI, QC and the resulting decisions on how to act in terms of innovation. The following main theses will be argued: (T1) On the one hand, the world is becoming more and more fast-paced and AI, QC and their intelligent combination

- 1 For a specific breakdown of the debate, see the factors of competition that AI can be used to specifically reduce costs and increase speed in companies: Cockburn et al. (2019, 119).
- 2 The consequences of the negative effects of innovations only become directly apparent through the consumption of human energy and resources, as described by Lange et al. (2023). They are also indirectly linked to the so-called risk tipping points, which are reached when a social system can no longer bear risk factors. See UNU EHS (2023). Furthermore, the negative consequences of technical innovations become apparent indirectly (through energy consumption, etc.). See WEF (2022) and IPBES (2019).

increase the pressure to innovate in the market and create potential as meta-innovations. Meta-innovations are (usually highly) disruptive innovations that, when used correctly, can produce further innovations (network). (T2) On the other hand, innovations often not only have positive effects, but also negative externalities. For example, although constant innovation increases people's standard of living and provides better employment opportunities, it also leads to bottlenecks in resource use and environmental pollution (Nasrudin 2011). In view of these negative externalities, there is also evidence (especially in industrialized countries) of an increasing shift in market demand towards greater sustainability and social aspects.³ The pressure on companies to take these aspects into account is also increasing, and management must incorporate this into their decisions – also in the context of trust and credibility (Edelman Trust Barometer 2017). (T3) Within the increased innovation potential and pressure from AI, QC and meta-innovations and market developments, the focus on management's decisions to act in this regard is growing. Within the management task, it is therefore important to ask the question of a possible quality of innovation, instead of just always being (incrementally) innovative. This quality is to be generated in the sense of a smart future with better possibilities for quality of life, as already argued by Lee and Trimi (2008, 1) and to be expanded in the light of technological developments.⁴ This is done on the basis of Sen (2003). (T4) On this basis, it should be shown that the quality of an innovation and thus the leadership and its decisions for action are to a large extent shaped by normative (ethical) aspects. Consequently, more (actual) leadership is needed instead of pure management.

3 METHODS

In order to demonstrate the stated objectives and formulated theses, a qualitative approach was chosen that follows a literature study design. In conducting the literature review, a philosophical and analytical orientation was applied, with the purpose of systematically exploring concepts and normative frameworks rather than undertaking direct empirical testing. The results and forecast presented in this paper are therefore based on a critical and interpretive engagement with existing primary and secondary sources, which serve as the data corpus for analysis (Creswell 2009). The review was carried out systematically across peer-reviewed journals, conference proceedings, and selected industry reports published between 2000 and 2025. Database such as Google Scholar, JSTOR, and SpringerLink were consulted and keywords included "AI and leadership", "quantum computing and innovation" and "ethical leadership". The inclusion criteria required a clear relevance to technological innovation, leadership, or normative frameworks. Exclusion criteria involved works focusing solely on technical or engineering aspects of AI or QC without explicit reference to innovation, leadership or the normative dimension.

The assumption guiding this methodical approach can be summarized as follows: (1) that the current literature adequately covers the most important developments in AI and QC; (2) that leadership theories can be meaningfully linked to technology-driven innovation processes; and (3) that normative and ethical aspects of leadership remain underrepresented in current innovation models and therefore require analytical elaboration. Based on these assumptions, inductive reasoning was used to identify trends and forecasts for AI, QC, and their combined potential as meta-innovations (in relation to T1 and T2). The data was compared and coded according to thematic categories, which allowed recurring patterns and conceptual relationships to be identified.

On this basis, deductive reasoning was used to extend the analysis to the normative determination of innovation quality and leadership (in relation to T3 and T4). The approach thus combines inductive insights from the literature with a logical-deductive framework to justify the need for normative-ethical leadership. At the same time, the study follows a thematic investigation and reflexive

3 For more information, see, for example, Statista (2017) or Transfair (2017) for data in Germany. This is also reflected in political pressure, as discussed by Cormier et al. (2005). An analysis of this pressure for more sustainability and sociality in corporate innovation decisions (beyond Germany) can be found in Hall and Vredenburg (2003).

4 The idea that innovations are characterized by their effects on the well-being of society as a whole can already be found in Drucker (1993). Aspects here are to be understood in social, ecological and technological terms, but do not follow a holistic understanding of well-being.

categorization (Alvesson and Skoldberg 2000), ensuring that both empirical descriptions of AI and QC developments and their normative implications are systematically linked. This combination forms the theoretical basis for the central question of when leadership through AI and QC becomes "better" leadership and why such an improvement requires a normative orientation.

Despite the systematic approach, several limitations and restrictions must be taken into account. First, the analysis is qualitative, interpretative, and philosophical in nature, which means that it does not claim to be empirically generalizable. Second, the use of existing literature carries the risk of bias, particularly in favor of Western and European academic traditions, which may result in diverse cultural or regulatory perspectives not being taken into account. Third, the lack of large-scale longitudinal data on real-world QC applications limits the predictive power of the arguments. Consequently, the analysis should be viewed as a conceptual investigation rather than an empirically verified model. Future research should therefore build on these analytical foundations and conduct empirical investigations. Three directions are particularly promising: (a) empirical testing of the proposed relationships between leadership quality and normative innovation outcomes in organizational contexts; (b) broadening the scope beyond Western perspectives to include comparative analyses of leadership and innovation in different cultural and regulatory contexts; and (c) combining literature-based analyses with mixed methods such as surveys, interviews, and case studies to link conceptual and empirical perspectives. Such extensions would help to validate, refine, and contextualize the theses presented here and provide a more comprehensive understanding of how AI and QC interact with leadership in shaping innovation quality. In summary, the methodological orientation of this study is grounded in a philosophical-analytical literature review and this analytical stance allows for the development of theoretical arguments and the formulation of normative proposition about leadership and social-technological resilience.

4 RESULTS

The relevant literature illustrates the development of AI and QC without contradiction. AI already has a broad and indispensable influence on our daily lives and many corporate structures. Especially in recent years, the understanding of AI has shifted from "narrow" to "broad" to "general" and now encompasses machine learning and neural networks (Argrawal et al. 2009; Heil 2021). Many automated decisions can and are already being taken over by AI because they can map selection processes across broad data analysis and processes (Kleesiek et al. 2020). The enormous developments in the field of AI in recent years are mainly due to the increasing computing power, but also to the ever-increasing availability of data itself (Cockburn et al. 2019, 199). On the one hand, this enables companies to save costs and speed up processes. On the other hand, it means that the company itself is more likely to be innovative as a result.⁵ The quantum computer will greatly accelerate this effect (see IBM, 2023; Brooking Analysis 2023). Calculating with qubits instead of normal bits increases performance and application enormously.⁶ This not only enables QC to perform calculations much faster, but also to solve complex tasks with multiple variables (Mainzer 2020; McMahon 2007). This prognosis emerges also from a review of the literature concerning the question of the use and application of quantum computing in a specific company.⁷ So while there may not yet be any quantum advantages, there is already quantum utility (Bogobowicz et al. 2024). While the former predict the advantage of QC over conventional systems in the near future, the latter points out that QC is current-

5 One example is the ENN Group, which uses an automated AI platform to support its employees in their daily work with features customized to their individual needs (ENN Group, 2024). Watson and its AI technology also enabled the company Woodside, for example, to reduce its research time by 75% (Watson, 2024).

6 While normal bits can always represent one state [0] or the other [1], qubits can be in both states and infinite states in between at the same time.

7 For example, Kossman et al. (2023) show open-shop scheduling in the sense of optimization problems with QC. While Stühler et al. (2023) present benchmarking for price forecasting. Other examples include the use of QC at Bosch for material design and the industrialization of quantum sensor technology (Bosch 2025), the development of better aircraft surfaces at Boeing (Boeing 2023), the development of chemical designs and hydrocarbons, the simulation of small molecules (JSR 2023), and the global route planning of merchant ships (ExxonMobil 2023).

ly already producing comparable results to those of conventional systems with limited computing power and error approximation (Kim et al. 2023, p.500; Chouwdhury et al. 2024).

These developments are increasing the pressure on companies and their management to innovate and compete (Iansiti and Lakhani 2023; Gebauer et al. 2011; Kindström 2010). On the one hand, this is due to the direct effects of AI and QC (IBM 2023; Chuckburn et al. 2019). On the other hand, this results from the possibility of meta-innovation of AI and QC, as well as their intelligent combination.⁸ They are not only highly disruptive in themselves, but also a means of creating further innovations or even networks of innovations.⁹ As a consequence, this means that not only is the world becoming increasingly fast-paced, but it is also constantly progressing within the range of innovations (Carbon et al. 2021). However, this is not always exclusively positive: as already indicated, innovations give rise to a number of negative externalities associated with pollution and energy use, as well as other factors related to population growth, etc (Nasrudin 2011; Faix 2023). An overview of positive and negative factors of innovation can be summarized as follows, based on Witt (2003) and Nasrudin (2011) across industrial revolutions:¹⁰

Figure 1: Positive and negative effects of innovation.

Positive effects:	Negative effects:
Goods available in abundance & variety	Increasing social problems in urban areas
More job opportunities & higher labour product.	Environmental pollution & resource depletion
Better education standards & health care	Wealth gap & structural unemployment
Increase national income & opportunities	Increase imports of raw material, goods etc.
Rising standard of living & human rights	Negative foreign investment effect
Trade balance improvement	Worker exploitation
More qualified workforce & -place	More stress & less family time

(Source: Authors.)

So far, the following effects can be summarized: The pressure to innovate in companies is increasing, but they also have an increasing number of innovation potentials and orientations (meta-innovation). On the other hand, awareness of negative external effects for innovations and requirements for them is increasing (Statista 2017; Transfair 2017; Danciu 2013; Gualandris and Kalchschmidt 2014). Both effects are related, and AI, QC and meta-innovation thus intensify social and sustainability issues. Since these questions about innovation and its direction fall within the specific remit of a company's leaders, and since leadership has the greatest influence on innovation in the company (and indeed makes it possible in the first place), the issue here is specifically an increasing problem of decision-making regarding action on innovation potential in the management area itself.

In the abundance of potential for innovation (meta-innovations) and the forecasts presented, it is helpful to provide a suitable concept that can map and summarize the requirements. If leadership is to be good, it must be innovative and guide it accordingly. There is a wealth of literature on theoretical models of social innovation and responsible innovation (RI). However, these are usually rooted in political and legal systems and do not reflect the issues at the interface between AI and QC. If a decision is to stand up to prevailing market terminology, it must be pro-competitive. An approximation of this can be found in Faix et al. (2015), in which innovation quality is defined as a concept across all social levels as a field of management activity (internal and external). The important aspect here is that an innovation can only be successful if it is also realized and creates value in the long term in the

⁸ This connection can be aligned directly by coupling AI to the computing power of QC, as well as indirectly by using quantum algorithms in conventional AI (Klaus et al. 2023; Abdelgaber and Nikolopoulos (2020); Rawat et al. (2022).

⁹ One example of this is the intelligent use in the development of antibiotics and other new medicine.

¹⁰ The effects mentioned of increased social and sustainable demand due to increased awareness of global effects (see Chapter I) reinforce the effect in their consequence on companies and the perception of them. It should also be noted that AI and QC can, depending on the application and consumption, promote or not promote sustainability.

society. Accordingly, quality is determined by value creation and requires goal-oriented leadership. Since Drucker (1993) and other approaches in economic tradition already define innovation in this broader context, the definition does not appear to be one-sided or contrary. The approach of Sen (1997 and 2013) and/or Nussbaum (2013) can provide an important concept that can be used here for the extended purpose of the evaluation. The concept criticizes the GDP in distribution issues and contrasts it with the capability approach.¹¹ The central insight is that well-being or value creation must be understood in normative terms: in the sense of the consequences for all those affected and an indirect social consensus (see e.g. Nida-Rümelin 2019). Well-being per se is then neither purely economic nor completely contrary, but dependent on various normative determinations of this sociality (*ibid.*). Initial studies show that this also brings long-term competitive advantages through corporate orientation and is not a contradiction in terms (Spitzeck et al. 2009).

Since AI and QC are seriously increasing the pressure for innovation, making it more difficult for management to implement and align innovation, and further fueling it through further market processes, the innovation quality defined in this way is an initial fundamental methodology that can take management further and reduce the negative external effects of innovations. In the sense of the extended definition of this quality, an orientation towards normative factors – including leadership – is indispensable. This requires more leadership and also more ethical leadership (Faix et al. 2020; Ciulla 2014). More leadership and, above all, ethical leadership (however this is then further described in detail) is necessary because the implementation of innovations and the setting of innovation goals is to be understood in terms of leadership qualities (by definition): more motivational, disruptive, visionary goals and conditions, instead of targeting organizational, coordinative factors of the classic management area (Drucker 1993 and 1994). Both the classification of normative factors in one's own actions and their implementation in an organization or company are processes that take place in a social environment and require appropriate leadership in their implementation and realization (instead of management). The developments towards an increased importance of these processes demand more normative leadership aspects and more leadership per se (in the definitional sense). If we want to shape new technologies for people rather than chasing after the market processes of technical innovations, we need leadership in this sense and leadership based on normative standards. This prevents a valueless progression of the fast pace, negative external effects for all and can, on the other hand, strengthen social-technological resilience (through value creation and meaningful selection mechanisms).

5 DISCUSSION

Key points that suggest themselves in the context of the development of an approach towards an increased need for (normative-ethical) leadership and a model of innovation quality in the light of developments in AI and QC require a concluding discussion. On the one hand, there is a wide range of concepts of value creation in a social context, as well as countless models of well-being that take into account factors (beyond pure GDP growth; see e.g. Doyal and Gough 1991). A discussion of these has so far remained open and is due to the broad application of the capabilities approach and GINI index, as well as his argumentative conviction. However, since the approach is defined in terms of innovation and leadership, it would be questionable whether an extended examination and consideration would be meaningful at all. Factors here would be, if derivable from empirical testing. At this point, therefore, there is a need for more extensive debates that provide practical models for action with concrete instructions. However, it should also be noted at this point that more of leadership – in the context under discussion – is oriented towards open situations and cannot specifically prescribe actions (creative and disruptively innovative action). A fundamental discussion can also be found in the concept of innovation, since there are countless definitions and models available here alone and they are discussed inconsistently (Kisgen 2017). The analysis is based on the original definition by Schumpeter (1911), which is taken up again in most modern definitions. She also determines the basic definition of leadership uses here.

¹¹ Concrete formulations of these forms of empowerment can be found in the GINI index. See, for example, Federal Statistical Office (2015). Whereby expanded conditions would have to be applied depending on the innovation question in the corporate context against the background of innovation questions.

A further debate in this direction, which was only briefly touched upon, would be the agreement of the discussed normative references of innovation and current approaches of *Responsible Innovation* (RI, see e.g. Ruggiu 2019). In a business context, the main focus of RI is on the specific implementation and models for implementation (Lubberink et al. 2017). The concept is based on the assumption that innovations will be produced that are socially desirable and ethically accepted (Sutyliffe 2011; Von Schomberg 2013), which are usually seen in juxtaposition to the traditional growth objectives, profit maximization and competitive advantage (Owen et al. 2013; van den Hoven et al. 2014). IR should initiate a paradigm shift in this regard and the proximity to the model presented can be seen in the factors (Timmermans, 2020). However, the RI approach always describes a political and legal link in juxtaposition to the traditional economy, and the prognosis from the perspective of AI and QC is difficult to integrate in the sense presented (Genus and Iskandarova 2018). The most important factor in the context of the discussion, however, would be how to define a social consensus or, in general, a consensus within a society. The above consideration indirectly suggests references to *collectively rational decisions* here. However, this is more difficult to implement from a global perspective, since political and legal conditions should not be ignored. It remains unclear, however, how this could be integrated into leadership decisions (without being queried). This is precisely why the normativity of the approach and the ethical conditions of leadership are so important and would ideally be self-regulating (Ciulla 2014, 13).

6 CONCLUSION

In summary, it became clear that forecasts and current developments in the field of AI and QC require more leadership, but above all leadership that takes normative (and ethical) aspects into account. This applies at least when technological innovations are to be used in a targeted manner—in the sense of the long-term orientation of companies on the market and thus also of the law firm and its well-being. Only in this way can innovation be successful as a management task in the long term, mitigate negative external effects, and be driven forward through vision, creativity, motivation, and targeted implementation. From a normative perspective, leadership then relates to the law firm and the well-being of all those affected (at all levels). Well-being cannot be defined purely in economic terms but must take into account fundamental normative aspects and a variable social consensus. Finally, it should be mentioned here that a more conceptual definition of leadership and ethically and normatively oriented leadership go hand in hand (Ciulla 2014). The central thesis of this article is therefore that the quality of innovation in the age of AI and QC is not determined solely by speed or efficiency, but by the normative orientation of leadership decisions. Future research should empirically test whether such normative orientations in leadership actually promote higher innovation quality and socio-technological resilience in different organizational and cultural contexts. From a practical perspective, the central recommendation is that managers should introduce framework concepts for innovation quality that explicitly integrate ethical and normative criteria and ensure that AI and QC innovations serve the well-being of society and do not merely follow market-oriented imperatives.

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1.08 Objavljeni znanstveni prispevek na konferenci
Published scientific conference contribution

INVESTIGATING THE PROJECTIFICATION OF SOCIAL ENTERPRISES AND ITS IMPACT ON SOCIAL ENTREPRENEURS(HIP): A COMPARATIVE STUDY

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ABSTRACT

This paper presents a comparative study examining the impact of projectification on social enterprises (SEs) within the distinct institutional contexts of Nepal and Slovenia. Using a qualitative methodology to analyze nine SEs (five from Nepal and four from Slovenia), the research identifies a clear contrast in outcomes shaped by the institutional frameworks. Strong EU funding, participatory governance, and coherent policies in Slovenia enable SEs to balance project flexibility with long-term stability. Conversely, in Nepal, fragmented support, donor dependency, and inconsistent funding necessitate a strategic shift towards short-term projects, which risks mission drift and jeopardizes sustainability. The analysis reveals a "projectification paradox," where projects foster innovation while threatening organizational stability, particularly in fragile ecosystems. The study's main contribution is to highlight the vital mediating role of institutional structures. It concludes with practical recommendations, proposing blended finance for Nepal and localized funding for Slovenia to enhance the sustainability and social impact of SE in diverse contexts.

Keywords: Projectification, Social Enterprises, Social Entrepreneurship, Comparative Study, Social Impact

1 INTRODUCTION

The modern organizational landscape is increasingly characterized by "projectification", a pervasive trend where work is organized around temporary, short-term projects rather than permanent hierarchical structures (Kuura 2020; Fred and Godenhjelm 2023b). This phenomenon has profoundly impacted the social economy, fundamentally reshaping how social missions are pursued, funded, and implemented, raising critical questions about long-term sustainability and public policy (Jacobsen 2022). While project-based approaches are lauded for fostering innovation, agility, and responsiveness (Lundin 2016), a growing body of research highlights their significant downsides, including a shift in focus from long-term objectives to short-term deliverables, an increased administrative burden, and the potential for mission drift (Maylor and Turkulainen 2019; Huaricallo and Lean 2024).

This paper examines the dualistic impact of projectification on social enterprises (SEs). The European Union defines SEs as "operators in the social economy whose main objective is to have a social impact rather than make a profit for their owners or shareholders" (European Commission 2022). These organizations strategically blend social missions with market-based economic activities to address persistent societal challenges (Yuangiong et al. 2022). However, the operationalization of this model and its complex interaction with project-based work are not uniform; they vary considerably across different institutional and policy environments.

To explore this nexus, this study employs a comparative analysis of two markedly different contexts: Slovenia, a European Union member state with a structured, supportive ecosystem, and Nepal, a developing nation with a nascent and donor-driven landscape. Slovenia benefits from robust institutional support, clear legal frameworks, and access to coherent European Union funding streams (SENS Network 2020; OECD 2023). In stark contrast, Nepal's ecosystem is fragmented, lacking clear definitions and policies for SEs, which results in high donor dependence and operational instability (Gautam and Rupakhety 2021; Dangol et al. 2022).

This research argues that the benefits and drawbacks of projectification are not inherent but instead depend critically on the surrounding institutional framework. It posits a "projectification paradox," wherein projects can simultaneously act as catalysts for innovation and as sources of strategic fragility. Through a qualitative study of nine SEs, we demonstrate how the macro-level institutional context from Slovenia's EU-aligned policy coherence to Nepal's donor-driven fragmentation shapes the micro-level lived experiences of social entrepreneurs, influencing their capacity for innovation and their pathways to sustainability.

2 LITERATURE REVIEW

2.1 The Concept and Evolution of Projectification

Midler (1995) first defined "projectification" as the trend of organizing work through temporary, goal-oriented teams rather than permanent structures (Midler 1995; Fred and Godenhjelm 2023b). While it promotes innovation and agility, it also introduces significant risks to sustainability by creating resource dependence and shifting focus from long-term strategic goals to short-term deliverables (Maylor and Turkulainen 2019; Huaricallo and Lean 2024). This issue is especially serious in aid-dependent settings, such as Nepal, where excessive reporting pulls resources away from primary missions (Dial 2025).

2.2 Social Entrepreneurship. A Global Perspective

Social entrepreneurship (SE) is a market-oriented approach to solving social issues, catalyzed by global movements such as Ashoka and Grameen Bank (Hotcubator 2017; Gupta et al. 2020). It combines business strategies with social objectives, often engaging marginalized groups (Zahra and Wright 2015; Saebi et al. 2018). Two predominant models exist: the European Model (EMES), which combines economic activity with a social mission and participatory governance, and the American Model, which prioritizes market-based social innovation (Hotcubator 2017; LEED 2025).

2.3 Comparative Analysis of Projectification

2.3.1 Projectification in Slovenia

Slovenia's projectification is highly institutionalized, driven by EU frameworks, such as the European Social Fund (Jalocha and Jacobson 2021). This results in a formalized model characterized by: (a) EU-mandated funding requiring complex budgeting and reporting (Government of the Republic of Slovenia 2014); (b) hybrid operations that supplement core activities with temporary grants, creating dependency (OECD 2023); (c) high professionalism in project management and impact frameworks like SROI (Hojnik 2020); and (d) strategic integration of EU projects into their operational DNA (European Commission 2022).

2.3.2 Projectification in Nepal

Nepal exhibits a transitional projectification shaped by post-conflict and post-earthquake international aid (Khanal and Weber 2017). Its model is defined by: (a) donor-driven agendas from organizations like the World Bank and USAID, which compel the use of tools like the logical framework (Smith 2021; Karkee and Comfort 2016); (b) a structured, project-based approach to scale impact across geographic challenges (ILO and FNCCI 2025); and (c) the fusion of global project models with community-owned approaches to create unique hybrids (K.C. and Ghimire 2021). Slovenia's EU-backed stability contrasts with Nepal's vulnerabilities and may provide insights for future governance reforms (Lundin 2016; Jalocha and Bojtanowska 2016).

2.4 Social Entrepreneurship. A Comparative Overview of Slovenia and Nepal

2.4.1 The Slovenian Ecosystem

Slovenia has a clear legal framework for SEs, overseen by the Ministry of Economy, Tourism, and Sport, which grants access to benefits and public procurement (OECD 2023). Support organizations like SEN and the Social Enterprise Network for Training (SENT) offer advocacy and capacity-building services. Financial mechanisms include start-up subsidies from the Slovenian Enterprise Fund and EU funding streams (Slovenian Enterprise Fund 2024). A national impact measurement model helps attract investment (LEED 2025). Challenges remain in securing growth capital and simplifying administration.

2.4.2 The Nepalese Ecosystem

Nepalese SEs emerged to address poverty and service gaps, often initiated by donor-funded projects (Rai et al. 2025). Government support includes the Social-Economic Development Plan (SEDP) and the Social Entrepreneurship Act (2014) (Adhikari and Sharma 2022; Government of Nepal, Ministry of Finance 2021). Funding is provided through programs such as the Micro-Enterprise Development Program (MEDP) and Microfinance institutions. A vibrant support network of incubators (e.g., Daayitwa) and NGOs exists. The ecosystem's growth hinges on improving infrastructure, policy implementation, and access to larger-scale investment (Omidyar Network Fund 2022; Nirdhan Utthan Bank Limited 2022).

2.5 Opportunities and Challenges at the Intersection

The impact of projectification is dualistic and shaped by national context. For Slovenian SEs, opportunities include access to structured EU funding, enhanced organizational capacity, strategic financial hybridity, and a contextual impact measurement framework (Hojnik 2020; Wu et al. 2020). Challenges comprise competitive grants, short-term project cycles, and constraints on innovation resulting from rigid funding structures, which create a significant administrative burden, dependency, and mission drift (Government of the Republic of Slovenia 2014; Maylor and Turkulainen 2019). For Nepalese SEs, opportunities involve access to essential resources, introduction of management discipline, hybrid innovation, and ecosystem catalysis through donor-built support structures (Khanal and Weber 2017; Karkee and Comfort 2016; Joshi, 2021; Rai et al. 2025). Challenges include instability and extractive reporting, donor-driven agenda setting, misaligned Western impact metrics that hinder investment, and fragmented governance that perpetuates aid dependency (Smith 2021; Upadhyaya 2024; Lovermore 2021; Godenhjelm et al. 2015).

2.6 Synthesis

The literature confirms that the manifestation of projectification is shaped by national context. Slovenia's structured, EU-integrated approach offers stability, while Nepal's donor-dependent model demands high adaptability. The core tension is balancing project-based agility with long-term mission sustainability. For Nepal, Slovenia's experience suggests that building cohesive national policies, strong institutions, and context-appropriate measurement tools is crucial for harnessing the benefits of projectification without succumbing to its vulnerabilities.

3 PURPOSE AND GOALS

This study examines how social enterprises influence their strategy, operations, and sustainability, forming the core of a comparative analysis between Nepal and Slovenia. Using a comparative analysis of Nepal and Slovenia, it explores how different socio-economic contexts shape this phenomenon. The primary objectives are to: (1) analyze the projectification of social enterprises in Nepal and its effects on their strategic and operational efficacy; (2) assess their societal implications for poverty alleviation, community development, and environmental sustainability; (3) conduct a comparative analysis with European models to identify commonalities and transferable practices; (4) identify key challenges (e.g., funding dependencies, short-termism) and propose actionable solutions to enhance resilience; (5) contribute to academic discourse intersecting projectification studies, social entrepreneurship, and comparative methodology; (6) inform policymakers, donors, and support organizations with evidence-based recommendations to strengthen the social enterprise ecosystem; (7) guide future practitioners with practical insights and case studies; and (8) provide evidence-based recommendations for cross-cultural collaboration. This study examines the impact of project-based methods on social enterprises, comparing strategic and operational challenges in Nepal and Slovenia. The research aims to inform policy, support practitioners, and contribute to academic and practical social entrepreneurship scholarship.

4 METHODOLOGY

This study employed a qualitative comparative design within an interpretive framework to investigate the impact of projectification on social enterprises (SEs) in Nepal and Slovenia, analyzing institutional, financial, and operational dimensions (Lang and Fink 2019). This approach was selected to capture nuanced dynamics, trace donor pressures, and facilitate a cross-context analysis between Nepal's aid-dependent ecosystem and Slovenia's EU-integrated environment (Defourny and Nyssens 2021).

A purposive sample of nine SEs, four in Slovenia and five in Nepal, was selected to ensure diversity across sectors, funding models, and exposure to projectification, aligning with the International Comparative Social Enterprise Models (ICSEM) Project framework (Defourny and Nyssens 2017). The Slovenian cases included SEs in social housing (Hisa Drustvo), cooperative development (Zadrugator), social inclusion (MOBA Housing and SCE Network), and assistive technology for accessibility (Feelif d.o.o.). The Nepalese cases spanned agricultural technology (Smart Krishi), consulting and capacity building (Biruwa Advisors Private Limited), community development (The Village Café), education and training (Higher Ground Nepal), and renewable energy (Greenway Nepal).

Primary data were collected through 60-minute semi-structured Zoom interviews with founders and senior managers, using a protocol to avoid leading questions on mission drift (Naeem and Ranfagni 2023). Interview data were triangulated with document analysis of annual reports, project proposals, and policy documents (Maksum et al. 2020). Recorded data were inductively coded using NVivo 15, with manual cross-verification in MS Word. Emergent codes were synthesized into thematic categories (e.g., "donor dependency") and analyzed through the lens of social capital dimensions (bonding, bridging, and linking) using NVivo's matrix coding function (Lang and Fink 2019). A final cross-case synthesis integrated narrative summaries with institutional-level mapping (Naeem et al. 2023).

Rigor was ensured through triangulation, peer debriefing, and reflexive memoing (Lang and Fink 2019). The study adhered to strict ethical protocols, including compliance with the General Data Protection Regulation (GDPR), the use of pseudonyms for anonymity, and approval from the institu-

tional review board (European Commission 2022). A limitation is the limited generalizability due to the small sample size, which is addressed through a thick description for analytical transferability. The findings are also temporally sensitive to Nepal's federal restructuring and Slovenia's EU funding cycles. Researcher positionality and reflexivity were documented to contextualize interpretations (Majumdar and Ganesh 2020; Khadka 2025).

5 RESULTS

This section presents the empirical findings on how the institutional ecosystem shapes the manifestation and impact of projectification in social entrepreneurship, comparing a total of nine SEs (five from Nepal and four from Slovenia). The operational landscape for Nepalese social entrepreneurs is profoundly shaped by international donors and a project-based funding model, resulting in high dependency and strategic constraints. Funding for Nepalese social enterprises is predominantly tied to short-term projects with predefined deliverables. Organizations reported spending 30-50% of their operational capacity on proposal writing and donor reporting, a significant diversion of resources from their core mission. This creates a cycle of short-termism that hinders long-term planning for social entrepreneurs. The projectification model causes operational fragmentation. To ensure financial viability, social enterprises like Smart Krishi and Greenway Nepal often run multiple disconnected projects simultaneously, leading to inefficiencies. Strategically, it forces a reactive posture, where a coherent, internally driven vision is frequently replaced by one shaped by donor trends and preferences. The broader ecosystem lacks robust support structures. Social entrepreneurs face limited access to non-project-based capital (e.g., impact investment), an underdeveloped regulatory framework, and a shortage of managerial talent, which exacerbates the challenges of operating within a projectified environment.

In contrast, Slovenian social enterprises leverage project funding as a strategic tool within a mature, supportive, and EU-integrated institutional environment. A clear legal framework, such as the Social Entrepreneurship Act, defines the status of social enterprises and provides incentives for their development. EU structural funds, channelled through national programs, catalyze strategic alignment and capacity building, enabling enterprises like Feelfi d.o.o. and Hisa Drustvo to use projects for growth. The institutional system mitigates the inherent volatility of projectification through co-financing requirements, technical assistance, and a growing emphasis on standardized social impact measurement (e.g., SROI). This scaffolding enables entities such as Zadrugator, MOBA Housing, and SCE Network to pursue innovation with greater stability and confidence. Despite the robust system, Slovenian social entrepreneurs still face challenges, including bureaucratic complexities in accessing EU funds, competition for public contracts, and a need to professionalize impact measurement practices.

The cross-case comparison reveals a central paradox in how projectification affects social entrepreneurship, mediated by the strength of the institutional ecosystem. Projectification demonstrates a dual nature. In Slovenia, projects act as catalysts for innovation and scaling impact. In Nepal, the same project-based model is a primary source of strategic and operational fragility for social enterprises. The fundamental difference lies in the strength of the supporting ecosystem. Slovenia's structured, multi-stakeholder system provides a "scaffolding" that absorbs uncertainty and manages the risks associated with projectification. Nepal's donor-driven ecosystem amplifies these uncertainties, pushing risks onto individual enterprises and entrepreneurs. Social enterprises in both contexts face pressures of mission drift. Slovenian entities, such as SCE Network, are better equipped to resist them due to their clear legal identity and established support mechanisms. Nepalese enterprises, like Biruwa Advisors and The Village Café, are more susceptible to shifting their activities toward fundable themes for mere organizational survival.

The findings yield distinct policy lessons for each context, alongside a universal warning about over-reliance on projectification. For Nepal, policy must focus on developing a formal legal framework, creating alternative financing vehicles (e.g., impact investment funds), and building managerial capacity. An example of innovation includes piloting localized impact metrics to align project funding with community needs. For Slovenia, the country offers transferable practices, including a clear legal status for social enterprises, the strategic use of public/EU funds for capacity building, and the mandating of impact measurement. A key innovation would be simplifying EU fund application processes for small-

er, rural enterprises to enhance inclusivity. Both contexts demonstrate that over-reliance on projects carries inherent risks of bureaucratic capture and mission dilution. Universal safeguards, such as core funding allowances and mentorship programs, are needed to help social entrepreneurs navigate projectification without compromising their long-term vision. In conclusion, the analysis demonstrates that the progress of social entrepreneurship depends on context-specific innovation grounded in its institutional determinants. The future hinges not on the management of isolated projects, but on transforming fragile ecosystems into resilient, supportive, and adaptive ones.

6 DISCUSSION

This study reveals the central paradox of projectification: it is simultaneously a vital source of resources and innovation for social enterprises (SEs) and a significant threat to their long-term sustainability and integrity of mission. This research demonstrates that a strong institutional environment mediates this paradox, which is not inherent to projectification. The comparison between Slovenia's robust framework and Nepal's fragmented ecosystem shows that institutions determine whether projects empower or entrap SEs. Projectification presents SEs with a universal set of opportunities (financial capital, innovation, scaling impact) and risks (mission drift, administrative burden, instability). However, this study finds that balancing these is not merely a matter of chance or managerial skill. The institutional context is the decisive mediating variable, determining an SE's ability to capture benefits while mitigating downsides.

In Nepal's weak institutional ecosystem, the risks of projectification dominate, forcing SEs into a dependent cycle as "grantpreneurs." This is driven by three key factors: (a) donor dominance, where skewed power dynamics compel SEs to align with shifting donor priorities over community needs, leading to mission drift; (b) policy fragmentation, as a lack of cohesive government policy or legal frameworks forces SEs to navigate complex project requirements without a safety net, amplifying administrative burdens; and (c) inadequate metrics, where pressure to report quantifiable, short-term outcomes to international donors comes at the expense of measuring long-term social transformation, exacerbating the divergence from the organization's mission.

Slovenia's structured, EU-integrated environment enables SEs to harness projectification effectively. Key institutional strengths include: (a) integrated policy frameworks, where alignment with EU policies provides a clear legal identity (e.g., social cooperatives) and access to structured funding, reducing transactional costs and increasing stability; (b) participatory governance, as institutional designs that mandate stakeholder participation (e.g., in cooperatives) act as a bulwark against external donor pressures, anchoring SEs to their social mission; and (c) advanced impact measurement, where focusing on "impact management" over "output reporting," driven by EU and state standards, helps align project goals with long-term social value creation.

Theoretically, these findings extend social enterprise and institutional theory (Defourny and Nyssens 2016a) by showing how macro-level institutions directly influence micro-level practices, confirming that model functioning is contingent on institutional embeddedness. Practically, solutions must be systemic and context-specific. For Nepal, the focus should be on building institutional capacity by developing a national SE policy, creating catalytic public funding, and fostering local platforms for collective donor engagement. For Slovenia, the focus should be on refining existing systems by streamlining administrative procedures for EU funds and promoting knowledge sharing on impact measurement and evaluation.

The qualitative, small-N design limits generalizability, though it provides a template for analytical transferability. Given Nepal's federal restructuring and evolving EU funding cycles, the findings are also temporally sensitive. Future research should employ longitudinal studies to track the evolution of SE and use quantitative, large-n surveys to test correlations between institutional variables (e.g., legal frameworks, public funding) and the sustainability of SE across countries. Institutional strength profoundly shapes the impact of projectification. Slovenia's robust framework allows its SEs to leverage projects for growth, while Nepal's fragile ecosystem traps its SEs in dependency. This contrast expands our theoretical understanding of how institutions mediate project-based work. The central takeaway is that supporting SEs requires moving beyond project-level interventions to build the supportive institutional ecosystems that allow them to thrive.

7 CONCLUSION

This study concludes that the impact of projectification on social enterprises (SEs) is not inherent but is fundamentally mediated by the strength of the surrounding institutional ecosystem. The comparative analysis reveals this stark contrast: projectification functions as a trap in fragile institutional settings (Nepal) and as a tool in robust ones (Slovenia). SEs achieve sustainable, mission-aligned impact within strong, supportive ecosystems, not through isolated efforts. Slovenia's integrated policy framework, strategic public and EU funding, participatory governance, and advanced impact protocols create an environment where SEs can harness project-based work for innovation while maintaining stability. Strong institutions absorb the risks of projectification, allowing SEs to capture its benefits. Conversely, Nepal's ecosystem, characterized by fragmented funding, policy voids, and weak governance, amplifies the vulnerabilities of projectification, trapping SEs in a cycle of donor dependency and strategic precarity that undermines their long-term social goals.

These findings offer critical guidance. For developed economies, Slovenia's model provides a blueprint, demonstrating that cohesive support systems—including legal recognition, catalytic public funding, and capacity building are a prerequisite for a thriving social economy, not a luxury. For the Global South, Nepal's challenges underscore an urgent need for targeted institutional strengthening. International aid must shift from funding discrete projects to investing in foundational structures: national policies, local community foundations, impact investors, and advocacy platforms. The goal is to transform fragility into resilience. Ultimately, the future of the social economy depends less on managing individual enterprises and more on architecting the ecosystems in which they operate. A steadfast commitment to building strong institutions is essential to ensure SEs can navigate projectification and allow their positive impact to take root and endure.

AUTHOR BIOGRAPHY

Salik Ram Maharjan researches projectification in social enterprises. His comparative study of Slovenia and Nepal, mentored by Dr. Reinhard Wagner, aims to develop strategic frameworks to enhance project efficacy and socio-economic impact for mission-driven organizations.

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1.08 Objavljeni znanstveni prispevek na konferenci
Published scientific conference contribution

TECHNOLOGY SOLUTIONS OF SHARING ECONOMY AS A TOOL FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

The sharing economy, enabled by advances in digital technologies, represents a paradigmatic change in how we consume and use resources. Our contribution focuses on the potential of technological solutions within the sharing economy to contribute to sustainable development, which consists of more efficient use of resources through the sharing of goods and services, reducing emissions through shared mobility, and increasing the sustainability of consumption through the use of various platforms, as well as in the different social and economic benefits provided by the sharing economy (e.g. creating new job opportunities, supporting local communities and increasing social inclusion). To fully exploit this potential, it is necessary to ensure a comprehensive approach to their successful implementation, which considers not only economic but also social and environmental aspects.

Keywords: *The sharing economy, Sustainable development, Technology, Efficient use of resources, Reducing emissions, Sustainable consumption*

1 INTRODUCTION

The sharing economy has become a very popular phenomenon in recent years and its importance is immensely increasing. In the next lines, we will look closer at this phenomenon.

1.1 Sharing economy

The sharing economy is seen as a modern phenomenon in politics, society, and the economy, and one that situates the principle of exchange, sharing, and lending at the center of all interactions and transactions (Mossman 2019, 30). Sharing economy became an umbrella term for the different designations used to characterize the new economy such as collaborative, circular, on-demand, or zero-marginal-cost (Bas 2022, 1). From a broad perspective, the sharing economy includes traditional government-to-peer (G2P) (e.g. public libraries, transportation, parks, and land) and business-to-peer (B2P) initiatives: however, much of the attention has focused on peer-to-peer (P2P) or collaborative consumption-based initiatives (Albinsson and Perera 2018). Oskam (2019) suggests the definition of sharing by Rachel Botsman, who defines it as the more efficient use of underutilized assets. Based on Botsman's and Rogers's opinions Sundararajan (2016) mentions that in the 21st century, we can speak about collaborative consumption, where its access is driven by community and sharing and the collaboration may be local and face-to-face, or it can use the Internet to connect, combine, form groups, and find something or someone to create "many-to-many" peer-to-peer interactions. Simply put, people are sharing again with their community – be it an office, a neighborhood, an apartment building, a school, or a Facebook network. As Arvidsson (2019, 10) points out, the sharing economy constitutes a new combination of market exchange, commons-based sharing, and capitalist profit-seeking. Strømmen-Bakhtiar and Vinogradov (2020) mention the definition of the Norwegian Ministry of Local Government and Regional Development, which defines the sharing economy as coupling between individuals and/ or legal entities through digital platforms that facilitate the provision of services and/ or sharing of assets/ property, resources, expertise or capital without transferring ownership rights. In other words, it is a digital platform-based business model, where these platforms have dramatically reduced transaction costs, which in turn have opened the door to a world of innovations.

1.2 Sustainable Development

As Rogers, Jalal, and Boyd (2012, 22) mention, sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Another definition mentions that it is a development that is sustained in the sense that it endures over a period of time, but it is more commonly understood as development causing little or no damage to the environment and therefore able to continue for a long time (French and Kotzé 2018, 21). As Roorda (2017, 9) points out, sustainable development involves the distribution of prosperity between the various parts of today's world, and also the distribution of that prosperity between humans today and humans of tomorrow. As Zielinsky et al. (2017, 2) mention, for sustainable development to be achieved, it is crucial to harmonize three interconnected core elements: economic growth, social inclusion, and environmental protection. The optimistic news is that every year, more affordable and reliable solutions appear and thus people are able to turn into cleaner, more resilient economies. As Kimura (2024) reports, the guiding principle for sustainable development is encapsulated by the five P's: People, Planet, Prosperity, Peace, and Partnerships, where each of these elements represents a critical aspect of human and planetary well-being:

- People: Ensuring no individual, group, nation, or region is left behind.
- Planet: Living within Earth's environmental boundaries.
- Prosperity: Extending the benefits of modern education and technology globally.
- Peace: Coexisting under the principles of the UN Charter and international law, advocating for non-intervention and peaceful conflict resolution.
- Partnerships: Collaboration among governments, civil society, and businesses to achieve shared global goals.

These principles can be also found in the 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, which provides a shared blueprint for peace and prosperity for people and the planet, now and into the future (United Nations, 2025).

1.3 Sharing Economy as a Tool for Sustainable Development

As Aref (2024) mentions, the sharing economy, supported by digital platforms, efficiently matches the demand and supply of underused resources. Expanding globally and impacting different industries is offering a new path to sustainable resource consumption. Zygmunt (2020) suggests that the primary goal of the sharing economy is to minimize the consumption of resources and services used to perform company operations while achieving maximum outcomes. The undertaking of sharing economy practices contributes to the three types of SDGs, with many social benefits (increased social well-being of the stakeholders), environmental benefits (reduced negative environmental impacts of business practices), and economic benefits (reduced total costs, enhanced marketing, and increased profits). Also Sadiq et al. (2023) see the sharing economy as a phenomenon that supports sustainable economic activity. It combines information technology and management methods to develop a new culture in which resources are used more efficiently. As a result, it provides an innovative framework that may pave the way for long-term economic development and energy efficiency. Based on their opinion the sharing economy offers a route to long-term development based on resource efficiency and stronger social links. The sharing economy, which makes it possible to use the resources already put into circulation and do it efficiently both from an economic and an environmental point of view, is often considered a component of sustainable consumption (Lyaskovskaya and Khudyakova 2021). As Zhang et al. (2023) mention the sharing economy is another focus of world attention, as it relates to the economy and sustainability. It is commonly framed as: 1) an economic opportunity; 2) a better and more sustainable form of consumption; and 3) a pathway to an equality-based and sustainable economy. As Karobliene and Pilinkiene (2021) point out, some authors have argued for the importance of the sharing economy as a phenomenon that generates sustainable value creation, which highlights the relevance of the sharing economy from the perspective of reducing consumption and resource and energy usage, thus potentially supporting the achievement and improvement of the Sustainable Development Goals.

2 PURPOSE AND GOALS

The main purpose of this paper was to answer the elementary research question – If the technological solutions of the sharing economy can be used as a tool of sustainable development?

To achieve this purpose we looked first at the sub-goals:

- What is the sharing economy and its position in sustainable development?
- Which are the best countries due to SDG achievements and which cities are the best for the sharing economy?
- Is there any existence of the sharing economy activities, that can be related to SDG?

3 METHODS

To create this paper we used comparative analysis to analyse various documents, literature, and research papers to bring the best overview of the sharing economy, sustainable development, and the concept of the sharing economy as a sustainable development tool. We also used the Report of Sharing Economy Index 2024 and the Sustainable Development Report 2024 to look at the rank of the best countries due to SDG achievements and sharing economy friendliness. We used it to compare the benefits of the sharing economy to the sustainable development of the cities. As the last, we analysed the various forms of the sharing economy possibilities, that can be used as a solution for the concrete Sustainable development goal.

4 RESULTS

In Table 1 we can see the top 10 countries based on the ranking published in the Sustainable Development Report 2024. Countries are ranked by their overall score. The overall score measures the total progress towards achieving all 17 SDGs. The score can be interpreted as a percentage of SDG achievement. A score of 100 indicates that all SDGs have been achieved.

Table 1: Top 10 countries with the best score of SDG achievement

Rank	Country	Score
1	Finland	86.35
2	Sweden	85.70
3	Denmark	85.00
4	Germany	83.45
5	France	82.76
6	Austria	82.55
7	Norway	82.23
8	Croatia	82.19
9	United Kingdom	82.16
10	Poland	81.69

(Source: Sustainable Development Report 2024, 2024)

In Table 2 we can see the top 10 most sharing economy-friendly cities worldwide based on the Sharing Economy Index 2024. The research was made by the Consumer Choice Center, that ranked 60 cities worldwide to help consumers pick the destination that best fits their sharing economy preferences. They examined several variables ranging from ride-hailing, professional car-sharing, car-pooling, and flat-sharing to gym-sharing, ultra-fast delivery apps, and e-scooters (Panzaru and Aun, 2024).

Table 2: Top 10 most sharing economy-friendly cities worldwide

Rank	Country	City	Composite index score
1	Lithuania	Vilnius	16.01
2	Argentina	Buenos Aires	15.18
3	Spain	Madrid	14.97
4	Serbia	Belgrade	14.96
5	United Kingdom	London	14.79
5	USA	Washington DC	14.79
7	Netherlands	The Hague	14.75
8	USA	Nashville	14.74
9	Finland	Helsinki	14.55
10	Czech Republic	Prague	14.54
10	Sweden	Stockholm	14.54
10	Switzerland	Zurich	14.54
10	USA	Dallas	14.54

(Source: Panzaru and Aun 2024)

In Table 3 we used the Research of Pérez-Pérez et al. (2021), to bring an overview of possible actions of the sharing economy which can bring benefits not just for communities where they take place. But they can also support the fulfillment of the SDG in the countries.

Table 3: SDG and examples of the Sharing Economy actions/ solutions related to them

	SDG goals	Examples of the sharing economy solutions
	No poverty	sharing resources of local people with others users to generate extra income and by reducing the barriers to entrepreneurship
	Zero hunger	shared urban gardens or food sharing among members of community
	Good health and well-being	sharing of medical equipment
	Quality education	for example platforms such as Skillshare or Sharing academy and communities around them
	Gender equality	Due to the no-discrimination policies of the platforms are the services and products available to everyone
	Affordable and clean energy	for example platforms such as Gridmates or Vandebron help to reduce energy poverty, as well as facilitate access to renewable energies
	Decent work and economic growth	digital platform workers
	Industry, innovation and infrastructure	SE platforms challenge traditional business models
	Reduced inequalities	reducing inequalities by granting access without ownership
	Sustainable cities and communities	shared transportation
	Responsible consumption and production	sharing of used goods or for example Vinterd (a peer-to-peer marketplace and community for second-hand fashion)
	Climate action	reducing pollution by shared transportation
	Peace, justice and strong institutions	SE platforms can forge trust and social understanding among users

(Source: Authors' own elaboration based on Pérez-Pérez 2021)

5 DISCUSSION

As we can see in Table 1, all the top 10 countries with the best ranking in the Sustainable Development Report are situated in Europe. The first place with the highest score of 86.35 belongs to Finland, closely followed by Sweden and Denmark. In the fourth place, we can see Germany with a score of 83.45 points followed by France with a score of 82.76 points. The 82 points limit is also reached by Austria in the 6th place, Norway (7th place), Croatia (8th place), and the United Kingdom in the 9th place. In the 10th place we can still see Poland that fulfills the SDG by 81.69%.

When we look at Table 2 we can see that just the United Kingdom with London, Finland with Helsinki and Sweden with Stockholm belong not just to the top 10 countries with the best score of SDG achievements, but also to the 10 top sharing economy friendly economies. But when we look further on the Sharing Economy Index, we can see that also the remaining countries from the top 10 countries can be found in the Sharing Economy Index ranking. Most countries are represented in the ranking by only a single city—for example Denmark (Copenhagen, 51st place), France (Paris, 35th), Austria (Vienna, 27th), Norway (Oslo, 16th), Croatia (Zagreb, 40th), and Poland (Warsaw, 49th). In contrast, Germany is represented by four cities, making it one of the most strongly featured countries: Cologne (23rd), Berlin (27th), and Munich and Hamburg (both ranked 31st).

As we know, the Sharing Economy Index examines just some areas of the sharing economy, that can be associated with SDG 3, 10, 11, and partially SDG 8. There are 17 SDGs that are defined by the United Nations. When we look further in Table 3, we can see, that there exist also other sharing economy activities, that can help to fulfil some other of the Sustainable Development Goals, such as sharing of the second-hand fashion (for example platform Vintered) or sharing of various goods can help with the reduce of consumption and with better use of the resources – SDG 12. Shared transportation (Zipcar, BlaBla Car, Bolt, ...) can help with the air pollution reduction – SDG 13. One of the SDG areas is Good Health and Well-being (SDG 3). In this area, it is necessary to point out the possibilities of shared economy tools to support and create a healthy and health-promoting work environment and corporate culture (e.g. Virgin Pulse, Strove). As stated by Tóthová and Nemec (2024), these will ensure an atmosphere of support for employees, which will also positively affect their subsequent performance and well-being in the workplace. Various volunteer platforms, where volunteers can also find opportunities for short-term mission trips to the developing countries that can help with the fulfilment of SDG 2.

6 CONCLUSION

As we can see, the sharing economy brings various opportunities that can help communities and countries to better fulfil the Sustainable Development Goals defined by United Nations. In the last years we can see that the sharing economy platforms offer not just opportunities for sharing of underused resources or services, but there are various platforms that offer opportunities for education, volunteering, finding friends/ buddies, shared transportation, sharing of spaces not just office areas or accommodation places (Airbnb) but also for example sharing of meals or urban or community gardens.

As we have also found, these platforms are a technical tool that helps to bring together different stakeholder groups as well as communities of like-minded people who are interested in exploiting under-used resources, reducing over-consumption, and also want to give something back to the community in which they live. At the same time, it is an ideal technical solution that helps individuals and communities to more easily meet their goals, which often overlap with the Sustainable Development Goals defined by UN Members.

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1.08 Objavljeni znanstveni prispevek na konferenci
Published scientific conference contribution

ZOON PROJEKTIKON: NAVIGATING THE ROLE OF "PROJECT BEINGS" WITHIN SUSTAINABLE PROJECT MANAGEMENT IN THE AGE OF GENERATIVE AI

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ABSTRACT

Generative AI is already widely present in project management. In addition to commonly used tools, the amount of input these tools use increases and provides higher quality. However, the question arises to what extent AI tools can help project managers solve certain situations related to the project's contribution to sustainable development, either without context or within a defined contextual setting; in other words, whether the Generative AI tools impact project managers to be less Zoon Projektikon ("Project being"). The paper is based on a case study in which different situational questions concerning planet, people, and prosperity contributions were asked of project managers and generative AI tools. The analysis of the responses showed that generative AI tools provide different proposals for solving situations, just like project managers. The difference arises when the three separate situations are in a shared context. In this case, the generative AI tools showed different answers in contrast to the proposed solutions offered by the project manager. The conclusion is that, at the moment, AI can be a helpful tool that project managers will use to simulate options analysis for individual situations; however, when the problem is more complex and contextual, project managers provide more complete solutions.

Keywords: Sustainable Project Management, Generative AI, Zoon projektikon ("project being" or "project animal")

1 INTRODUCTION

Artificial intelligence has become an integral part of many aspects of human activity, including project management. AI has been effectively utilized for predictions, particularly in project planning. For instance, generative AI can assist project managers in identifying risks, creating a work breakdown structure, and planning resources. However, one must consider the extent to which artificial intelligence is prepared to engage in decision-making within complex project situations. Can AI truly replace the uniquely human traits that stem from our social nature? Human decision-making is often informed by knowledge, experience, values, and a broader understanding of the social context. Aristotle coined the term *Zoon Politikon* some 2,350 years ago, describing humans as beings determined by their sociality. Humans are social beings who shape and are directed towards a community. Therefore, they are necessarily political beings (or political animals).

More than 2,000 years before Aristotle, humans built the Great or Cheops Pyramid, which can be considered a demanding construction project even from today's perspective. If humans have been managing the most complex projects that have built our civilization for 5 millennia, can we say that we are also a *ZOON PROJEKTIKON* (project animals)?

"*Projektikon*" is a fictional term that does not exist in ancient Greek. The neologism *Zoon Projektikon* is introduced to evoke the characteristics of man as a being endowed with projective thinking. Our decisions are significantly influenced by our nature as social beings, which also affects how we make choices in projects. If we heavily utilize generative AI that doesn't account for the nuances of social interaction, will we compromise the quality of our decision-making? If so, to what extent? Bredillet et al. (2015). in their paper "What is a good project manager? An Aristotelian perspective" gave an answer to the question of what a competent project manager should be. A "good" PM is a "wise" PM and conversely acts "rightly" or does "good" action in context. That is what a "good" PM is expected to "do" regarding the purpose s/he pursues and the role s/he fulfils in this very situation (Bredillet et al., 2015). To what extent is the role of the project manager changing in the digital era? Many factors influence project managers' competencies, including working in a virtual environment, multicultural projects, and the increasing use of generative AI. Andre Ribeiro points out that Industry 4.0 and digitization will affect the soft and hard competencies of the project manager. In soft competencies, communication skills, authority, team management, management of unforeseen events and negotiation skills are highlighted, in hard competencies, full comprehension of Cyber-physical systems from the project manager along with deep domain knowledge while the implementation is mainly delegated to project team experts or virtual assistants. The most important hard skill for project managers is experience with innovative technologies and projects, big data analysis and predictive algorithms that will help them to manage projects correctly and focused on the objectives to be achieved. (Ribeiro, et al. 2021). A new major shift occurred with the arrival and application of AI in project management. When an AI system is applied to the knowledge management system, the process by which relevant information is accessed and displayed could be automated making it much more efficient and therefore leading the project manager to have a lot of information regarding who performed well on which task, what were the main drainers of the budget and what were the success factors giving him/her the ability to make the best out of the recorded experiences and make the most effective decision contributing to higher project success (El Khatib, M. and Al Falasi, A. 2021). The category of GPT refers to Large Language Models (LLMs) that use deep learning techniques for extensive training with tremendous amounts of data (Casella et al., 2023). The capabilities of ChatGPT are enabled by generative AI, which refers to a type of AI that can generate human-like text and creative content, as well as consolidate data from different sources for analysis (Dasborough, 2023).

There are several articles that analyse the applicability of generative AI to certain processes in project management. The top-ranked functions in Project management to be supported by AI are: create a project schedule, analyse implications of missing deadlines, create a WBS/tasks list, create a project budget, update project progress and schedule, identify scope creep and deviations, produce a dynamic risk map, extract deliverables, prioritize tasks, and allocate team members (Holzmann et al. 2022). AI-generated plans serve as efficient starting points, often introducing novel insights, especially in areas like risk management. However, they should not be viewed as final deliverables.

Human expertise remains vital for validating and refining these AI outputs. A human project manager's domain knowledge, understanding of industry standards, and best practices make them uniquely qualified to provide context and address potential gaps in AI-generated plans (Barcaui, 2023). In addition to the efficiency gain, the effectiveness of projects can also be improved by applying AI. This is because generative AI can develop new, innovative, and more targeted solutions. Here, the collected knowledge in the company and far beyond is used through trained data and knowledge pools. At the same time, AI can largely avoid human errors or cognitive biases (Wagner, 2024).

Despite the undoubtedly advantages that the application of generative AI brings to project management, research also recognizes some advantages, risks and limitations of use that may arise. The number of scientific papers that problematize the use of AI in the context of its impact on humans and sustainability in general is growing. Rohde et al. emphasize that the increased use of AI systems is associated with multi-faceted social, environmental, and economic consequences. These include non-transparent decision-making processes, discrimination, increasing inequalities, rising energy consumption and greenhouse gas emissions in AI model development and application, and an increasing concentration of economic power (Rohde et al. 2023). Clarke R. points out several negative effects of Generative AI on the individual, of which he particularly emphasizes: Increased delegation of authority to automated facilities, and increased difficulty in reviewing and reversing unfair decisions ("the computer says no"), based on original Adensamer et al. (2021).

1.1 Purpose and goals

The purpose of this paper is to assess to what extent AI tools can help project managers solve certain situations related to the project's implementation, either without context or within a defined contextual setting. Based on the literature review, the following research questions arose:

- Do the Generative AI tools impact project managers to be less Zoon Projektikon?
- To what extent AI tools can help project managers solve certain situations related to the project implementation?
- Can AI efficiently replace project managers in project planning and implementation?
- What are key advantages of AI and human PMs in solving problems?
- How could AI and human PMs knowledge and skills be integrated to increase quality and efficiency in project management?

2 METHODS

This study employs primarily qualitative methodology to analyse and assess responses of Generative AI tools and project managers. For this purpose, three project situational questions from project implementation phase were answered by three Generative AI tools (ChatGPT, Perplexity and Infinity) as well as by three well-experienced project managers from different sectors. In order to provide more comparable and concise responses, the respondents were asked to limit their responses to maximum of 800 characters. The situational questions cover different problems that project managers face during the project implementation. The first question describes the situation when project manager is dealing with difficult client who neglects project deliverables. The second situation deals with very common situation when one of the project team member is conflict person and having difficulties to follow some of project tasks. The third situation is about making decision on project management method to be used. The list of situational questions is presented in the Table 1.

Table 1: List of situational questions

Situational question 1 (S1)	You are implementing a project management service that you have been awarded based on a public procurement procedure. The public sector client that hired you originally wanted to work with another company, but due to legal obligations, was obliged to carry out a procurement procedure in which your offer was assessed as the most economically advantageous. The responsible persons in the client's organization do not approve your outputs due to their allegedly poor quality, although you suspect that the dissatisfaction stems from the fact that they did not contract the company they expected. What are the three steps you will take?
Situational question 2 (S2)	You have a conflicting person in your project team. He is a technical project manager, an experienced engineer who thinks he is always right. He does not perform his administrative tasks (TSs). However, his knowledge and experience are hard to replace. What three steps would you take to resolve the conflict situation?
Situational question 3 (S3)	You are implementing a project in which you will have a lot of typical infrastructure interventions (installation of typical equipment in the energy sector). In addition to infrastructure interventions, you are developing new software that needs to monitor losses in the energy system. PMO offers the use of traditional methods using MS Project as the basic tool or agile methods according to the Kanban working method. What is your decision and three arguments on which you base the decision.

(Source: Authors' interpretation)

The assessment was conducted against 8 criteria, 7 general criteria and 1 derived from IPMA Individual Competence Baseline (IPMA ICB4) framework. The list of assessment criteria is shown in the Table 2.

Table 2: Assessment criteria

Assessment Criteria	AI advantages	Human advantages
Accuracy / Relevance of data / Speed	<ul style="list-style-type: none"> Potentially vast database – precise, fast and fact-based answers Dependency on accuracy of data base 	<ul style="list-style-type: none"> More time is needed to provide solution Accuracy can be limited due to individual experience and incomplete information
Critical thinking / Problem solving / Context	<ul style="list-style-type: none"> Excel in solving structural problems May struggle with complex, novel, or ambiguous situations that require creative solutions 	<ul style="list-style-type: none"> Better context awareness Better adjustment of answers to the context Subjectivity due to individual experience
Creativity / Flexibility / Adaptability	<ul style="list-style-type: none"> Efficient at common scenarios but lacks true creativity 	<ul style="list-style-type: none"> May bring unique and creative perspective that is crucial for unexpected situations
Emotional intelligence / Ethical aspects	<ul style="list-style-type: none"> Lack of true emotional intelligence Ethical framework designed by developers' guidelines 	<ul style="list-style-type: none"> Adapting answers to interpersonal dynamics and leadership styles Ethical evaluations influenced by personal values and organizational ethics, could also be biased
Communication / Collaboration	<ul style="list-style-type: none"> Able to facilitate project management collaboration by using project management tools Lack of understanding of true team dynamics and interpersonal conflicts 	<ul style="list-style-type: none"> Tailor approach to fit team needs and adjust leadership styles to resolve conflicts and foster teamwork Potentially biased by personal values, character and experience
Risk management	<ul style="list-style-type: none"> Based on historical data and predictive models 	<ul style="list-style-type: none"> Broader perspective, using judgment and experience to make decisions in uncertain environments
Cost and Efficiency	<ul style="list-style-type: none"> Potential of reducing costs and improving efficiency in repetitive situations 	<ul style="list-style-type: none"> Potentially higher costs (salaries, training) and potential inefficiencies in handling large-scale data
IPMA ICB4 Criteria	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a

(Source: Authors' interpretation)

The research includes the following steps:

1. Initial development of situational questions based on the literature review and authors' experience
2. Interviews with experienced project managers to select 3 situational questions to be responded by both AI and project managers
3. Online questionnaire with situational questions
4. Data collection from both types of respondents
5. Data analysis using Multi Criteria Analysis method
6. Results interpretation and conclusions

The collected responses were analysed by the authors as professional project managers by using the Multi Criteria Analysis. The responses were rated on a 3-point scale (1- poorly aligned with the criteria, 2- average alignment with the criteria, 3 – completely aligned with the criteria). The alignment with IPMA ICB4 criteria included both alignment with more than 1 competence element within competence area and Alignment with at least 1 competence element indicator to obtain 3 points. If only one criterium was met, the response gained 2 points.

3 RESULTS

The research showed that Generative AI tools obtained better results in two of three situations. The detailed results are shown in the Table 3.

Table 3: The MCA research results

	S1		S2		S3		Total AI	Total Human
	AI	Human	AI	Human	AI	Human		
Accuracy / Relevance of data / Speed	3	1	3	1	3	1	9	3
Critical thinking / Problem solving / Context	2	1	2	3	3	2	7	6
Creativity / Flexibility / Adaptability	2	2	1	3	3	2	6	7
Emotional intelligence / Ethical aspects	2	3	1	3	1	1	4	7
Communication / Collaboration	3	3	2	3	1	1	6	7
Risk management	2	2	1	1	1	1	4	4
Cost and Efficiency	3	2	3	1	1	2	7	5
ICB criteria	3	3	2	2	2	2	7	7
Total	20	17	15	17	15	12		
Average	2,50	2,13	1,88	2,13	1,88	1,50		

(Source: Authors' interpretation)

The AI tools gained higher scores in Situation 1 (2,50) and Situation 3 (1,88). The Human project managers gained higher score in Situation 2 (2,13). In general, the higher scores were achieved in Situation 1, and both respondents groups achieved lower scores in Situation 3. When it comes to assessment criteria, The AI scored higher in the following criteria: Accuracy, Relevance of data and Speed, Critical thinking, Problem solving and Context and Cost and Efficiency. On the other hand, human project managers scored better at the criteria Creativity, Flexibility and Adaptability, Emotional intelligence and Ethical Aspects and Communication and Collaboration. Both respondents' groups gained same scores at the criteria Risk management and ICB criteria.

4 DISCUSSION

The research results proved that Generative AI tools can be very useful asset in problem solving situations in project implementation. The AI can achieve great results in well structured and repetitive situations. This confirms the literature review findings and research results from some of the previous research. Furthermore, AI tools excelled in criteria speed, cost and efficiency. It

provided very detailed, to the point and accurate responses in a short period of time compared to human project managers. Most of the AI responses took into consideration potential costs and efficiency when proposing measures to solve the problem which can be beneficial in less complex situations or can be used as a good starting point to discuss in complex situations. AI can be used for fast analysis of large amounts of data but further development of problem solutions should be left to human project managers.

On the other hand, human project managers excel in criteria communication, creativity, emotional intelligence which also confirms the findings from previous research. This result is expected as AI tools do not have true emotional intelligence and can not replace humans when it comes to emotions and empathy. In all of the human responses it is visible that they prioritized team dynamic, opinions of other team members and empathy. The results prove that human responses tend to be more affected by individual personal experience which in some situations may be limited and not leading to the optimal problem solution.

The limitations of this research can be found in small number of both problem situations and number of respondents which may lead to limited possibilities of generalization.

5 CONCLUSION

In general, it can be concluded that AI tools neither minimize nor replace the role of human project managers as Zoon Projektikon. On the contrary, AI tools make a great asset to project managers when implementing projects. AI can help project managers in solving some repetitive, simple situations, saving time and effort of project managers to focus more on complex situations. In any case, AI solutions should be considered only as a starting point that should be discussed and critically analyzed before accepted and implemented.

The research results brought into focus possibilities for future research. Namely in future research it would be good to see how the AI assesses the responses of human project managers to test the ability of critical thinking. Furthermore, it would be beneficial to compare results among different geographies, sectors and respondents' profile but also to apply similar methodology to a specific type of project (narrowing). Lastly, since AI tools are constantly changing and advancing, the same problem situations should be assessed to test whether AI-generated responses provide improved models in a near future.

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EXPLAINABLE ARTIFICIAL INTELLIGENCE IN THE CREDIT VERIFICATION PROCESS

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ABSTRACT

Credit offering has formed part of sustainable development over the years, as it provides access to economic opportunities for the underprivileged. Explainable Artificial Intelligence (XAI) plays a vital role in credit scoring, where transparency and interpretability are crucial for fostering trust, ensuring regulatory compliance, and mitigating biases in financial decision-making. Despite its high predictive accuracy, the AdaBoost algorithm has been criticised for its lack of interpretability, which can hinder its adoption in sensitive domains such as credit verification. This study aims to explore the integration of the XAI technique using Local Interpretable Model-agnostic Explanations (LIME) to enhance the transparency of AdaBoost-based credit verification models. We analyse the key features driving model predictions using a publicly available credit dataset and assess the trade-off between interpretability and predictive performance.

The findings reveal that XAI methods can effectively decompose the complex decision-making processes of AdaBoost, providing clarity into the factors (which were Debt to income ratio, delinquency and the credit age) influencing credit decisions for specific customers while maintaining high classification accuracy. However, the study highlights certain limitations, including utilising publicly available data instead of real data; further, large language models may be beneficial in making the models understandable through natural language. These insights contribute to advancing the development of explainable credit scoring models, ensuring their alignment with ethical and regulatory requirements while maintaining robust predictive capabilities.

Keywords: XAI, Credit Verification, LIME, Machine learning

1 INTRODUCTION

The current drama within the OpenAI board is interesting; the substance of the debate is whether OpenAI is committed to creating safe AI (Roush 2023). OpenAI is an organisation that has heightened research on generative AI, thus introducing ChatGPT in early 2021. The scholarly debate on safe AI has been topical and has been discussed in multiple disciplines. In law, the question remains on the accountability when AI errs (Engstrom and Haim 2023, 290). In social science, concerns are raised about fairness and whether AI can be trusted (Kellogg, Valentine, and Christin 2020, 371). Computer scientists have developed explainable AI, which addresses the black-box nature of algorithms by promoting transparency and safeguarding against bias (Shin 2021, 2). An industry that could substantially benefit from transparent AI is the financial services industry; as this industry is highly regulated, customer trust is key to sustaining profitability, and financial risk needs to be always managed. A process that poses the greatest financial risk to the point where a financial services organisation can be closed is the credit verification process (Jovanovic et al. 2024, 1). The credit verification process assesses a customer's historic credit profile to predict whether a customer will not default on future credit facilities or loans (Jovanovic et al. 2024, 1).

The objective of this study is to evaluate the transparency of the credit verification process when machine learning algorithms are used to predict customer credit facility defaults.

Trust plays a vital role in the recommendations made by AI systems in critical sectors such as healthcare, banking, and criminal justice. A key challenge lies in comprehending the intricate nature of machine learning models. While these models can decipher complex relationships between input variables and outcomes, understanding their underlying processes can be complex (Alblooshi et al. 2024, 2). The black-box nature of algorithm processes has led to calls for research on explainability in AI, particularly as there has been increasing pressure to give the right explanation on how and why a result was provided (Shin, 2021, p. 1). It is widely acknowledged that eXplainable AI (XAI) is essential for establishing trust in classifier algorithms. Nonetheless, varied theoretical frameworks and approaches exist in different research studies. XAI effectively elucidates biased and unbalanced datasets (Alblooshi et al. 2024, 2).

1.1 Purpose and Goals

The study's main goal is to evaluate the efficacy of the eXplainable Artificial Intelligence (XAI) model, known as Local Interpretable Model-agnostic Explanations (LIME), in explaining the results of our experimental trials. It aims to demonstrate the viability of incorporating LIME into the assessment of credit scores. The primary research question is: "Is it feasible to assess the transparency of the machine learning models in credit scoring applications?"

This study is practically significant as it can assist managers in organisations in managing credit verification risk using XAI. Furthermore, the study will assist managers in managing financial risk specifically caused by offering customers loans which they cannot afford to pay back (Alblooshi et al. 2024, 1). The study is theoretically relevant as it furthers knowledge in XAI specifically using LIME in evaluating credit verification models. Furthermore, it seeks to pinpoint any obstacles and constraints that may arise when utilising LIME in credit scoring analysis. Credit managers and customers are not acquainted with XAI models but can converse in natural language.

The study is organised as follows. The introduction outlines the research problem, objectives, and contributions. Followed by a literature review. Thereafter discusses the methodology. Following the analyses and discussion of the results, the study provides recommendations for future research.

2 LITERATURE REVIEW

The literature review's structure is as follows: It commences with exploring explainability, interpretability, and understandability. Subsequently, it addresses the classification models utilised in credit verification for this study AdaBoost will be utilised. Following this, it provides an elucidation of LIME, and it concludes with a comprehensive summary of the chapter.

2.1 Explainability, Interpretability and Understandability

This section explores the interconnected relationships among explainability, interpretability, and fidelity within the field of machine learning. Despite often being used interchangeably, these terms have nuanced differences. Explainable AI focuses on explaining the reasoning behind decisions rather than delving into the decision-making process itself (Chinnaraju 2025, 176). Explainability involves the ability to express a machine learning model and its results in a way that is easily understandable to individuals. It requires a comprehensive examination of the logical constructs that underlie the system's decision-making processes. By ensuring that insights from a machine learning model can be effectively communicated using precise and accessible language, explainability plays a crucial role (Adadi and Berrada 2018, 52140).

Interpretable AI provides insight into how decisions are made but may not necessarily provide explanations for the specific criteria selected (Vishwarupe et al. 2022, 870). Interpretability allows for understanding the results of learning models by revealing the rationale behind their decisions (Miller 2019, 2). Interpretable systems are considered explainable when humans can comprehend their processes, highlighting the close relationship between explainability and interpretability (Adadi and Berrada 2018, 52141). Interpretability and completeness (fidelity) are fundamental aspects of explainability (Gilpin et al. 2018, 2).

A comprehensive explanation should be human-comprehensible (interpretability) and accurately represent the model's behaviour across the entire feature space (fidelity). Interpretability refers to the extent to which humans can comprehend the connections between input variables and the resultant model predictions, thereby ensuring transparency and relevance of AI decision-making processes for relevant stakeholders (Chinnaraju 2025, 176). Simply put, The principle of fidelity addresses the level of accuracy with which explanations depict the true computational reasoning of AI models, thus protecting users from erroneous understanding based on excessively simplified or approximate accounts (Chinnaraju 2025, 190). The primary objective of eXplainable AI (XAI) is to enhance the interpretability of deep learning and machine learning models (Dastile, Celik, and Vandierendonck 2022, 69544).

2.2 AdaBoost in Credit Scoring

AdaBoost, or Adaptive Boosting, has emerged as a robust machine learning algorithm for improving predictive accuracy in credit scoring while handling complex and high-dimensional datasets. As an ensemble learning method, AdaBoost combines the outputs of multiple weak classifiers often decision stumps, into a single, strong classifier, progressively refining its predictive capabilities through iterative adjustments to misclassified instances (Freund and Schapire 1997, 156).

AdaBoost overcomes the limitations of individual classifiers as a weighted ensemble model by assigning greater emphasis to incorrectly classified instances during each iteration. This adaptive weighting mechanism allows the model to focus on difficult cases, enhancing its accuracy. Furthermore, AdaBoost's simplicity and flexibility make it applicable to a wide range of credit datasets, even those with imbalanced distributions, which are common in credit scoring scenarios (Rokach 2010, 5). AdaBoost also supports interpretability through post-hoc explainability techniques, which provide insights into the model's decision-making process. Using methods such as feature importance visualisations through SHAP (SHapley Additive exPlanations), the contributions of individual variables to predictions can be quantified (Lundberg and Lee 2017, 1)

2.3 XAI Models

Complex machine learning models often lead to black-box models, necessitating explanations through either post-hoc, ante-hoc, or instance-based approaches (Dastile, Celik, and Vandierendonck 2022, 69544). Post-hoc explanations involve utilising additional models such as Shapley Additive explanations (SHAP) and Local Interpretable Model-Agnostic Explanations (LIME). These methods, commonly known as eXplainable Artificial Intelligence (XAI) models, are frequently applied to elucidate underlying machine learning credit scoring models. On the other hand, ante-hoc explanation involves inherently interpretable models like Decision Trees. Instance-based explanations rely on specific instances to explicate the behaviour of a black-box model (Dastile, Celik, and Vandieren-

donck 2022, 69544). Explainable Artificial Intelligence (XAI) is a research area within artificial intelligence that aims to enhance the interpretability of machine learning models. Understanding these models is crucial as it enables us to grasp their inner workings, identify the most critical attributes influencing them, and comprehend the rationales behind their predictions (Alblooshi et al. 2024, 2).

2.4 Local Interpretable Model -Agnostic Explanation (LIME)

The Local Interpretable Model-Agnostic Explanation (LIME) framework is a publicly available resource designed to enhance trust in machine learning models by elucidating their decision-making mechanisms (Alblooshi et al. 2024, 3). LIME is structured to concentrate on specific data points, aiming to render models interpretable while remaining model-agnostic. This framework provides valuable insights into model operations, enabling the identification of critical areas within images or highlighting important features. Its key functionalities span image interpretation, text analysis, and evaluation of tabular data (Carmona, Dwekat, and Mardawi 2022, 10).

The increasing reliance on machine learning for credit scoring has necessitated the adoption of explainability techniques, such as Local Interpretable Model-agnostic Explanations (LIME), to enhance model transparency. Several studies have explored the efficacy of LIME in explaining credit scoring models, highlighting both its advantages and limitations.

The authors noted that LIME successfully highlights important features that affect credit decisions, enhancing the model's interpretability. Nevertheless, they observed that the effectiveness of LIME's explanations is heavily influenced by its parameter settings, which can result in inconsistencies. Additionally, LIME's local focus might fail to fully represent the model's overall behaviour (Gramigna and Giudici 2021, 2).

Similarly, LIME improves model transparency by offering clear explanations for specific predictions. However, it raised issues about LIME's applicability to the entire dataset and the computational expense of producing numerous local explanations (Aljadani et al. 2023, 15). In a recent study, researchers utilised LIME on neural network models, showing that it enhances trust in model outputs by providing clear, instance-based explanations. Nonetheless, the research revealed that LIME is less effective with highly imbalanced datasets frequently encountered in credit scoring (Chen, Calabrese, and Martin-Barragan 2024, 359). Furthermore, choosing the right parameters for LIME is crucial for delivering meaningful explanations (Nguyen and Truong 2024, 322). By integrating LIME with neural networks, the authors found that LIME helps interpret intricate models by emphasising key features. However, they pointed out that although LIME delivers localised interpretability, it fails to understand the neural networks' overall behaviour comprehensively. Additionally, the explanations produced by LIME were inconsistent when tested on various data subsets (Munkhdalai et al. 2019, 409). Another relevant study evaluated LIME's stability with imbalanced datasets. The findings indicated that as class imbalance increases, the reliability of LIME's explanations diminishes, which is a frequent issue in credit scoring models. This research emphasised the need for additional strategies to ensure LIME's interpretations remain consistent across different data distributions (Chen, Calabrese, and Martin-Barragan 2024, 358).

One limitation of using Local Interpretable Model-agnostic Explanations (LIME) is that it requires human interpretation of its outputs, which can be subjective, time-consuming, and prone to errors, especially for complex models (Ribeiro, Singh, and Guestrin 2016, 1137).

This limitation can be mitigated by employing Large Language Models (LLMs), which can process and summarise LIME's explanations in a more human-like manner, making the results more accessible and interpretable for non-experts (Suh et al. 2025, 2). By leveraging LLMs, the interpretability of LIME can be enhanced, allowing for a more efficient and scalable approach to model explainability.

2.5 Summary of the Literature Review

The study will focus on using AdaBoost, which has been found to provide the best results in credit verification. LIME is also quoted as being able to explain AdaBoost models (Lundberg and Lee 2017, 2).

3 METHODOLOGY

3.1 Datasets

The dataset used for the experiment in this study was the Home Equity dataset (HMEQ) used to predict clients who default on their loan. The dataset can be accessed publicly from Kaggle. The data was selected as it was the most recent data set at the time of the experiment as of January 2025. It had a usability score of 7,65 and 5960 rows and 13 columns. There were missing values in the data which were adequately treated.

3.2 Performance Measures

The confusion matrix is crucial for evaluating classification models, offering a detailed breakdown of predicted versus actual outcomes.

Table 1: Confusion Matrix

		Predictions	
		Positive	Negative
Actual	Positive	True Positive	False Negative
	Negative	False Positive	True Negative

(Source: Author's own work. The same applies to all subsequent tables and figures.)

In the confusion matrix presented in **Table 1**, positives represent defaults, whereas negatives represent non-defaults. The matrix categorises predictions into four outcomes:

- **True Positives (TP):** Instances where the model accurately identifies applicants as "bad" credit risks. This means that the customer was predicted to have defaulted, and they actually have defaulted.
- **True Negatives (TN):** Cases where the model correctly classifies "good" credit risks. This means the customer was predicted as having no defaults, and they actually did not default.

Recall centres on the model's ability to capture true positive cases.

- **False Negatives (FN):** Cases where the model fails to classify actual "bad" credit risks properly, misclassifying them as "good" credit risks. This means that the customer is predicted to have not defaulted, whereas in actual fact, they have defaulted.
- **False Positives (FP):** Instances where the model inaccurately classifies "good" credit risks as "bad." This means that the customer is predicted to have defaulted, whereas, in actual fact, they did not.

Recall is a particularly valuable metric for assessing model performance in credit scoring using the Home Equity (HMEQ) dataset. Recall, also referred to as sensitivity or the true positive rate, measures the proportion of actual "bad" credit risks correctly identified by the model. This metric is especially significant in credit scoring, where failing to identify high-risk applicants can lead to substantial financial losses. Recall is defined as:

$$\text{Recall} = \text{TP} / (\text{TP} + \text{FN}).$$

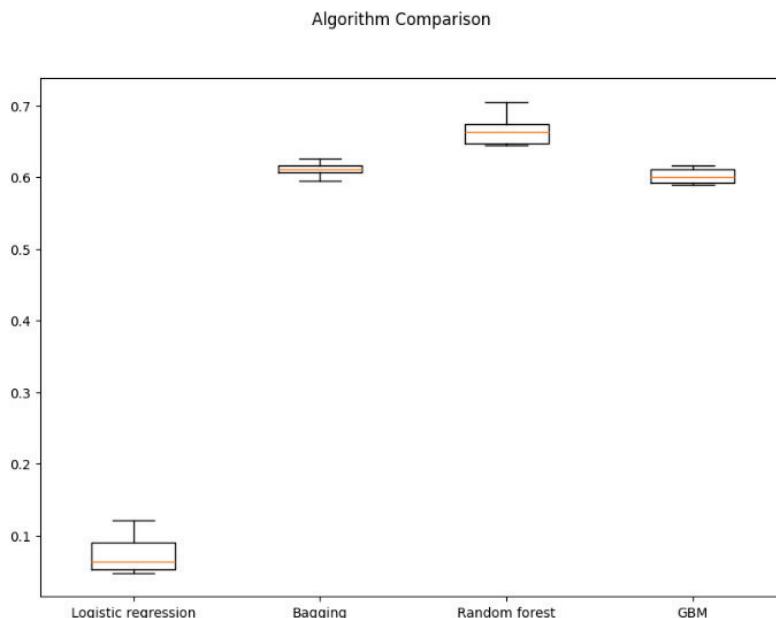
Failing to identify "bad" credit risks (false negatives) incurs a higher cost to financial institutions than mistakenly flagging "good" applicants as "bad" (false positives). **False Negatives (FN):** These errors represent applicants who are classified as "good" credit risks but default on loans. This situation results in direct financial losses and undermines the institution's risk management strategy. **False Positives (FP):** While these errors may lead to lost business opportunities or dissatisfied customers, the financial impact is usually less severe than that of false negatives. Financial institutions can minimise the risk of loan defaults by prioritising recall, thereby ensuring a more robust credit scoring process. A recall-focused approach in credit scoring underscores the model's capability to identify high-risk applicants, leading to fewer defaults. The confusion matrix and recall provide critical insights into the performance of credit scoring models applied to the HMEQ dataset. Financial institutions can effectively mitigate the risks associated with false negatives by concentrating on recall, enhancing their capacity to manage credit risk. Nonetheless, the trade-offs between recall, precision, and other metrics must be carefully evaluated to ensure the model aligns with broader business objectives and operational requirements.

3.3 Workflow

Data preparation included data exploratory data analysis. There were outliers in the data set. There were missing values in 11 of the 13 columns. To impute missing values for continuous variables, the median was used; the mean was not used as it would cause skewness in the data distribution. However, the median maintained the distribution of the data to be representative of its original distribution. For categorical data, the mode was utilised to impute missing values, thus providing a similar data distribution. The data was separated into training and testing data sets. The training data set comprised 80% of the data with 4768 rows and 16 columns. The testing dataset comprised of 20% of the original data with 1192 rows and 16 columns. Additional columns were a result of one-hot-encoding for categorical variables. The target variable was the column titled BAD indicating whether the client defaulted or paid the loan. This column was converted into numerical data: 1 representing defaulted clients and 0 representing loans repaid.

During model training, various models were trained to identify the best one. In Figure 1, we compare different models using Recall as a performance measure in the test set. Based on the Recall score, the logistic regression model had the lowest performance, whereas the random forest had the highest performance.

Figure 1: Algorithm comparison



The AdaBoost credit scoring model will be evaluated using recall in the confusion matrix as a performance indicator. The model with higher recall is considered better; in this case, Random Forest has the highest recall score.

4 RESULTS

The credit verification process initially employed Logistic Regression, Bagging, Random Forest, Gradient Boosting Machines. The results showed poor performance in these models as logistic regression provided the lowest recall, and the other modules were overfitting. The training recall score was significantly higher than the validation recall score.

The study evaluated the transparency of credit verification processes using machine learning, specifically comparing AdaBoost and Gradient Boosting models with explainability techniques. After addressing overfitting issues through SMOTE oversampling and hyperparameter tuning, AdaBoost

was selected as the optimal model due to its superior generalisation performance (84% validation recall versus 76% for Gradient Boosting). Feature importance analysis identified debt-to-income ratio, delinquencies, and credit age (CLAGE) as the most critical predictors of loan default. The LIME (Local Interpretable Model-agnostic Explanations) technique was applied to provide instance-specific explanations, revealing that for a particular defaulted customer, a high debt-to-income ratio (>37), multiple delinquencies, and adverse credit reports were the primary factors driving the default prediction. However, the study highlighted a significant limitation: LIME outputs proved difficult to interpret in natural language, making them cumbersome for credit risk managers to use in practice. The research concluded that while XAI methods like LIME can effectively decompose complex decision-making processes and maintain high classification accuracy, future work should explore integrating large language models to translate technical outputs into more accessible, human-understandable explanations for business users.

5 DISCUSSION

The trained models indicate a high recall score, as illustrated in Table 2 below. The model with the highest recall is Gradient Boosting, tuned with oversampled data, followed by the AdaBoost classifier, tuned with oversampled data. Although random forest showed the best performance compared to other models, it was significantly overfitting with a training set recall of 95% and on the validation set a recall of 81%. Hence, we opted for gradient boosting and AdaBoost comparisons as they were showing less overfitting.

Table 2: Training Performance Comparison

Performance Matrix	Gradient Boosting tuned with oversampled data	AdaBoost classifier tuned with oversampled data
Accuracy	0.975	0.956
Recall	0.974	0.954
Precision	0.976	0.958
F1	0.975	0.956

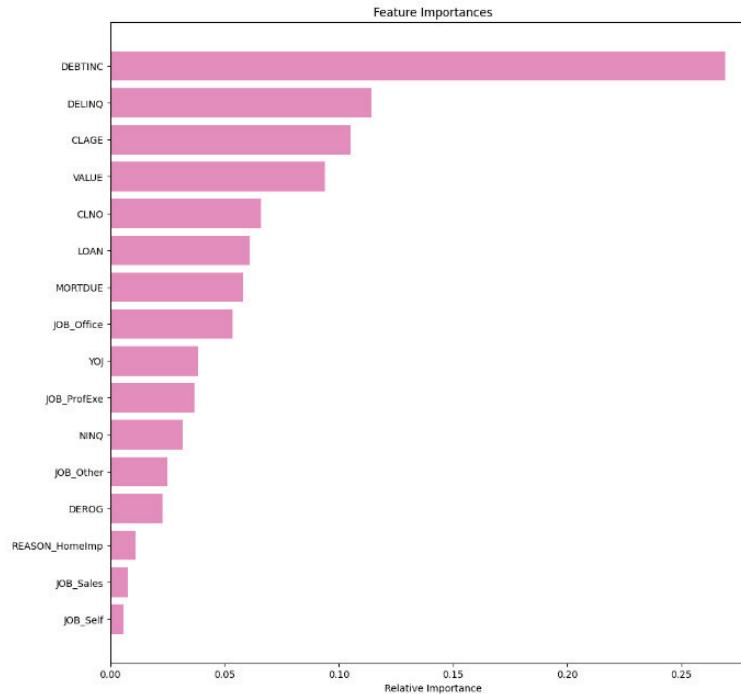
The criterion selected by the researcher for an overfitting model is 10%. Please note that this value was arbitrary and not scientifically determined, as this is the author's choice. A difference greater than of 10% between the training performance score and the validation performance score would result in the model not being considered for further analysis. The validation performance comparison indicates a lower score, as illustrated in Table 3 below. Gradient Boosting tuned with oversampled data indicates a recall score of 76% compared to 97% in the training data set. This indicates that the model is overfitting; therefore, the predictions may not be accurate compared to the actual data set. AdaBoost classifier tuned with oversampled data indicates a recall score of 84% compared to 95% in the training data set. This is less than 10% of the selected threshold; therefore, the data is not overfitting, and AdaBoost is the selected model.

Table 3: Validation performance comparison

Performance Matrix	Gradient Boosting tuned with oversampled data	AdaBoost classifier tuned with oversampled data
Accuracy	0.884	0.910
Recall	0.756	0.845
Precision	0.692	0.742
F1	0.723	0.790

The feature importance indicated in Figure 2 below indicates that the most important feature is the debt-to-income ratio; a ratio of less than 1 indicates that a client has lower debt compared to their income. A higher than one ratio would indicate that the customer is over-indebted.

Figure 2: Feature Importance

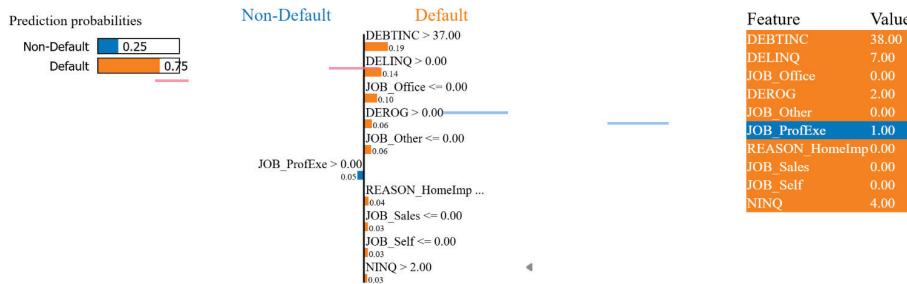


The second important feature is delinquencies, which indicate the number of days a customer has not paid their debt from the due date. A number less than 30 days would indicate that the customer is still within a calendar month of paying an overdue debt. A number above 30 days adversely reflects that the customer's debt has been overdue for more than a month. The third important feature is CLAGE, which indicates the age of the debt; as this data set represents home equity, the duration of the debt is likely to be multiple years.

5.1 LIME

LIME is a single instance explanation technique, which means that we only look at one data point at a time and explain it. The selected data below is a defaulted customer. The item's actual features are represented in Figure 3 below.

Figure 3:LIME results



The model predicts a 75% probability for the instance being classified as "Default" and a 25% probability for "non-default." Since the "Default" probability is higher, the model predicts this instance as "Default." The bar chart on the right explains how individual features contribute to the prediction. Orange bars push the prediction towards "Default," while blue bars push it towards "non-default."

The key features pushing towards "Default" are:

- DEBTINC (Debt-to-Income Ratio > 37.00)
- DELINQ (Delinquencies > 0)
- DEROG (DEROG > 0) (Adverse reports)
- JOB Office (<= 0)

It is not easy to explain the outputs in natural language or in a humanly understandable manner, so a credit risk manager might find it cumbersome to interpret the outcome for an applicant/ customer. However, this is the explanation for this instance.

The Local Interpretable Model-agnostic Explanations (LIME) analysis confirms that a high debt-to-income ratio at 37 is the most significant predictor of loan default for this customer, contributing to the likelihood of default. Additionally, a history of seven instances of delinquent behaviour—where the customer has failed to meet payment obligations on time substantially increases the probability of default. The presence of more than one adverse credit report, which typically indicates severe financial distress, such as accounts sent to collections or legal judgments, further classifies the individual as highly likely to default. Moreover, two recorded derogatory remarks (DEROG) in the customer's credit history—indicating severe adverse credit events such as bankruptcies or charge-offs—slightly increase the probability of default. These findings highlight the significant influence of financial stability and past credit behaviour in assessing default risk.

6 CONCLUSION

This study aimed to enhance the explainability of credit verification processes using AdaBoost, with Local Interpretable Model-agnostic Explanations (LIME) as an explainable AI tool. The methodology used the publicly available Home Equity (HMEQ) dataset to develop credit verification models, including logistic regression, bagging, random forest, and gradient boosting machines (GBM). However, these models exhibited overfitting. To address this, the data was balanced using the Synthetic Minority Over-sampling Technique (SMOTE), and both a tuned Gradient Boosting model and an AdaBoost classifier were trained on the oversampled data. AdaBoost was ultimately selected as it demonstrated improved generalisation without overfitting, making it a more reliable choice for credit risk assessment.

The findings from the feature importance analysis and the LIME results highlight key factors contributing to loan default, but they differ in their level of specificity and the factors they emphasise. Both methods identify the debt-to-income ratio and delinquent behaviour as significant predictors of default, demonstrating consistency in their financial risk assessment. However, the LIME results provide a more detailed, instance-specific explanation by assigning a specific contribution rate to the debt-to-income ratio (37) and highlighting additional factors such as adverse reports and derogatory credit history. In contrast, the feature importance analysis identifies credit age as a key determinant of default risk, which is not explicitly emphasised in the LIME results for this particular customer. This suggests that while LIME is useful for understanding individual cases, feature importance provides a broader, more generalised view of the most influential variables across multiple customers. Together, these methods offer complementary insights into credit risk assessment.

It proved difficult to explain the prediction only using LIME. The outputs are not easy to explain in natural language or in a humanly understandable manner. As a result, a credit risk manager might find it cumbersome to interpret the outcome for an applicant/ customer.

6.1 Limitations and Future Research

The research used publicly available data, which provided a simulation of the real environment. The research findings would be different if real data had been used, which would provide better insight into how explainable AI models can explain complex models. The research project would further provide different insights if deep learning models were utilised for credit verification purposes. As explainability is defined as humans understanding complex models in human language, an interesting future study would be the interpretation of the results of a credit verification model using natural language processing models using large language models. Due to time limitations the researcher was not able to perform LLM experimentations.

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1.08 Objavljeni znanstveni prispevek na konferenci
Published scientific conference contribution

THE RISE OF AI IN THE EDUCATIONAL LANDSCAPE FOR PROJECT MANAGERS

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ABSTRACT

The application of artificial intelligence (AI) is increasingly being incorporated into projects and project management. This trend is driven by the potential benefits that AI can bring to project management. However, since project managers still have limited competence in using AI technologies, educational opportunities are increasingly in demand. However, the specific requirements AI users have for projects remain unclear as to which training programs are effective. Therefore, our research aimed to identify the requirements, the training programs offered, and the need for education to utilize AI in project management. Ultimately, we sought to clarify how appropriate educational offers could effectively improve the application of AI in project management.

Based on a systematic literature analysis, we researched the requirements of AI users in education projects and the courses currently available. The analysis reveals that integrating AI technologies is transforming the landscape of project management. Studies indicate that professionals must develop technical and soft skills to leverage AI tools effectively. This dual focus is crucial as AI enhances decision-making, resource allocation, and risk management processes. Overall, our results confirm that educational programs should be refined and AI application competences should become an integral part of project management curricula.

Keywords: Artificial Intelligence, Project Management, Education, Technology Acceptance

1 INTRODUCTION

AI is becoming increasingly important in almost all areas of the economy. New applications in research and practice are also being reported in project management. However, these applications are mainly driven by technically adept experts. Most users still lack sufficient knowledge of AI's technological possibilities or the necessary application-related understanding. For this reason, our study examined the impact of AI on the educational landscape in terms of project management. This resonates with research findings that assert the introduction of AI into higher education (Crompton and Burke 2023), on the one hand, and with the demand for digital competences for project managers as a "must-have" in contemporary times (Marnewick and Marnewick 2021) on the other. Initial approaches to enriching higher education offerings with AI generally relate to education, rather than explicitly to education in project management (Chan 2023; Clegg & Sarkar 2024), but have been called for several years (Auth et al. 2019). Students are also increasingly demanding this (Chan and Hu 2023; Smit et al. 2025). Our research aims to bridge this gap by identifying the current requirements for the application of AI in project management and showing what impact this may have on future educational offerings for project managers. As research has so far examined these questions in a non-systematic manner, we set out to conduct a systematic literature review to determine the current prevalence of AI in higher education and to identify the requirements for corresponding educational offerings in project management. This provides an essential basis for future research in this field and gives continuing education institutes and teachers important insights into which offerings could be helpful. Finally, it also helps project managers understand which educational offerings could benefit them in the context of AI. After this introduction, the purpose and objectives of our investigation are described. The methods section and the presentation of the results follow, which are then discussed and finally concluded.

2 PURPOSE AND GOALS

Our study aimed to analyze the diffusion of AI in educational offerings for project managers and to identify requirements for future educational offerings. Furthermore, we were interested in the general application of AI in project management as well as the potential limitations and challenges related to the people involved. The following research questions were the focus of our study: 1. What educational opportunities for project managers address AI? 2. Which requirements for the competences (primarily technical and human) of a project manager should be addressed in education? 3. To what extent is AI already integrated into project management today, and what challenges does this pose for the people involved?

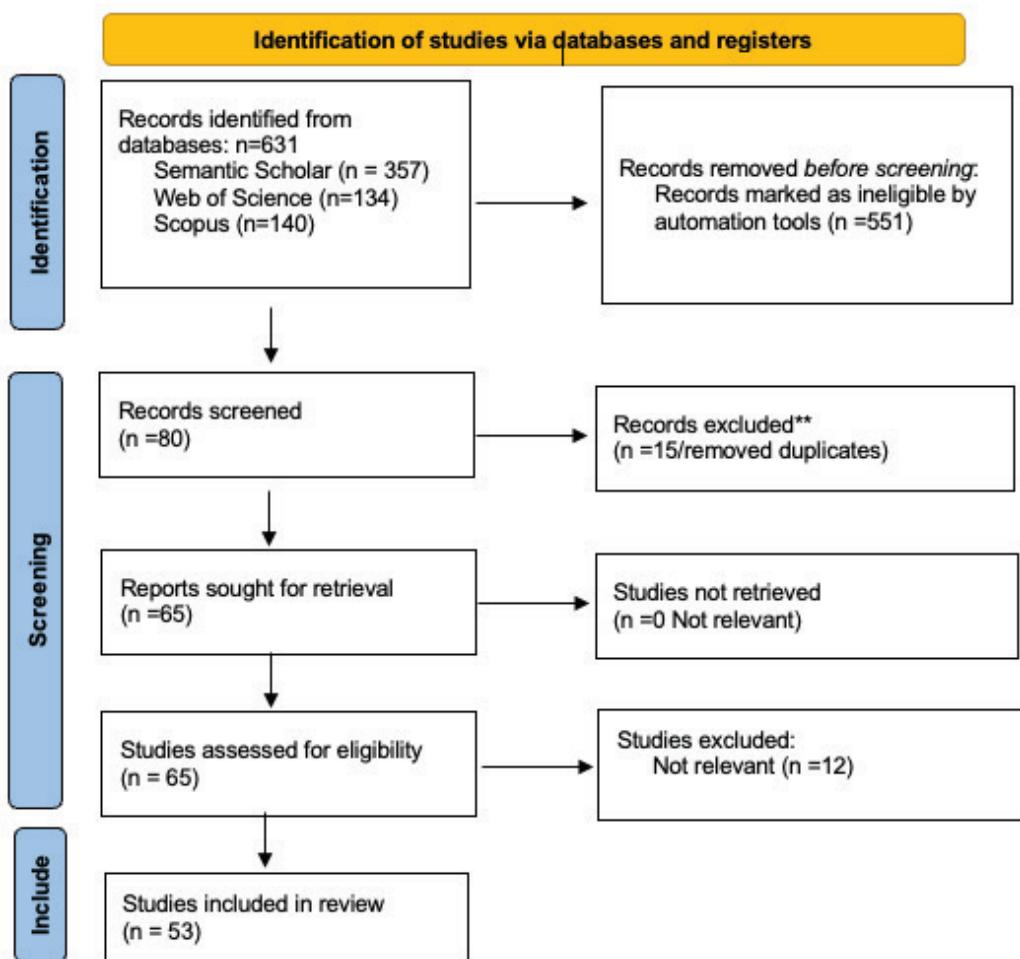
3 METHODS

This study employs a qualitative research approach, utilizing a systematic literature review (SLR) and thematic content analysis to investigate the application of AI in project management, with a focus on educational requirements, necessary skills, and learning programs. The review process involved designing a comprehensive search strategy, clearly defining inclusion and exclusion criteria, and carefully identifying relevant resources. This research followed a systematic literature review (SLR) approach to collect relevant studies, adhering to the PRISMA 2020 guidelines (Page et al. 2021). This ensures transparency, consistency, and reproducibility of findings. By systematically searching, selecting, and analyzing existing studies, the research investigates how AI is applied in project management, particularly in the context of education and skill development. The research analyzed existing academic articles, industry reports, and case studies using the SLR methodology to gain comprehensive insights into AI's role in project management. Data collection took place during September and October 2024. The study was conducted globally, without limiting the analysis to a specific geographic region, as the selected databases include research from around the world. Formal ethical approval was not required since this study is based on secondary data from published papers and reports. However, the research adheres to ethical principles, ensuring all sources are correctly cited and paraphrased to comply with academic integrity and copyright standards. This study relies solely on publicly available sources, ensuring that no personal or sensitive data is collected.

3.1 Identification

All relevant studies have been collected from three academic databases: Semantic Scholar, Web of Science, and Scopus. The ultimate starting condition is that the study title includes both components. AI+PM was used to identify resources, ensuring that only studies explicitly addressing both topics defined in this research (AI in PM, excluding other matters or individual topics) were included. In these search engines, besides the mentioned two obligatory terms "Artificial Intelligence" or "AI" and "Project Management" or "PM", for initial explorations across existing reviews, the following diverse terminology was used within titles as well: "Education"/"Requirements" or "Training/Learning Needs"/"Skills" or "Competence Development" targeted literature discussing necessary skills for AI within project management; "AI Applications" or "AI-Driven Tools"/"Challenge" included studies exploring specific AI tools and applications in project management; "Curriculum Development" or "Education"/"Training" focused on educational frameworks, encompassing formal curricula or other forms of informal education, such as online courses or lifelong learning training, investigated how AI is integrated within project management education.

Figure 1: PRISMA 2020 flow diagram for SLR AI in PM



(Source: Created by the authors)

The aim was to identify publications that study the relationship between AI and PM, with an explicit focus on the impact of AI in PM, its applications, and how it relates to the competences, skills, knowl-

edge, and training required during this transition. This includes studies exploring the availability of education and training for the competences needed for AI in PM. Synonyms and related terms were also included to broaden the scope and identify more relevant studies. In the first step of the systematic literature review, built-in automation tools within the academic databases (Semantic Scholar, Web of Science, and Scopus) were used to automatically exclude records that did not meet predefined criteria ensuring that only relevant publications were retained for further screening. The research was filtered according to the following inclusion criteria: publication period (2020–2024), research fields (Economics, Business, Computer Science, and Education), and the language set to English only. Studies that did not meet these criteria were excluded from further analysis. This rigorous search and selection process ensured that the review included relevant studies. Figure 1 shows the selection strategy chart based on the PRISMA guidelines. As a result, 65 papers were included in this literature review.

3.2 Screening, analytical methods, and tools for data analysis

QDA Miner Lite was used for thematic content analysis, while data organization was managed in Microsoft Excel. The 65 studies that were collected were catalogued in an Excel table and presented as a list of authors. For each author (defined as "case"), the following details were displayed in separate rows according to the column headings (defined as "variables"): ordinal number, author, title, and abstract. The cleaned data was imported into QDA Miner Lite for further data analysis. Firstly, the data was extracted. The review was done by reading the abstracts of each author, extracting key information relevant to the researcher's topic and pertinent details (research proposal, study method, location, and sample) as initial coding to gain insight into the sample scope. Then, the coding process was conducted to identify authors whose studies addressed key themes defined within the four categories: 1. AI in PM Expertise and Education – addresses questions related to educational and training programs and the need for AI in PM competences; 2. Requirements for AI in PM – examines the key requirements, including technical and soft skills, necessary for successfully implementing AI in project management; 3. AI application in PM – focuses on identifying how AI is adapted within project management practices, and 4. Considerations of AI in PM – Indicate what the authors of the reviewed literature have identified as constraints and highlight potential areas that require more attention in the future. Codes were assigned manually in the QDA software variable based on the main themes identified in each source, aligning with the key topics addressed in the respective literature. An overview of the codes, along with their descriptions, is presented in Table 1.

Table 1: Framework for Categorization and Coding of AI in Project Management

Category	Code	Description
AI in PM Expertise and Education	Educational Programs	Discussion of educational trainings and programs related to AI in project management.
	AI Competences	Required expertise or educational needs in the field of AI.
Requirements for AI in PM	Technical Skills	The technical skills required to effectively use AI tools in project management.
	Soft Skills	The interpersonal and cognitive skills necessary for AI-driven project management.
	Human Need	Identified human needs or contributions in the context of AI in PM
Application of AI in PM	AI in PM	The application of AI in project management.
	Adaptation	The process of accepting/adopting AI within project management practices
	Integrating AI in PM	The incorporation of artificial intelligence into project management workflows.
Considerations of AI in PM	Limitations of AI	Identified, recognized, or recommended limitations of AI in PM
	Challenges	Identified challenges associated with AI implementation in project management.

(Source: Created by the authors)

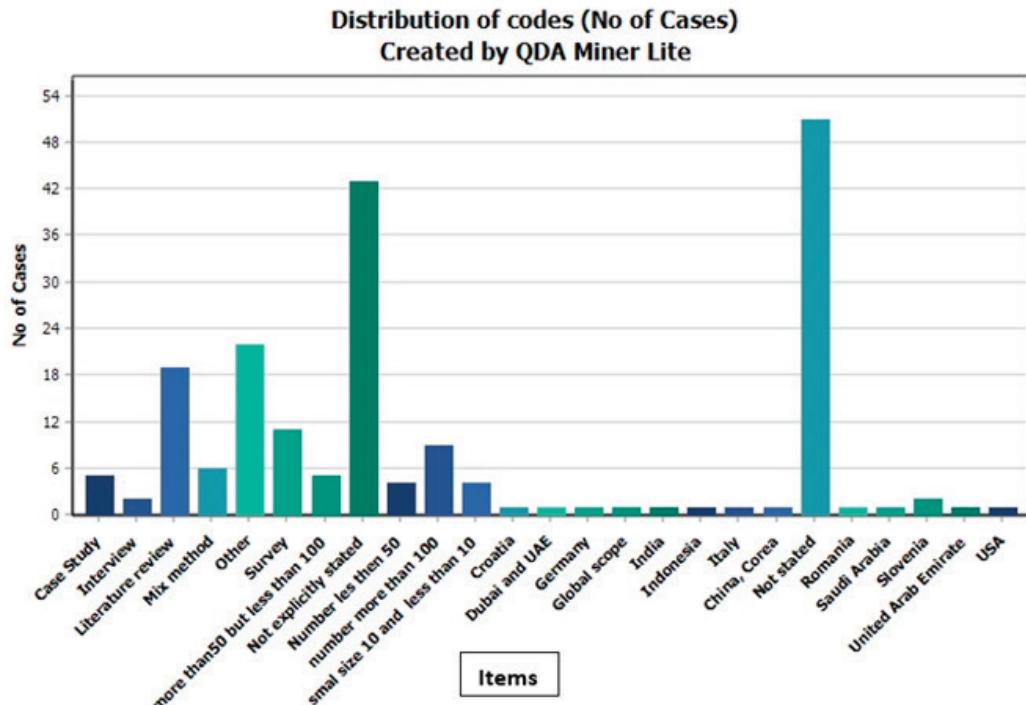
The final analysis included a detailed review of selected studies available in PDF form, during which discussions and conclusions were analyzed to confirm the codes and provide a descriptive presentation of the findings. This thematic analysis was conducted to identify trends and the current state of research in this field, providing insights into requirements, training offered, and education needs. As this is a qualitative study, no statistical methods were applied. Instead, thematic content analysis was conducted using QDA Miner Lite, with results presented through a descriptive analysis of key theme findings. The presentation of findings by reference authors is provided in Appendix I.

4 RESULTS

4.1 Overview of source publications

This search identified 65 studies from Semantic Scholar, Web of Science, and Scopus. Based on an analysis of the study abstracts, three key categories were considered to gain a sample scope: geographical distribution, sample size, and research method. The dominating codes are shown in Figure 2.

Figure 2: Sample scope distribution



(Source: Authors, based on primary data)

Geographical Distribution: Nearly 80% of studies do not specify a research location, reflecting the nature of Literature Reviews, which compile global data without a regional focus. The remaining 20% includes various regions, ensuring diverse perspectives and international relevance for AI in project management.

Sample Size: In 66% of studies (43 sources), the sample size is not explicitly mentioned, likely due to the use of qualitative or review-based methodologies. Among those that report sample sizes, 14% use large samples (100+ units), 7.7% use medium-sized samples (51–100), and about 6% each use small samples (up to 50 or 10). This diversity balances broad trends with detailed case studies, making findings applicable across different research contexts. No standard thresholds exist for classifying the size of systematic literature reviews. Wang et al. (2023) report a median of 57 studies

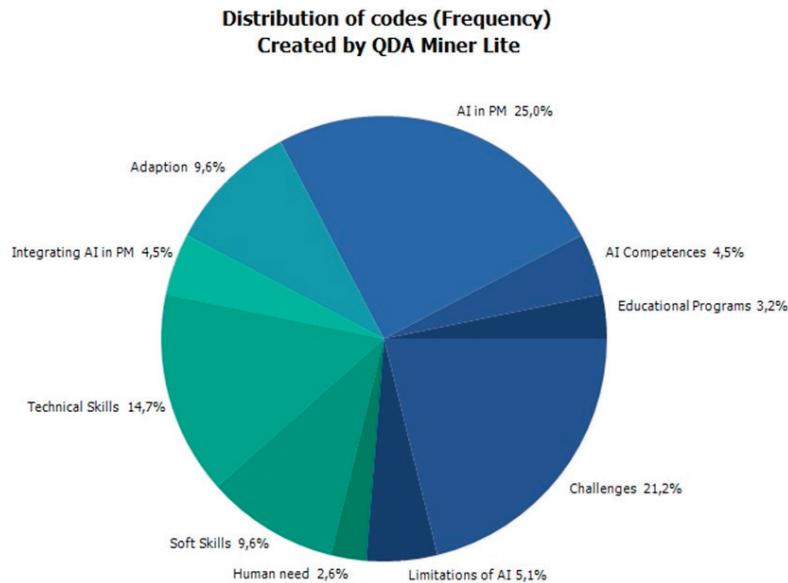
per review in software engineering, which aligns with our definition of a 'medium' review (51-100 studies). Accordingly, to facilitate interpretation we define small (≤ 50), medium (51-100), and large (> 100) reviews. This categorization is transparent, context-specific, and supports meaningful differentiation in review scope and complexity.

Research Methods: The most common method is a Literature Review (29.9%), which is crucial for mapping existing knowledge. "Other Methods" (32.8%) include theoretical analyses, framework development, and practical evaluations. Surveys (16.4%) offer quantitative insights, while mixed methods (9.0%) ensure comprehensive analysis. Case studies (7.5%) and interviews (4.5%) provide deep, qualitative perspectives. The dominance of quantitative research, supported by mixed methods, ensures a well-rounded examination of AI in project management. The research sample encompasses various methodologies and perspectives, providing a comprehensive and industry-wide understanding of AI applications in project management. The findings provide a foundation for thematic analysis, highlighting the need for structured data to enhance research clarity and practical AI applications.

4.2 Thematic Analysis Findings

In the reviewed publications, several key themes emerged regarding AI applications in project management, necessary educational competences, and the challenges associated with AI integration in PM. Those themes represented by a code were grouped into four main categories, as summarized in Table 1 from Section 2. The following graph in Figure 3 illustrates the distribution of codes found.

Figure 3: Distribution of Codes in AI Project Management (PM)

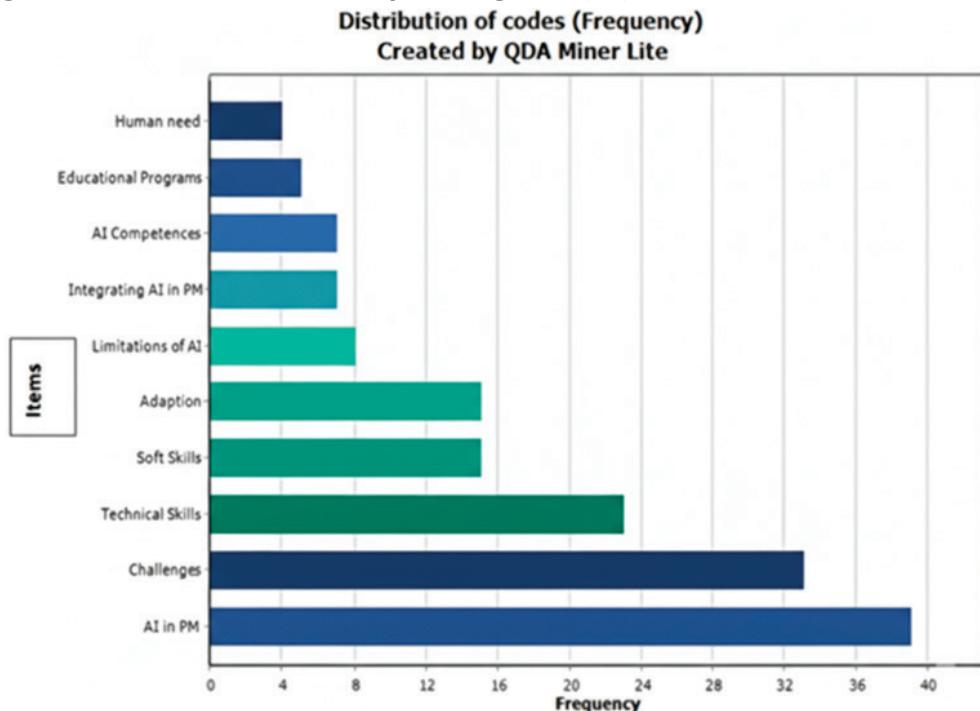


(Source: Authors, based on primary data)

The most frequent code is "AI in PM", accounting for 25%, indicating that AI applications in project management have received the most research attention among the reviewed studies. This is followed by "Challenges" at 21% and "Technical Skills" with a slightly lower frequency of 14%. The lowest frequency is observed for "Human Need", at just 2.6%.

The next, additional figure presents the distribution of studies or case analyses based on the themes (set codes) they investigated. It is important to clarify that some studies address multiple themes simultaneously—for example, a study may explore both human needs and challenges related to AI in project management. Therefore, in this graph (Figure 4), a single study may be assigned more than one code, which means that the total frequency of codes does not correspond exactly to the number of studies, and the cumulative percentages do not add up to exactly 100%.

Figure 4: Distribution of Cases in AI Project Management (PM)



(Source: Created by the authors)

The distribution of cases aligns with the frequency of codes, reflecting the key areas of focus in the reviewed studies. This indicates which topics the authors emphasized the most. The following section provides a descriptive interpretation of the results, categorized into the four thematic groups mentioned.

4.2.1 AI in Project Management: Expertise and Education

The findings indicate a growing emphasis on AI-related education and competency development among project management professionals. However, only 8% of studies address educational programs, with none exclusively focusing on AI education within the project management domain (Hossain et al. 2024; Aggrawal and Dittman 2023). Nonetheless, several studies emphasize the importance of structured AI training and competency-building initiatives (Obana 2024). Furthermore, 11% of studies emphasize the essential nature of AI-related competences, particularly in areas such as decision-making, automation, and predictive analytics (Paparić and Bodea 2024; Müller et al. 2024; Merdžanović et al. 2023). The findings suggest that the current landscape of AI education is fragmented, with inconsistencies across academic institutions, which limits the establishment of a standardized framework for AI skill development (Deshpande 2023). A global study by Müller et al. (2024) reports that more than 50% of surveyed project management professionals possess limited knowledge of AI, further underscoring the nascent stage of AI adoption in this field.

With the increasing prevalence of generative AI, Deshpande (2023) advocates for educational programs that balance technical expertise with interpersonal competences. Similarly, Oyekunle et al. (2024) emphasize agility, cross-functional collaboration, and data-driven decision-making as critical competences in AI-driven project environments. Obana (2024) further highlights the need for a balanced approach integrating both hard and soft skills to ensure effective AI implementation in project management. These findings align with the Report on the Impact of Artificial Intelligence on Project Management, which projects significant disruptions necessitating comprehensive change management and leadership coaching (Belharet et al. 2020).

4.2.2 Core Requirements for AI Integration in Project Management

Technical competences essential for successfully integrating AI in project management were a prominent theme in 34% of reviewed studies. The core technical skills identified include data analysis and predictive analytics, Fundamentals of machine learning and artificial neural networks (ANNs), AI-driven risk assessment, and the interpretation and utilization of AI-generated reports for decision-making. Additionally, the Integration of AI tools into project workflows is emphasized (Niederman 2021; Rathod and Sonawane 2022).

While project managers are not required to be IT specialists, they must possess proficiency in leveraging AI technologies for strategic decision-making, resource allocation, and team leadership (Niederman 2021). AI facilitates productivity improvements through automation and optimization, necessitating familiarity with web technologies, data processing, and refinement of AI models (Paparić and Bodea 2024). Rathod and Sonawane (2022) further emphasize the role of artificial neural networks in predicting project-related risks, particularly within the construction sector.

Beyond technical expertise, 17% of studies emphasize the importance of soft skills, including data-driven decision-making, effective communication of AI-related insights, interdisciplinary collaboration, and digital leadership (Fridgeirsson et al. 2021; Zahaib Nabeel 2024; Hossain et al. 2023; Diao 2023; Odeh 2023; Alshaikhi and Khayyat 2021). Critical thinking, emotional intelligence, and adaptability are fundamental for managing AI-driven project environments (Deshpande 2023). Moreover, 5% of studies examine the indispensable role of human expertise in conjunction with AI advancements. Fridgeirsson et al. (2021) argue that leadership, stakeholder engagement, and team development rely on human judgment, emotional intelligence, and contextual understanding. While AI enhances operational efficiency, human intervention remains critical in complex project management scenarios (Sahadevan 2023).

4.2.3 AI Applications in Project Management

AI applications in project management were examined in 54% of reviewed studies, with the most frequently analyzed implementations including resource optimization: AI improves scheduling and resource allocation (Zahaib Nabeel 2023); Risk management: Predictive models facilitate risk identification and mitigation (Crawford et al. 2023; Merdžanović et al. 2023); Decision-making support: AI-powered tools enable enhanced project planning and real-time decision-making (Fridgeirsson et al. 2021; Taboada et al. 2023).

Additionally, AI has demonstrated significant potential in minimizing project delays and optimizing cost efficiency, particularly within the construction sector (Rathod and Sonawane 2022). However, despite its advantages, 23% of studies highlight key barriers to AI adoption, including high implementation costs, system complexity, and limited expertise among project professionals (Sarafanov et al. 2023; Buschmeyer et al. 2022).

The level of AI adoption varies across industries, as reported in 11% of studies, with financial and technical constraints frequently impeding progress (Alshaikhi and Khayyat 2021; Belharet et al. 2020). AI technologies are still in the early stages of integration, with limited applications in areas such as stakeholder management, procurement, and project communication (Hashfi and Raharjo 2023).

4.2.4 Considerations and Limitations of AI in Project Management

11% of studies explored the challenges associated with AI implementation, with primary concerns including Bias in AI-generated decision-making, High costs associated with AI adoption, Regulatory and compliance challenges, and Ethical concerns related to data privacy and automation (Zahaib Nabeel 2024; Sahadevan 2023).

Despite technological advancements, 35% of projects reportedly fail due to the immaturity of AI technologies (Nenni et al. 2024). Additional barriers include resistance to change within organizations and the substantial training requirements necessary for effective AI utilization (Engel et al. 2021; Müller et al. 2023).

While AI significantly enhances project management efficiency, it does not replace human-centric skills such as leadership, stakeholder engagement, and strategic decision-making (Fridgeirsson et

al. 2021). AI should, therefore, be viewed as a complementary tool that augments human expertise rather than replacing it (Sahadevan 2023).

5 DISCUSSION

The research conducted undoubtedly confirms that AI is a hot topic in research, but it is still in its initial phase, with much of the research focused on qualitative analyses. Researchers are aware that the emergence and application of AI represents a milestone after which several practices or principles confirmed so far should be re-examined. Given that the topic is new and complex, differences in approach and research goals can be observed. Part of the researchers' approach involves examining the macro aspect to see the impact of AI on the totality of existing knowledge and practices. Meanwhile, some researchers take a micro view, studying the potential new opportunities that AI offers in the development of a particular topic.

It can be asserted that the complexity of the subject of AI has, in some way, shaped the current topic, such that some researchers focus their research on the question of how AI can best assist us in our current practices and principles of work. In contrast, some researchers question whether the advent of AI can or should change certain aspects. Until now, there has been the least amount of research on the topic of the influence and possible imbalance of the human-centric system due to the emergence of AI, i.e., the complete takeover of a part of human creative work by AI. This is entirely understandable because the mentioned topic represents a key and complex question that has social, humane, legal, technical, and business aspects so that answers will be sought in future research over a more extended period.

The research conducted confirms the above statements for the field of education, including project management. A paper by a group of well-known researchers sparked discussions about the rise of AI in project management education and training. While setting the call for the further research they indicated an illustrative list of potential aspects to be addressed: Transformative impact of AI, AI and new technologies in Project Management learning in different contexts, Assessment and pedagogics, new competences and skills of educators, ethical considerations, innovative technologies in education, project management learning and training in business context (Mariani et al. 2024.). Our research aligns with this framework, and the primary aim was to present findings on opportunities, requirements, and challenges.

Our results show that the topic of AI in PM has a global research presence, with overviews and qualitative research dominating, mostly from secondary sources. In a way, this is expected and confirms that the topic is still in the initial phase of opening and that there is a lack of more exact quantitative research, i.e., case studies. The speed with which new research results appear confirms that researchers believe in an essential role of AI in facilitating learning in the PM area (Konstantinou et al. 2023). The results of this research also confirm that in the thematic sense, AI is still treated as a new topic dominated by the concept of broad questioning of the topic (i.e., "AI in PM") and associated challenges, with an inevitable shift towards researching the role of AI in the domain of technical skills. In contrast, topics that combine "AI & soft skills" are still poorly represented, probably because they are incredibly complex. However, researchers are aware that the soft side of AI in PM must be equally developed in parallel with the technical part of skills (Obana 2024).

The results related to AI in Project Management: Expertise and Education demonstrate the synergy of opinions regarding needs and importance, while also highlighting the fact that relatively little has been done in this area (Deshpande 2023; Müller et al. 2024). Regarding core requirements for AI integration in project management, it is clear that support from AI specialists is necessary, as well as project managers understanding the possibilities, conditions, and limitations of AI use to a certain extent. Even when AI is used for problems familiar to project managers, such as resource optimization, risk analysis, or decision-making, they must first perfect a new way of thinking, an "AI-driven mindset." Namely, it is challenging to combine the old logic of work and thinking without harmonizing it with AI, even if AI is viewed as just a new technology (and it is much more). Obviously, the central question for the future will be the potential gap between human-centric and AI approaches, and their coexistence in creating greater value that is realized through the process of project delivery. The results of our research indicate that AI is in the initial phase of integration into today's

project management, and a dynamic of activity is emerging that foreshadows a different future for the profession, which, at this moment, we cannot fully see or describe. This is precisely why the formal education of project managers who will work in the future needs to be continuously aligned with the development of AI. Given the magnitude of change and the rapid pace of AI development, adjustments are necessary for the higher education curriculum and training throughout the process of continuous learning. It is by no means learning additional new facts, but rather the ability to develop a different way of thinking, according to a scenario in which, in the future, AI will be "an equal member of the project team when deciding on important issues. In our opinion, project managers of the future will have to know even better all areas of PM competences to lead delivery projects with the help of, or together with AI, towards creating greater value and benefit for stakeholders and the community.

6 CONCLUSION

The results of our research show that the emergence and application of AI are highly current and important topics for researchers and practitioners in the project management profession. The topic of AI is still in its initial stage of research, globally present, but primarily through initial research and application results, which reveal some standard issues that project managers encounter daily, such as resource utilization optimization, risk management, and decision-making in complex situations. It appears that research and application are currently focused on the technical aspects and competencies, while the human-centric elements have been overlooked. It is undeniable that the issue of the relationship between human intelligence and AI will be central to future development, including the project management profession. Viewed from the community's perspective, this issue is complex and encompasses social, human, regulatory, normative, business, and other aspects, all of which require extensive research.

We believe that the education process would benefit from a faster and more effective approach by harmonizing the curriculum and training project managers to work in new circumstances with the help and partnership of AI. An insight into the activities so far in this matter indicates a serious gap. This is not just about a one-time, top-notch education that is the foundation, but about the systematic maintenance of top-notch competences through times of turbulent and rapid change. Suppose we do not adequately educate and re-educate future project managers for new challenges and situations. In that case, we can already ask ourselves who will be the project manager of the future: human or AI? The solution is undoubtedly in the harmony of work that results in project deliveries, benefiting both project stakeholders and the community in which the project is implemented.

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APPENDIX I

Category	Code	Relevant Authors	Summary Explanation
AI in PM Expertise and Education	Educational Programs	Hossain et al. (2024), Parekh et al. (2024), Engel et al. (2023), Oyekunle et al. (2024), Aggrawal and Dittman (2023)	These authors emphasize the need for education and the development of educational programs to prepare professionals for working with AI technologies.
AI in PM Expertise and Education	AI Competences	Paparić and Bodea (2024), Obana (2024), Sahadevan (2023), Belharet et al. (2020), Deshpande (2023), Oyekunle et al. (2024), Müller et al. (2024), Merdžanović et al. (2023)	Emphasizes the need to develop AI competences among project managers.
Requirements for AI in PM	Technical Skills	Värzaru (2022), Fridgeirsson et al. (2021), Zahaib Nabeel (2024), Hossain et al. (2024), Diao (2024), Odeh (2023), Alshaikhi & Khayyat (2021), Niederman (2021), Lakshminarasimham (2024), Paparić and Bodea (2024), Sahadevan (2023), Davahli (2020), Sarwar and Rahman (2024), Wachnik (2022), Deshpande (2023), Jayaram et al. (2024), Joshi (2024), Rathod and Sonawane (2022), Bahi et al. (2024), Crawford et al. (2023), Oyekunle et al. (2024), Merdžanović et al. (2023), Aggrawal & Dittman (2023)	Indicate the technical skills needed for AI tools in project management.
Requirements for AI in PM	Soft Skills	Fridgeirsson et al. (2021), Zahaib Nabeel (2024), Hossain et al. (2024), Diao (2024), Odeh (2023), Alshaikhi & Khayyat (2021), Paparić and Bodea (2024), Alevizos et al. (2024), Deshpande (2023), Oyekunle et al. (2024), Aggrawal and Dittman (2023)	Explores the soft skills required for AI in PM, including communication and leadership.
Requirements for AI in PM	Human Need	Fridgeirsson et al. (2021), Alshaikhi and Khayyat (2021), Sahadevan (2023)	Examines human needs and perceptions regarding AI acceptance.
Application of AI in PM	AI in PM	Holzmann et al. (2022), Taboada et al. (2023), Hashfi and Raharjo (2023), Fridgeirsson et al. (2021), Auth et al. (2021), Zahaib Nabeel (2024), Hossain et al. (2024), Parekh et al. (2024), Diao (2024), Alshaikhi and Khayyat (2021), Lakshminarasimham (2024), Paparić and Bodea (2024), Obana (2024), Hofmann et al. (2020), Sahadevan (2023), Čančer et al. (2023), Belharet et al. (2020), Lai et al. (2024), Sarwar and Rahman (2024), Kiani (2024), Alevizos et al. (2024), Nenni et al. (2024), Engel et al. (2021), Shang et al. (2023), Veger and Mijac (2024), Jayaram et al. (2024), Rathod and Sonawane (2022), Bahi et al. (2024), Karamthulla et al. (2024a), Crawford et al. (2023), Merdžanović et al. (2023), Müller et al. (2024), Aggrawal & Dittman (2023)	Explores the application of AI in project management, including resource optimization, risk management, predictive analytics, and automation.
Application of AI in PM	Adaptation	Värzaru (2022), Parekh & Mitchell (2024), Alshaikhi & Khayyat (2021), Skinner (2021), Belharet et al. (2020), Felicetti et al. (2024), Sarwar and Rahman (2024), Davahli (2020), Engel et al. (2021), Wachnik (2022), Sarafanov et al. (2023), Shang et al. (2023), Bahi et al. (2024), Buschmeyer et al. (2022), Čančer et al. (2023), Karamthulla et al. (2024a)	Explores the process of AI adoption in project management.
Application of AI in PM	Integrating AI in PM	Hashfi and Raharjo (2023), Parekh et al. (2024), Alshaikhi and Khayyat (2021), Mahmood et al. (2023), Joshi (2024), Auth et al. (2021), Najdawi and Shaheen (2021), Merdžanović et al. (2023)	Explores AI integration in PM decision-making and AI tools.
Considerations of AI in PM	Limitations of AI	Zahaib Nabeel (2024), Parekh et al. (2024), Alshaikhi and Khayyat (2021), Alevizos et al. (2024), Wachnik (2022), Müller et al. (2024)	Indicate the limitations and challenges of AI in project management.

Considerations of AI in PM	Challenges	Värzaru (2022), Hashfi and Raharjo (2023), Zahaib Nabeel (2024), Hossain et al. (2024), Parekh et al. (2024), Diao (2024), Alshaikhi and Khayyat (2021), Lakshminarasimham (2024), Paparić and Bodea (2024), Sahadevan (2023), Davahli (2020), Belhareet et al. (2020), Pereira et al. (2024), Alevizos et al. (2024), Engel et al. (2021), Wachnik (2022), Sarafanov et al. (2023), Shang et al. (2023), Joshi (2024), Rathod and Sonawane (2022), Bahi et al. (2024), Karamthulla et al. (2024a), Čančer et al. (2023), Karamthulla et al. (2024b), Crawford et al. (2023), Merdžanović et al. (2023), Müller et al. (2024), Aggrawal & Dittman (2023)	Indicate AI challenges, including biases, technical, ethical, and organizational issues.
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STRATEGIC COMMUNICATION MANAGEMENT

2024

HOW DOES GEN Z PERCEIVE SUSTAINABLE FASHION: ATTITUDES OF CROATIAN STUDENTS TOWARDS THE GREEN H&M CAMPAIGN¹

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ABSTRACT

The phrase "sustainable fashion" is increasingly heard in the media and among consumers. A literature review indicates that environmental awareness is greatly influenced by the concept of greenwashing, which plays a central role in the communication strategies of numerous. In the theoretical part, the concept of fast fashion and the sustainability question are analysed from social, economic, environmental, and ethical perspectives. Furthermore, the paper provides a review of previous research on fast fashion in the Croatian market, which served as a stimulus to this research. The second part of the paper presents a study aimed at examining how students in Croatia perceive the green campaign of one of the world's leading fast fashion brands, such as H&M. The research was conducted from October 10, 2022 to October 16, 2022, through an online questionnaire with a sample of 162 students from three Croatian universities in Zagreb, Rijeka, and Osijek. The research results show that students in Croatia are aware of the impact of fast fashion on society as a whole and the communities to which they belong. On the other hand, the results of the conducted research indicate that the green campaign does not significantly affect their consumer habits and behaviour.

Keywords: Sustainable fashion, Environmental awareness, Greenwashing, Students, H&M campaign

¹ This paper is based on the research conducted by Ema Petrušić as a part of her final thesis at the graduate university study program in Communication Studies. The thesis titled *Perception of the Impact of the Green H&M Campaign on Students in Croatia* was made under the mentorship of Tanja Grmuša, PhD, Assistant Professor, and defended at the Faculty of Croatian Studies in September 2023.

1 INTRODUCTION

Ample attention was paid to the problems of the fast fashion industry back in 2013. A tragedy occurred in the Rana Plaza building collapse in which 1,134 people lost their lives and nearly 2,600 were injured (Rana Plaza, n.d.). The eight-story building was improperly used as a clothing manufacturing centre. Biočina (2016, 59–60) points out that, among other manufacturers, Benetton, Mango, Primark and Walmart produced their goods in the building, and such factories in Bangladesh can also find more luxurious brands such as Armani, Ralph Lauren, Michael Kors or Hugo Boss, research from 2020. The year shows how the general working conditions have improved since then: the minimum wage of workers has increased, but all other conditions have not been fully met (Bossavie et al. 2020). This event serves as a powerful reminder of the hidden costs of fast fashion and the need for greater transparency and accountability in the industry. But it was also the inspiration for this research paper that explored the habits of young consumers in Croatia and their attitudes about fast fashion on the example of the H&M brand. This research paper is based on an MA thesis written by the same author.

2 FAST FASHION AND SUSTAINABILITY: BETWEEN PROFIT DEMANDS AND ETHICAL DILEMMAS

Fast fashion is an expression that has been increasingly mentioned in the media in recent years as a considerable problem on a global scale. Stephanie Buck believes that the very beginning of the fast fashion trend began in the sixties of the last century. Specifically, 1966 was the year in which disposable dresses in America experienced great success among consumers thanks to a marketing campaign, Scott Paper Company wanted to increase sales of its new napkins and toilet paper, which were manufactured from a combination of paper napkins and viscous fibres (Buck 2017). More as a joke than a serious campaign, the women were offered a choice of two cuts of garments made of that material at a cheap price of \$1,25 (Buck 2017). What was originally conceived as a mockery became a huge success when they sold 500,000 disposable dresses in eight months, according to Buck (2017). It did not take much until other companies jumped on the profit wagon and started producing a wide range of disposable clothing made of cheap materials. Until the middle of the twentieth century, fashion was more focused on practicality, unlike today, but most importantly, fashion as an industry knew four seasons: spring, summer, autumn, and winter. In contrast to fast fashion, there is what could be called slow fashion – it is sustainable and focuses on ethical production and consumption by consumers and producers to reduce production and the negative influences that are more related to it, and puts quality before quantity in the forefront, but in the literature sustainable fashion is often called an oxymoron because the idea of sustainability is contradictory to the ethos of fashion, which is constantly evolving and new trends are coming (Mandarić et al. 2022).

2.1 The impact of fast fashion on society, economic movements and the individual

Šimunić (2021, 2) points out several negative impacts of fast fashion: contribution to the climate crisis, harmful chemicals, an increasing amount of textile waste, consumption of water and non-renewable energy and raw materials, and space occupancy. She states that every second a quantity of one full truck of discarded clothing is being burnt, and washing clothes made of artificial materials produces 500,000 tons of microfiber that end up in the ocean (Mandarić et al. 2022).

With the constant development of society, more and more people moved from agricultural occupations to factory work. Cotton production was efficient and cheap, this allowed more people to participate in trade, thus increasing production, also creating a working class that participated in the economy. Biočina (2016, 39) believes that industrialization and capitalism developed on the back of women who were exploited as labour in industries that were on average paid significantly less. Radner Linden (2016, 9) states in his paper that this may be one of the reasons why cotton is still predominantly present in the production of clothing and mentions the first problem of fast fashion – which is that the production of cotton started because of slavery. Thus, mass production in America was extremely cheap. It began to mass export cotton as a raw material - more precisely, before the beginning of the Civil War, 61% of exports out of state were made of cotton (Radner Linden 2016, 10). The paper fashion industry in the context of green industry states that: "the fashion industry

is described by competitiveness on the market due to the increased supply of different clothing" (Šimunić 2021, 7). By moving production to countries where production is extremely cheap due to poor conditions and an underskilled and underpaid workforce, it created the opportunity for fast fashion to flourish, as young people in Europe and America were able to follow fashion trends for the first time at a low price (Radner Linden 2016, 3-5). Linden notes that there is another problem of fast fashion, besides exploitation, which is pollution and waste. Before that, manufacturers had to order a certain amount of goods, which they had to put on seasonal discounts and store them, if they failed to sell them during the intended season. With the advent of brands such as Zara, Mango, C&A, H&M, New Yorker, Stradivarius and many others, the whole process of forecasting, designing, making and selling is drastically accelerated to the point that new collections are produced almost every week. "Take it now or regret it later" is a principle that is stated in the description of consumers' attitude towards fast fashion because prices are so affordable that they often do not need discounts, and trends rotate so quickly that, if this opportunity is not used, on the next purchase the same item may be "out of style", which especially affects the younger population (Brstilo Lovrić et al. 2021). Grgurinović (2021) for faktograf.hr states that 85 % of textiles produced after 2015, were thrown out every year. This industry used 79 billion cubic metres of water in a year, and clothing and footwear production accounted for 10% of global greenhouse gas emissions.

The point is that environmental pollution does not only occur in the production and use of harmful chemicals, pollution also occurs when transporting goods. Some of the brands that have a bad reputation when it comes to production are Shein and ASOS – which are also popular in Croatia, where they publish from 500 to 5000 new pieces of clothing on their website daily (Grgurinović 2021). In her article Grgurinović (2021) quotes a sustainable fashion lover Dunja Jovanović who points out that consumerism has become a way of life today – shopping centres are our place for socialising and relaxation, and research shows that today we are buying 60% more than 20 years ago, and the quality of clothing is decreasing and there are fewer natural and degradable materials. When it comes to Croatia, Perković (2021, 11) states that young consumers (Generation Z) have become aware of the bad influences of the fashion industry on our environment and that fashion serves to show them their own identity.

The third problem is creating an image of oneself – that is, the influence of fashion on the perception of a young individual. Often, young people are the group most involved in spending when it comes to fast fashion, and it is said that this is probably due to postmodernist consumer conflicts. Young people create their own identity and try to build an individualistic image of themselves as an individual through consumerism, while at the same time, they want to fit in with their peers, following fashion trends (Brstilo Lovrić et al. 2021). In addition to influencing consumers and their pockets, the fashion industry greatly influences young people's perception of themselves and their bodies, which is best seen by starving models to fit into size 0 clothing (Šimunić 2021, 9-14).

Greenwashing has been singled out as a separate fast fashion issue because within that concept there are many more problems. Greenwashing is a marketing technique used by companies to make their products or services look more environmentally friendly than they are. The term was first coined and used by environmentalist Jay Westerveld, who used it to describe the hotel industry's practice of encouraging guests to reuse towels to save water, ignoring larger environmental issues. In the late 1990s, the word officially entered the Oxford English Dictionary (Oxford English Dictionary) (Watson 2016).

Greenwashing can take many forms, such as using vague or misleading terms such as "natural" or "environmentally friendly", making unverifiable claims about environmental benefits, or emphasizing a small environmental aspect of a product while ignoring its greater environmental impact. The Problem with greenwashing is that it can mislead consumers into believing they are making environmentally responsible decisions, even though in reality, they are not. This can lead to a false sense of security and a lack of motivation to make significant changes to reduce their environmental impact.

2.2 Overview of the current research on fast fashion in the Croatian market

Mandarić et al. (2022) in their paper address that the combination of cheap goods and constantly changing trends has created a culture of impulsive shopping where consumers need to point out

the difference between the consequences of fast fashion and altruistic interests in maintaining a healthy environment. Quantitative research on the consumption of sustainable consumer fashion in the Croatian market was conducted through the online Google form in January 2021. Respondents were selected by the snowball method via email, social media, and personal contacts, as the survey was not publicly available. The target group was Croats who work and have payment power, and the questionnaire was based on a previous survey by Shen et al. in 2013. and 2019 Ceylan research paper (Mandarić et al. 2022). In short, the conclusion of the research is in line with previous research on foreign markets – consumers do not make purchasing decisions based on their environmental impact, but the decision is more influenced by other factors. However, consumer awareness has influenced some changes for the better, as many major fast fashion manufacturers have introduced some steps to make their business model more partially sustainable. Some of them began supplying goods by local producers to reduce their carbon footprint (Omazić et al. 2017).

Another study conducted on a similar topic in Croatia is from 2021. 263 respondents took part in a questionnaire that examined views on the sustainable business of brands. As in the previously mentioned research, Mandarić (2021, 53-54) found that her respondents also agree with the idea of consuming sustainable fashion, which is confirmed by world research, but when it comes to practice, when deciding to buy fast fashion and sustainable fashion, other factors such as price prevail.

3 H&M RETAIL CHAIN-SUSTAINABILITY AT THE HEART OF COMMUNICATION AND MARKETING STRATEGY

The Swedish retail chain H&M belongs to a larger conglomerate described on its official website as a "family of brands and companies". It has over 150,000 employees in 4,200 stores across 72 countries. They state their core values as team uniqueness, faith in people, entrepreneurship, continuous improvement, awareness, directness, and simplicity. On their website, they immediately highlight important figures. They mention their goal for 2030: to produce clothes exclusively from recycled materials, noting that they have already started with their cotton, which is entirely sourced from recycled or sustainable sources (Research H&M Group, n.d.).

Under the "sustainability" section on its website, H&M highlights the environmental and community impact of fashion and reflects on its role in the entire sustainability chain. They claim to be the first in the world to have a recycling device called "Looop" installed in their Stockholm store. In addition, they are striving to maintain sustainability through greater transparency. In 2019, they launched an app where customers can check where products are made, with additional information. They state that, although they do not own the factories where they manufacture clothes, they aim to create a safe environment for everyone involved in the production process. They point out the "Garment Collecting program", which is also implemented in Croatia, and that it is the largest initiative of its kind in the world, introduced globally in 2013 (Dress the Whole World & help ensure the sustainability of fashion, n.d.).

4 RESEARCH METHODOLOGY

The subject of this quantitative research is a sample of students from three Croatian universities. The survey used a non-probabilistic sample and was conducted from October 10, 2022, to October 16, 2022, through online forms found on social networks (Student Facebook and WhatsApp groups). A total of 162 students from the Universities of Zagreb, Osijek, and Rijeka responded to an anonymous survey in four parts. The survey started with general data and moved towards specific data relevant to this research.

4.1 Objective, research questions and hypotheses

The main goal of the paper is to explore how important ecology is to the young population of Croatia (students) when it comes to fashion and production. The paper will explore the following issues:

1. What impact did the H&M brand campaign have on students in Croatia?
2. How did the campaign impact students' spending habits?
3. How did the campaign affect students' trust in the brand?

Auxiliary issues in the work are:

1. What is the student's familiarity with the concepts of "ecological and ethical production"?
2. What is the difference in student attitudes regarding their field of study and gender?
3. How important is it to students that the products they consume are environmentally and ethically produced?

Based on the questions, the following hypotheses of the work are posed:

1. Given the brand's attempt to position itself as a brand that recycles and belongs to the "Green Wave", students believe that the H&M Green campaign is true and effective.
2. The campaign did not increase the number of purchases of this brand among the student population of Croatia.
3. This campaign has boosted students' confidence in the brand itself.

4.2 Method and sample

The survey was conducted anonymously with 162 respondents, of whom 112 were women (69.1%) and 50 were men (30.9%). The largest number of respondents were between the ages of 24 and 26 – 59 (36.4%) and between 18 and 20 – 58 (35.8%). Furthermore, 37 respondents (22.8%) were between 21 and 23 years old, and 8 (4.9%) were between 26 and 30 years old. No survey respondents were over 30 years old at the time the survey was conducted.

The majority of respondents belonged to the University of Zagreb. A total of 106 (64.5%) studied in Zagreb, followed by the University of Osijek with 44 (27.2%) respondents, and 12 (7.4%) were from the University of Rijeka. Almost half of the respondents were from the field of Social Sciences, namely 77 (47.5%). They were followed by engineering students with 28 members (17.3%). Biomedicine and health were studied by 20 respondents (13%), the arts by 17 (10.5%), humanities by 10 (6.2%), natural sciences by 7 (4.3%), and biotechnical sciences by 2 (1.2%).

More than half of the respondents, 125 (77.2%), said they were familiar with the term 'fast fashion,' which the survey briefly described as cheap clothing produced quickly in response to high demand for fashion trends by mass retailers. The majority of respondents stated that they buy fast fashion products, more precisely – 75 (46.3%) buy these products but try to control the number of purchased items, 42 (25.9%) also buy them, while as many as 45 (27.8%) do not buy them at all. Only 2 respondents had never heard of this brand nor shopped at their stores, while the rest (98.8%) were aware of the H&M brand and purchased their products. More than half of the respondents, 94 (58%), had heard of the green H&M campaign, while the remaining 68 (42%) had not heard of it before completing the survey.

Respondents to the survey answered questions on a Likert scale, where for each statement they could choose one of the offered options on a scale from 1 to 5, with 1 signifying complete disagreement and 5 signifying complete agreement with the statement. The main criterion for participation in the survey was that the respondents were students at one of the three listed universities. The results were processed partly online with the help of analytics provided by Google Forms, as the survey was compiled in this program, and partly in SPSS (Statistical Package for the Social Sciences), a computer program for statistical data analysis.

4.3 Showing the results of the research

More than 70 % of respondents said they fully or partially consider H&M to be a fast fashion brand, with over 70 % of the total number of women in the survey and 40 % of the total number of men agreeing. Regarding attitudes towards the field of study, students of natural and technical sciences showed the most agreement with the statement. Over 60 % of respondents partially or completely considered this campaign, along with their recycling program, a good step for the brand towards a sustainable way of doing business – women and men voted equally on this issue. Interestingly, almost all groups of students were inclined to this response, while students in the arts were mostly restrained. Over 50 % believed partially or completely that the program was true and effective; again, the majority who considered it were women, with over 50% of the total choosing this answer, while 38 % of men felt the same. This belief is mostly held by students of biomedicine and health, social sciences, humanities, and natural sciences, while students of arts and technical sciences predominantly gave neutral answers. When asked if they had ever heard of the green H&M campaign, 58% of students answered

yes, so it is important to consider the large number of people who had not heard of this campaign before completing the survey. Over 60% of students are unfamiliar with the brand's activities beyond their final product. The current survey found that over 58% of people believe partially or completely in the truthfulness and effectiveness of this program, but the downside is that a large percentage of respondents were not aware of the campaign before completing the survey. Considering that this is the number of people who claim to have seen that campaign, we consider this hypothesis to be confirmed. Given that many respondents were not aware of the brand's green campaign before completing the survey, additional research is necessary with a group of people familiar with the campaign to determine with certainty whether the students believe the campaign is true and effective.

Table 1: Responses to the 30th survey question based on the field of study.

Field of Study	<i>I believe that this program is truthfull and effective.</i>					Total number of responses
	1	2	3	4	5	
Biomedicine and Health	1	0	6	8	6	21
Biotechnical Sciences	0	1	0	0	1	2
Social Sciences	5	10	25	24	13	77
Humanities	0	1	2	2	5	10
Natural Sciences	0	0	2	4	1	7
Technical Science	4	3	11	6	4	28
Artistic Field	4	5	6	2	2	17
Total number of responses	14	18	52	46	32	162

Less than 15 % of respondents said that because of the green H&M campaign they buy their products more often, while over 50 % said that the campaign did not affect the frequency of purchases with that brand, with the opposite opinion mostly held by students of natural sciences. More than 60% of respondents say that they do not buy the H&M brand more often than other brands, with only about 15% of respondents preferring this brand, where students of natural sciences stand out, among whom no one considers it. Even the brands' attempt to motivate customers to bring in old recycling goods, where they would receive discount coupons in return, did not significantly affect the student population, as just under 30 % said that these coupons made them more likely to buy at H&M stores. On the other hand, over 50% did not find it motivating enough to go to that store. Students also claim that they do not buy items from an eco-collection more often compared to a regular collection – only less than 20% of respondents claimed to have such a practice, while over 50% do not make a difference. The proportion of students who buy exclusive items that are labelled as part of the eco collection is even lower – there are only over 10% of them. Because of these results, we believe that the second hypothesis has been confirmed, just as in previous papers, where it states that although there is a certain level of awareness of sustainability, it does not play the most important role in purchasing.

Table 2: Responses to the 32nd survey question based on the field of study.

Field of Study	<i>Due to that campaign, I shop more frequently at H&M stores.</i>					Total number of responses
	1	2	3	4	5	
Biomedicine and Health	5	6	3	4	3	21
Biotechnical Sciences	1	1	0	0	0	2
Social Sciences	26	20	24	3	4	77
Humanities	2	3	3	0	2	10
Natural Sciences	1	1	3	1	1	7
Technical Science	9	7	8	4	0	28
Artistic Field	9	3	5	0	0	17
Total number of responses	53	41	46	12	10	162

Over 50% of respondents in the survey believe partially or completely that the green campaign was successful for this brand, and at least the technical students agree with this statement. From answering questions such as: "I consider clothing made of recycled materials as good as clothing made of new materials," and "I want more environmentally friendly products from this brand," we see that there is an interest in students in environmentally friendly fashion solutions, because in both cases over 50 % of respondents chose the option according to which they fully or partially agree with the above statements. When it comes to the general frequency of buying this brand, the answers are quite neutral and evenly distributed by categories: for, against, and in-between. Less than 20% of people claim to follow some brand activities outside of their merchandise or follow them on social media. Given that over 40% of respondents believe that this brand has quality campaigns and advertisements, 30% of them believe that the products of this brand are of quality, and over 70% of respondents claim that they consider this campaign a good step towards a sustainable way of doing business, we would say that the third hypothesis is confirmed. In this question, students of arts and engineering, who have a large number of neutral or negative answers, stand out again.

Table 3: Responses to the 37th survey question based on the field of study.

Field of Study	<i>I want more environmentally friendly products from this brand.</i>					Total number of responses
	1	2	3	4	5	
Biomedicine and Health	0	1	7	5	8	21
Biotechnical Sciences	0	1	1	0	0	2
Social Sciences	6	4	28	14	25	77
Humanities	0	1	2	3	4	10
Natural Sciences	0	0	0	4	3	7
Technical Science	3	2	10	5	8	28
Artistic Field	0	0	5	4	8	17
Total number of responses	9	9	53	35	56	162

From the confirmed hypotheses, we can see how the green campaign of the H&M brand has impacted students by improving the brand's image in their eyes, but it has not significantly influenced their consumer habits. This is not surprising, as similar results have been obtained in previous surveys across different markets, where consumer awareness has consistently been proven, but without a corresponding change in consumer habits.

5 CONCLUSION

The research confirms three hypotheses. The first hypothesis focuses on the student population's perception of H&M's Green campaign, which aims to position the brand as a part of the "Green Wave" and a proponent of recycling. A majority of the respondents view H&M as a fast fashion brand. Additionally, they believe the brand's green campaign and recycling program are positive steps toward sustainable business practices. However, the fact that a significant number of respondents were unaware of this campaign before the survey suggests a need for further research among those already familiar with the campaign to assess its credibility and effectiveness.

The second hypothesis examines the green campaign's influence on students' purchasing frequency with H&M. The survey findings indicate that less than 15% of respondents have increased their purchases from the brand due to the green campaign. Furthermore, the majority reported that the campaign did not alter the frequency of their purchases. The respondents also exhibited limited interest in the discount coupons offered for recycling old clothing, implying that sustainability awareness is not a primary factor in their purchasing decisions.

The third hypothesis pertains to the student's overall perception of the brand. Most respondents perceive the green campaign as successful for H&M. They also show a keen interest in environmentally friendly products and generally regard the brand's campaigns and advertisements as high quality. These outcomes point to an enhanced perception of the brand among students following the green campaign.

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THE INFLUENCE OF DIGITAL PLATFORMS ON THE PERCEPTION OF THE QUALITY OF INTERNAL COMMUNICATION IN A NON-PROFIT ORGANIZATION: THE PERSPECTIVE OF TEAM MEMBERS AND LEADERS¹

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ABSTRACT

Effective internal communication is integral to the success of any organization, prompting a growing emphasis on measurement and researching its effectiveness. This study, conducted in 2023, delves into the perception of internal communication quality within the non-profit student organization FSB Racing Team. Grounded in theoretical frameworks and previous research on internal communication, conducted research uses a mixed methods approach, utilizing both quantitative survey on a sample of 48 participants and qualitative in-depth interviews on a sample of three respondents. The primary objectives were to assess how members of the FSB Racing Team perceive the quality of internal communication and to examine the dynamics of communication within the organization. The findings reveal that, despite some shortcomings, internal communication is generally perceived as satisfactory by members. The study highlights the Microsoft Teams online platform as a valuable tool, facilitating more efficient information flow and organized storage of relevant reports for knowledge transfer.

Keywords: Non-profit organization, Internal communication, Satisfaction with communication, Organizational culture, Online platform.

¹ This paper is based on the research conducted by Rebeka Radovanović as a part of her final thesis at the graduate university study program in Communication Studies. The thesis titled „Perception of the quality of internal communication on the example of the FSB Racing Team“ was made under the mentorship of Tanja Grmuša, PhD, Assistant Professor, and defended at the Faculty of Croatian Studies in September 2023.

1 INTRODUCTION

In accordance with the definitions of various authors, communication is the process of exchanging information, and its significance manifests in all segments of life (Fox 2001, 13). Within the organizational context, effective communication is a pivotal factor, particularly for successful business outcomes. Research shows that high-quality internal communication positively influences employee motivation and productivity, while on the other hand, inadequate communication may develop dissatisfaction, frustration, and organizational failure (Tkalac Verčić et al. 2009, 176). In light of these considerations, the objective of this study was to assess the perception of internal communication quality among members of the *FSB Racing Team* and explore the communication practices within the organization. Employing a mixed-methods approach, the research encompassed survey questionnaires and in-depth interviews with key individuals occupying leadership roles within the team.

The success of any organization, including the *FSB Racing Team*, lies in effective internal communication. Through an examination of members' perspectives and an evaluation of communication practices, this paper provides an analysis of communication dynamics within the team. The *Microsoft Teams* online platform emerged as the most important communication channel, which displayed a positive influence on internal communication and facilitating the organization of information and data. The findings of this research can serve as benchmarks for further investigations within the team and may apply to other organizations. Moreover, these results provide a basis for the development and implementation of targeted communication strategies that encourage cooperation, motivation, and productivity within the *FSB Racing Team*.

2 THEORETICAL FRAMEWORK AND OVERVIEW OF PREVIOUS RESEARCH

Communication, as a process of information exchange, is a fundamental activity of managing organizations. As asserted by Clampitt and Downs, "the ramifications of quality internal communication extend positively towards enhanced productivity, diminished absenteeism, heightened innovation, decreased incidence of strikes, improved product and service quality, augmented reputation, and curtailed business costs" (Sušanj Šulentić 2014, 61). Recognizing the pivotal role of internal communication in organizational success, numerous organizations initiated the evaluation of communication quality in the early 1970s, with a primary focus on the communication climate, particularly within employee-management relationships (Tkalac Verčić et al. 2009, 176).

Numerous perspectives of many scholars upon the connection between internal communication and organizational success are cited, and Tkalac Verčić et al. (2009, 176) explain that internal communication results with heightened productivity, diminished absenteeism, elevated service and product quality, increased innovation, reduced strikes, and overall lowered costs. On the other hand, low-quality internal communication has a negative effect on an organization's business performance.

The assessment of internal communication satisfaction, conducted in 2015, measured satisfaction levels of internal communication within a public institution (Ćorić and Musa 2015, 157). The measuring tool used for this purpose was the CSQ, namely, the Communication Satisfaction Questionnaire designed by Downs and Hazen, where internal communication is conceptualized as a multidimensional construct. Specifically, the study identified the lowest level of satisfaction in the domain of "Data on personal success," indicating a dissatisfaction of the organization's members regarding feedback. In order to improve this identified deficiency, the authors proposed formulation of an internal communication program that encourages more needed two-way communication. Among the other factors of satisfaction with internal communication, the communication climate had the highest level of correlation. The importance of the communication climate is also emphasized in the research conducted by Tamara Sušanj Šulentić (2014), wherein she tried to establish a correlation between the internal communication climate and employee satisfaction and loyalty (2014, 71). The outcomes of the conducted research confirmed the hypothesis that the "internal communication climate is essential for employee satisfaction and loyalty," signifying that that quality internal communication positively affects the efficiency and loyalty of employees (Sušanj Šulentić 2014, 75). Both mentioned studies share their limitations, notably referring to a constrained sample size from a singular organization and restricted to internal participants, thereby suggesting caution in generalizing the findings.

Among the other inquiries within the domain of internal communication, noteworthy is the study conducted in 2022 by Štelk, Katavić, and Vukić, which endeavored to determine the level of internal communication in the selected city administration (Štelk et al. 2022). The results of this research emphasize the employees' acknowledgment of internal communication as essential for mutual understanding. Nevertheless, a significant share of dissatisfaction with internal communication was substantiated, which consequently has an impact on overall job satisfaction (Štelk et al. 2022, 165). Consequently, the discontent with internal communication, particularly in the interactions between superiors and employees, has a significant influence on workplace satisfaction. This, in turn, resonates on employee efficacy and the operational success of the organizational entity.

2.1 Organizational communication and organizational culture

According to the authors Kunczik and Zipfel (2006), it is said that "without communication, organized action would not be possible" (cited in Čorić 2019, 12). The main function of the communication network within an organization extends beyond the internal exchange of information, while the imperative lies in identifying and implementing the optimal communication model. Accordingly, a nuanced understanding of the communication process and its alignment with the organizational context is considered crucial for organizational sustainability in a competitive market milieu (Čorić 2019, 11).

Every society nurtures its own customs and culture, therefore one of the important aspects of an organization is precisely its culture. Culture, a complex entity with many definitions, in the societal context is conceptualized as "a series of fundamental values, beliefs, and norms that are common to members of a society" (Bedeković and Lukačević 2011, 16). So, when describing the culture within organizations, we are talking about the general patterns of behavior, common beliefs, and values of the members of that organization. Moreover, culture includes "processes of learning and transmission of knowledge, beliefs and behavioral patterns during a certain period" (Topić Stipić and Tomaš 2021, 259). Considering that organizational culture, like the broader concept of culture, is a multidimensional construct, explanation of organizational culture can be undertaken through two integral aspects: the visible and the invisible. The invisible part of the organization includes "the system of values, understandings, beliefs, ethical principles, lifestyles and personalities within the organization", whereas the visible dimension includes the behavioral patterns exhibited by the organization's members (Bedeković and Lukačević 2011, 17-18).

Nowadays, organizations frequently encounter dynamic shifts in market trends which force organizations to prompt responses and adaptability to the evolving environment (Belak and Ušljebra 2014, 81). Organizations need be ready for change, with the aim of progression of the organizational entity where the management of an organization has a pivotal role in orchestrating changes which should ensure business success. In order for organizational change to be implemented, it must begin and end with transformations in the behaviors of individuals who are as members of an organization, most influenced by the organizational culture (2014, 81).

2.2 The role of online platforms in internal communication

With the development of technology, new forms of communication have also developed with digital technology as a medium. Since the inception of the Internet, online communication, or computer-mediated communication, has become prevalent. This form of communication markedly differs from face-to-face interaction as it is exclusively text-based in nature (Prapotnik 2007, 87).

When it comes to Internet-mediated communication, social networks are taking precedence (Primorac and Primorac Bilaver 2022, 100). Social networks offer notable advantages such as accessibility, speed, the maintaining of relationships, and a sense of connection and belonging. However, there are certain lowlights such as the absence of face-to-face communication, which can potentially negatively affect cognitive and behavioral communication skills (Primorac and Primorac Bilaver 2022, 104-106). Social networks and online communication became the most prominent during the pandemic, where their immediacy and rapidity made them the simplest and most effective forms of communication during periods of complete social closure (Primorac and Primorac Bilaver 2022, 101).

In addition to social networks, online platforms gained significant importance during the pandemic, particularly for hybrid teaching. Noteworthy platforms in this context, among others, included *Micro-*

soft Teams and Zoom (Pauković and Krstinić 2021, 131–132). Research focusing on the significance of online platforms in education, such as the study titled "Analysis of the impact and importance of interactive platforms for the implementation of online classes in the era of the pandemic caused by the Covid-19 virus" (Dragosavac and Jakica 2022, 57–58), showed satisfactory performance of both platforms in remote teaching. Highlighted advantages included interactivity, ease of use, and the ability to establish direct contact. On the other hand, the research also identified some disadvantages of the platforms, such as microphonics and noise. Additionally, Pauković and Krstinić (2021, 132) outlined additional advantages of online platforms including real-time presentation and the capacity to store all data and teaching content. Research by the New York Times confirmed the success of implementing online platforms in traditional education, indicating that student success in hybrid classrooms may even surpass their results in traditional teaching settings (Pauković and Krstinić 2021, 131).

The above observations can be extended to draw connections with organizations. Specifically, the possibility of using online platforms as a supplement to traditional communication within the organization has its advantages such as speed, the ability to store information and data, but also to segment information according to the topic. Furthermore, these platforms can function as an intranet and internal communication channel within organizations, contributing to accelerated information flow and streamlined data storage.

3 RESEARCH METHODOLOGY

3.1 Quantitative research

3.1.1 Objectives, research questions and hypotheses

The primary aim was to assess how *FSB Racing Team* members perceive the quality of internal communication. This overarching goal can be broken down into specific research objectives: 1. Explore the internal communication quality concerning information; 2. Analyze the speed at which information flow among team members within the team workspace; 3. Establish the relationship between satisfaction with communication and duration of time spent within the organization; 4. Investigate whether satisfaction with private life influences satisfaction levels with internal communication.

Aligned with the research's primary goal, the main research question was posed: How satisfied are team members with internal communication? Additionally, supplementary research inquiries were also defined: What is the difference in satisfaction with communication based on the duration of time spent in the team? In what way does the speed of information flow influence satisfaction with communication? How does the quantity of information impact satisfaction with communication? What correlation exists between satisfaction with internal communication and satisfaction with private life?

Derived from the primary goal and research question, the main hypothesis of the study was formulated: Hypothesis 1: Team members perceive communication within the team to be at a satisfactory level. Supplementing this main hypothesis, auxiliary hypotheses were identified and set; Hypothesis 2: There exists a variance in satisfaction with internal communication based on the time spent in the team, Hypothesis 3: Team members believe that a faster flow of information requires physical presence in the team's workspace, Hypothesis 4: Satisfaction with private life has an impact on the overall satisfaction with internal communication.

3.1.2 Method and sample

Using the questionnaire method, the research aimed to delve into team members' perceptions of communication quality within the organization. The questionnaire comprised 28 questions organized into four segments: the influence of information on internal communication quality, the impact of communication on quality, the relationship between satisfaction with private life and internal communication satisfaction, and the connection between communication satisfaction and work willingness. Most of the questions in the questionnaire were closed-ended, utilizing a Likert scale format for responses. Respondents could select one of five possible answers, indicating their agreement or disagreement with statements (1 - completely disagree, 2 - disagree, 3 - neither agree nor disagree, 4 - agree, 5 - I completely agree). Additionally, the questionnaire included an open-ended question, providing participants with the opportunity to freely express their thoughts.

Specifically, this paper focused on internal communication and satisfaction levels within the *FSB Racing Team* organization. A brief examination of the theoretical framework led to the conclusion that proficient internal communication is the basis of organizational success. This effectiveness can enhance teamwork, encourage a positive work environment, and elevate the productivity of organization members, ultimately contributing to the overall growth and success of the organization.

The investigation into the perception of internal communication quality took place within a non-profit student organization which the *FSB Racing Team* project operates. The team has approximately sixty members (officially 65 during the questionnaire), and the research was conducted on a sample of 48 active participants, constituting around 73.85% of the organization's total membership. Notably, the research participants were current members of the team, and concurrently students across various disciplines at the University of Zagreb. A majority of the participants (52.1%) were enrolled in the Faculty of Mechanical Engineering and Naval Architecture, underscoring the notable presence of students from this faculty within the *FSB Racing Team*. The second highest representation came from the Faculty of Electrical Engineering and Computing, making up 35.4% of the sample. These results highlight a significant presence of technical students within the organization, aligning with the engineering nature of the *FSB Racing Team*. The type of sample is intentional considering that the participants were chosen based on their involvement in the project, i.e., membership in the *FSB Racing Team* and familiarity with the team's operational dynamics.

3.2 Qualitative research

3.2.1 Objectives and research questions

The primary objective of the research was to examine the communication dynamics within the *FSB Racing Team* organization. Derived from this overarching goal, specific aims were outlined, including the analysis of communication deficiencies, investigation into the effects of a large amount of information and data on work processes, assessment of manager's satisfaction with team organization, exploration of conflict resolution methods, examination of possibilities for improvement of communication, and evaluation of the effectiveness of online platforms in internal communication.

In alignment with the defined objectives of the research, a set of research questions was formulated. The main research question focused on offering understanding regarding the dynamics of communication within the team. Among additional research queries were: What deficiencies characterize the communication process? How does the substantial volume of information impact work? To what extent is the manager satisfied with the team's organization? What is the practice for conflict resolution? What are the possibilities for communication improvement? And, finally, what is the efficacy of the online platform in internal communication?

3.2.2 Method and sample

Following the completion of the quantitative survey, qualitative research using the in-depth interview method was conducted. For the purposes of this research, an in-depth interview guide was created, comprising 22 questions categorized into four main units corresponding to the research inquiries: a general overview of communication dynamics within the team, information flow, online communication platforms, and conflicts within the team. These in-depth interviews took place in May 2023, right before the competition season.

The research was conducted within the leadership of the *FSB Racing Team*, involving three in-depth interviews with key figures within the organization. Key individuals of the organization were selected for the examination of internal communication within the *FSB Racing Team*: the team's organizational leader, the project manager, and the leader of the Driverless team responsible for autonomous vehicle development. These individuals were selected due to the critical functions they perform within the organization, managing different facets of the team, which makes their insight into internal communication valuable and relevant. The organizational team leader oversees the overall functioning of the *FSB Racing Team*, the project manager plays a key role in planning and monitoring the tasks status, and the Driverless team leader manages a specific team, offering an additional perspective within the leadership. Despite the small sample size, the selection serves a specific purpose. Namely, the purposive sample ensures that participants represent key roles and

influential persons within the organization. Their responsibilities and time spent in the team afford them a comprehensive understanding of how internal communication impacts various aspects of team management and project execution. Their extensive responses contribute to a deeper understanding of communication dynamics within the organization.

4 RESULTS AND DISCUSSION

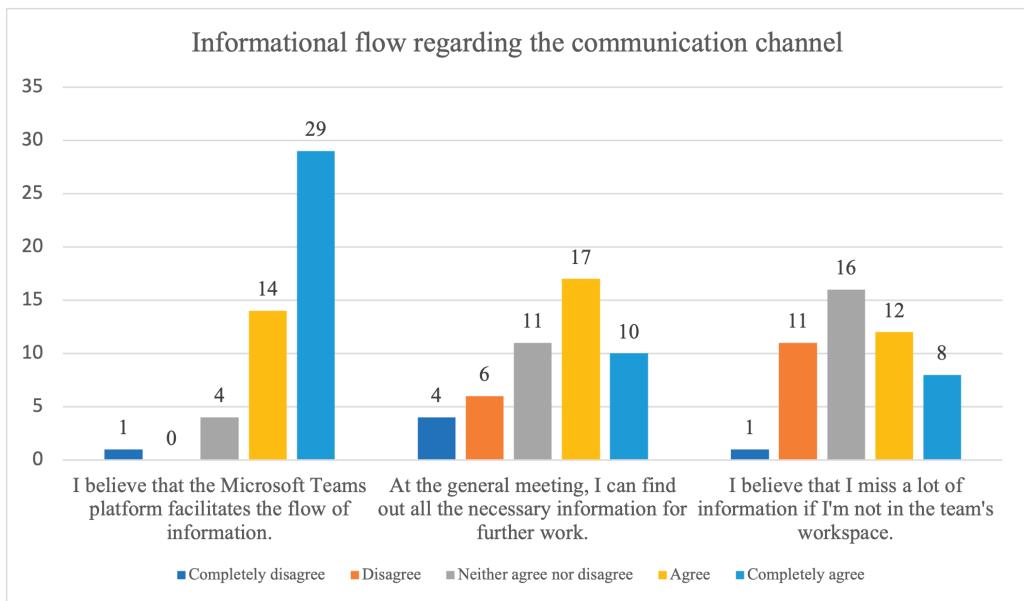
The organization primarily relies on the online platform for information distribution and mutual internal communication, especially in group settings. Almost 90% of members confirmed that the *Microsoft Teams* platform facilitates information flow within the organization. Survey results indicate that members feel well-informed in a timely manner, with the platform effectively delivering all necessary information. The online platform not only facilitates communication but is also utilized by the organization for internal communication purposes.

In addition to utilizing the online platform, the organization also practices face-to-face communication channels, mainly during weekly team meetings. The claim "At the general meeting, I can find out all the necessary information for further work" is defined by the fact that general meeting, held weekly to update the team, serves this specific purpose. This statement aims to measure the actual value of information members receive through this channel. According to the results, a majority (56.25%) of participants believe they receive all the necessary information for performing tasks at the general meeting, while a smaller portion (20.83%) disagrees. Notably, a significant percentage (23%) neither agrees nor disagrees with the statement, indicating uncertainty about the adequacy of information received. To complement this point of view, sub-team meetings were organized to delve into the details of each member's tasks.

In addition to using official channels such as the online platform and meetings, a significant amount of information flows through the team's workspaces. The statement "I believe that I miss a lot of information if I'm not in the team's workspace" aimed to explore whether members find it important to frequent the team's workspace not only for task completion but also for staying updated. Just under a half of the participants (41.67%) agreed with this statement, while a quarter (25%) didn't feel they missed much information by not being in the team's workspace. A notable portion (33%) neither agreed nor disagreed with the statement, suggesting that many members do not perceive a disadvantage or advantage in visiting the team's workspace for additional information. This outcome could be explained by the unique circumstance this season, specifically, the team's relocation outside the Faculty of Mechanical Engineering and Naval Architecture due to the extensive building reconstruction. During this period, team premises were unavailable, potentially explaining the nuanced responses observed at the beginning of the calendar year. The results are illustrated in the graph.

Over 66% of participants believe that internal communication deserves an excellent to very good rating, supporting Hypothesis 1 that states, "Team members perceive communication within the team to be at a satisfactory level." The t-test results confirmed Hypothesis 2, indicating a difference in satisfaction with internal communication based on the time spent in the team. These findings suggest that newer team members view their initial experience with internal communication as satisfactory, perceiving it as organized without encountering communication obstacles. The results also imply that a significant portion of surveyed team members believe crucial information circulates in the workspace, and irregular attendance may result in missing out. Consequently, Hypothesis 3 stating "Team members believe that a faster flow of information requires physical presence in the team's workspace" can be considered confirmed. Satisfaction with private life shows little correlation with satisfaction with internal communication, and there is no statistical evidence supporting the idea that satisfaction with private life affects satisfaction with internal communication. Thus, Hypothesis 4 "Satisfaction with private life has an impact on the overall satisfaction with internal communication" was rejected.

Figure 1: Informational flow regarding the communication channel



(Source: Radovanović 2023)

On the other hand, team leadership also places significance on utilizing online platform as a key internal communication strategy. By using such a digital tool, the systematicity and categorization of information according to the relevant topic is ensured. In-depth interview participant states "We have everything in one place, everything is connected to SharePoint and OneDrive. We can find all the documents sent there. Somehow all our information is grouped". Notably, digital tool offers significant time saving advantage, as a single message can reach a large number of team members simultaneously, avoiding the need for multiple individual communications. In addition, participant also claims that "You can find a lot of information in one place much faster" The efficiency of the online platform not only increases productivity, but also allows team members to focus on their tasks and responsibilities. Easy access to relevant information, data, documents, and reports promotes an informed work environment, ultimately saving time for both individual members and the team as a whole.

In spite of the numerous advantages associated with the online platform for internal communication, certain disadvantages have been highlighted. One such disadvantage is the lack of engagement and interest among members during online communication. These drawbacks may be the result from various factors, such as distractions, difficulties in concentration, technical obstacles, or a preference for traditional "face-to-face" communication. Although the online platform facilitates collaboration and allows for flexibility, some team members express a perception that virtual meetings may at times be less effective than in-person interactions. Second in-depth interview participant claims "I mean, somehow, communication is much more difficult then. When we are online there is no discussion", and third states that ""omeone can ignore the message". Furthermore, online communication can tend to become one-way, especially in the absence of feedback and dynamic discussions that are inherent in traditional face-to-face communication.

5 CONCLUSION

This research emphasizes the pivotal role of internal communication in efficient organizational management and its correlation with business success, as shown in previous research outlined in this paper. The primary focus was exploring the perception of internal communication quality within the *FSB Racing Team* and to analyzing communication patterns that prevail among its sixty members.

The research findings pointed to a notable challenge within the organization, revealing that only a minority of members showed high activity and availability at a certain time. This difference in engagement was linked to the organizational climate's impact on individual motivation, highlighting the importance of cultivating positive and good interpersonal relationships. Within this context, organizational leadership emerged as a key factor in maintaining quality internal communication, ensuring members' satisfaction and motivation. Although the research indicated an overall satisfactory level of internal communication, it also revealed areas for improvement. Specifically, there was a recognized need for better information segmentation and enhanced knowledge transfer. Despite the positive contribution of the *Microsoft Teams* online platform to internal communication and information organization, traditional "face-to-face" interaction remains prioritized.

One of the implications of this research is its potential applicability to other organizations, opening up opportunities to conduct similar research in different settings, with its results serving as a benchmark for future research exploring perceptions of internal communication quality in various contexts and organizational structures. The study emphasizes the pivotal role of internal communication in successful organizational management. By highlighting both strengths and weaknesses of communication within the *FSB Racing Team*, it sets the stage for future enhancements that can boost member motivation and overall organizational success. As organizations continue to evolve and adapt to changing circumstances, effective internal communication remains a cornerstone for gaining a competitive advantage in the marketplace.

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1.08 Objavljeni znanstveni prispevki na konferenci
Published scientific conference contribution

HEALTH NAVIGATION: STRATEGIC COMMUNICATION MANAGEMENT IN ISTRIAN HEALTH INSTITUTIONS

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ABSTRACT

Research on strategic communication management in healthcare institutions in Istria studies key strategies and challenges in communication. The focus is on the specifics of the health sector in this area, exploring communication approaches and implementing strategic practices to improve relationships with patients, staff and the community. The research aims to identify and analyze the potential relationship between applied communication management strategies and the level of patient satisfaction in health care institutions in Istria, with an emphasis on providing a deeper understanding of the factors that influence patients' perception of the quality of communication in the health care environment. Three research hypotheses were set: H₀: The application of strategic communication practices in healthcare institutions in Istria significantly correlates with increased patient satisfaction; H₁: There are statistically significant differences in the perception of the effectiveness of communication strategies in healthcare institutions in Istria in relation to the gender of the respondents; H₂: There are statistically significant differences in the perception of the effectiveness of communication strategies in healthcare institutions in Istria in relation to the age of the respondents. The research sample consisted of 130 patients. The research was conducted in Pula and Rovinj (Istria, Croatia). The scaling technique was used in the research part of the work. For the purposes of this research, the Assessment Scale of Strategic Communication Management in Healthcare Institutions was constructed. Based on the results of the research conducted, all three hypotheses were confirmed. First, the implementation of strategic communication practices significantly correlates with increased patient satisfaction. Also, statistically significant differences were observed in the perception of the effectiveness of communication strategies in relation to the gender and age of the respondents, which indicates the importance of adapting communication practices according to the individual characteristics of patients in Istrian healthcare institutions.

Keywords: Health institutions, Istrian, Patients, Satisfaction, Strategic communication management

1 INTRODUCTION

The fact that the World Health Organization recognized communication as one of the five basic skills necessary to maintain a healthy and satisfied life also speaks of the importance of communication (Tomaš 2022, 73). For a clearer insight into the communication process, it is necessary to recognize the key components that make it up. The central elements or ingredients of the communication process include the sender, the message, and the receiver. In addition to these basic elements, other important factors are included in the communication process, such as the means of communication (channel), feedback and possible interference that can affect the effectiveness of communication (Tomaš 2022, 76; Lamza-Maronić, Glavaš, 2008, 10).

Strategic communication has received several different definitions, which, like many definitions related to the concepts of strategy and communication, differ from each other (Thomas et al. 2015, 4). Strategic communication represents the conscious use of communication by an organization to achieve its mission (Hallahan et al. 2007, 3). Ensuring effective communication with patients and their families is a key foundation for providing high- quality healthcare (Practical Approaches to Building a Patient-Centered Culture, 2008 in Cingi et al. 2015, 82). Lack of effective communication is clearly documented as one of the key factors contributing to medical errors and adverse patient outcomes. Communication problems often result in errors in the provision of medical therapy, delays in treatment, and even unintended fatal outcomes (Brand et al. 2015). The satisfaction of health service users, especially patients, depends on various factors. The quality of healthcare, education, physical environment, processes, individual approaches and communication contribute to shaping patient satisfaction in the hospital context (Ruliyandari et al. 2019, 106). Below are the results of research conducted on the topic of the impact of communication on patient satisfaction.

Cingi et al. (2015, 82) point out that effective communication is the key to patient satisfaction, including understanding their feelings and careful monitoring of verbal and non-verbal communication. It is important not only what health professionals say, but also how they say it, so that patients feel supported and cared for. In situations with angry or anxious patients, using appropriate communication techniques is essential to defuse tension. (Cingi et al. 2015, 82). Considering the constant increase in sentinel and harmful events caused by ineffective communication, Burgener (2020, 128) states the key need for healthcare organizations to focus on improving effective communication. This improvement, according to Burgener (2020, 128), will result not only in greater safety and patient experience, but also in the final improvement of results. Research conducted by Sari et al. (2021, 241) points out that effective communication plays a key role in patient satisfaction in the hospital environment. Through the application of effective communication between nurses and patients, a sense of trust is created in the ability of nurses to help patients with their health problems. This trusting relationship contributes to patient satisfaction and, ultimately, can increase overall patient trust in the hospital. In addition, it is emphasized that effective communication plays a key role in supporting the development of high-quality health care programs, which leads to the provision of excellent services and increased patient satisfaction (Sari et al. 2021, 241). Research conducted by Pelletier et al. (2019, 9) emphasizes the essential connection between the dimensions of communication and patient satisfaction, while identifying key factors that shape their overall experience. These results indicate a logical alignment between different aspects of communication and satisfaction, further underlining the importance of a holistic approach in understanding patient experiences (Pelletier et al. 2019, 9). Research conducted by Touati et al. (2022, 115) emphasizes the importance of involving patients in the decision-making process in order to improve patient satisfaction with aesthetic dental treatments. Using additional communication tools in addition to conventional verbal communication improves patient satisfaction with treatment results, improves the quality of care provided, and builds a better relationship between patients and dentists. With the increased use of digital tools in cosmetic dentistry, communication with patients and shared decision-making may further advance in the future (Touati et al. 2022, 115). The results of research conducted by Altin and Stock (2016, 8) point out that German adults with a high level of health literacy and a positive orientation of general practitioners towards patients, including joint decision-making, show greater satisfaction with the health care provided. These results highlight the key role of communication and a participatory approach in achieving high patient satisfaction and recommend that healthcare organizations should develop comprehensive strategies that respond to health literacy needs to improve patient experience (Altin and Stock 2016, 8).

2 PURPOSE AND GOALS

The purpose of research on strategic communication management in healthcare institutions in Istria is to study key strategies and challenges in communication, with a special focus on the specifics of the healthcare sector in the region. The aim of the research is to explore communication approaches and the implementation of strategic practices to improve relationships with patients, staff and the community. Through the identification and analysis of the potential relationship between the applied communication management strategies and the level of patient satisfaction, the research aims to provide a deeper understanding of the factors that influence patients' perception of the quality of communication in the healthcare environment.

As part of the research, three hypotheses were set. The first hypothesis (H_0) claims that the application of strategic communication practices significantly correlates with increased patient satisfaction. The second hypothesis (H_1) assumes statistically significant differences in the perception of the effectiveness of communication strategies in relation to the gender of the respondents, while the third hypothesis (H_2) implies that there are statistically significant differences in the perception of the effectiveness of communication strategies in relation to the age of the respondents.

3 METHODS

This research paper applies a quantitative approach to studying strategic communication management in healthcare institutions in Istria. The research instrument is the Assessment Scale of Strategic Communication Management in Healthcare Institutions, which measures different dimensions of communication management. The statements in the assessment scale reflect different aspects of communication and their potential impact on patient satisfaction. These statements provide insight into the subjective perception of patients about different communication strategies and their contribution to the overall experience in the healthcare environment. Before conducting the research, ethical permits were obtained from the relevant ethics committees, along with permits from the organizations where the research takes place. Anonymity of participants and voluntary participation are guaranteed.

Data were collected in health institutions in Pula and Rovinj (Croatia) during October and November 2023. The research sample consisted of 130 patients. Data analysis was performed using the statistical software platform SPSS23 and included dimensions such as sample size and basic descriptive statistics, including frequencies, arithmetic mean, standard deviation, and minimum and maximum values. The Kolmogorov-Smirnov test was used to evaluate the data distribution. The identification of statistically significant differences in the respondents' answers according to the first independent variable (gender of the respondents) was carried out using the Mann-Whitney U test. Furthermore, the Kruskal-Wallis test was applied in order to determine statistically significant differences in the respondents' answers in relation to another independent variable (age of the respondents).

4 RESULTS

4.1 Descriptive statistics results

Of the total number of respondents, 90 % of respondents said that they agree and completely agree with the statement defining clear communication goals contributes to my satisfaction; for statement structured information management increases my satisfaction 83.8 % of respondents; for statement effective internal communication within healthcare institutions directly affects my satisfaction 88.5 % of respondents; for statement practicing individualized communication with me through a strategic approach contributes to my satisfaction 83.1 % of respondents; for statement integrating patient feedback into strategic communication strategies improves my satisfaction 82.3 % of respondents; for statement transparency regarding the quality of services provided is part of strategic communication management and contributes to my satisfaction 93.8 % of respondents; for statement the focus on my education through strategic communication management contributes to my better understanding and satisfaction 90 % of respondents; for statement proactively resolving potential misunderstandings as part of a communication management strategy maintains a pos-

itive perception of me as a patient 88.5 % of respondents; for statement developing an inclusive communication culture contributes to my sense of connection with the healthcare facility 83.1 % of respondents; and for statement regular evaluation and adjustment of communication practices as part of strategic management enables continuous improvement and increases my satisfaction 79.2 % of respondents. The lowest arithmetic mean ($M=4.2000$) is recorded by the statement regular evaluation and adjustment of communication practices as part of strategic management enables continuous improvement and increases my satisfaction, which also has the highest standard deviation ($Sd=.80116$) (table 1).

Table 1: Descriptive statistics of statements about the impact of strategic communication practices in healthcare institutions on patient satisfaction

Statement	f(1)	f(2)	f(3)	f(4)	f(5)	N	\bar{x}	Sd	Min	Max
Defining clear communication goals contributes to my satisfaction.	0	1	12	35	82	130	4.5231	.69567	2	5
Structured information management increases my satisfaction.	0	1	20	46	63	130	4.3154	.75775	2	5
Effective internal communication within healthcare institutions directly affects my satisfaction.	0	1	14	50	65	130	4.3769	.70728	2	5
Practicing individualized communication with me through a strategic approach contributes to my satisfaction.	0	1	21	50	58	130	4.2692	.75522	2	5
Integrating patient feedback into strategic communication strategies improves my satisfaction.	0	1	22	53	54	130	4.2308	.75265	2	5
Transparency regarding the quality of services provided is part of strategic communication management and contributes to my satisfaction.	0	0	8	60	62	130	4.4154	.60725	3	5
The focus on my education through strategic communication management contributes to my better understanding and satisfaction.	0	1	12	47	70	130	4.4308	.69258	2	5
Proactively resolving potential misunderstandings as part of a communication management strategy maintains a positive perception of me as a patient.	0	1	14	45	70	130	4.4154	.71294	2	5
Developing an inclusive communication culture contributes to my sense of connection with the healthcare facility.	0	1	21	43	65	130	4.3231	.76973	2	5
Regular evaluation and adjustment of communication practices as part of strategic management enables continuous improvement and increases my satisfaction.	0	2	25	48	55	130	4.2000	.80116	2	5

(Source: Own research, 2023)

4.2 Kolmogorov-Smirnov test results

All aspects included in the evaluation of the impact of strategic communication practices in healthcare institutions on patient satisfaction were subject to Kolmogorov-Smirnov testing. The results presented in Table 2 indicate that none of the variables have a normal distribution, which is confirmed by the statistically significant results of Kolmogorov-Smirnov test at the significance level of $p < 0.05$. As a result, in further research, non-parametric tests will be used to examine statistically significant subsamples, given that they do not require the assumption of a normal distribution of the variables in the analysis (Pallant 2017, 205).

Table 2: Results of the Kolmogorov-Smirnov test of claims about the influence of strategic communication practices in healthcare institutions on patient satisfaction

Statement	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	p	Statistic	df	p
Defining clear communication goals contributes to my satisfaction.	.384	130	.000	.687	130	.000
Structured information management increases my satisfaction.	.301	130	.000	.776	130	.000
Effective internal communication within healthcare institutions directly affects my satisfaction.	.311	130	.000	.762	130	.000
Practicing individualized communication with me through a strategic approach contributes to my satisfaction.	.280	130	.000	.791	130	.000
Integrating patient feedback into strategic communication strategies improves my satisfaction.	.262	130	.000	.801	130	.000
Transparency regarding the quality of services provided is part of strategic communication management and contributes to my satisfaction.	.309	130	.000	.738	130	.000
The focus on my education through strategic communication management contributes to my better understanding and satisfaction.	.333	130	.000	.742	130	.000
Proactively resolving potential misunderstandings as part of a communication management strategy maintains a positive perception of me as a patient.	.332	130	.000	.746	130	.000
Developing an inclusive communication culture contributes to my sense of connection with the healthcare facility.	.310	130	.000	.770	130	.000
Regular evaluation and adjustment of communication practices as part of strategic management enables continuous improvement and increases my satisfaction.	.264	130	.000	.807	130	.000

(Source: Own research, 2023.)

4.3 Mann-Whitney U test results

Based on a detailed analysis of the results of the Man-Whitney U test, which is shown in table 3, significant statistical differences were recorded in the respondents' perceptions of the impact of strategic communication practices in healthcare institutions on patient satisfaction, taking into account their gender ($p < 0.05$).

Table 3. Mann-Whitney U test – The difference in the attitudes of respondents in relation to gender regarding claims about the influence of strategic communication practices in healthcare institutions on patient satisfaction

Statement	Mann-Whitney U	Wilcoxon W	Z	P
Defining clear communication goals contributes to my satisfaction.	725.500	1505.500	-6.243	.000
Structured information management increases my satisfaction.	602.000	1382.000	-6.506	.000
Effective internal communication within healthcare institutions directly affects my satisfaction.	491.000	1271.000	-7.215	.000
Practicing individualized communication with me through a strategic approach contributes to my satisfaction.	470.500	1250.500	-7.185	.000
Integrating patient feedback into strategic communication strategies improves my satisfaction.	483.500	1263.500	-7.090	.000
Transparency regarding the quality of services provided is part of strategic communication management and contributes to my satisfaction.	978.500	1758.500	-4.541	.000
The focus on my education through strategic communication management contributes to my better understanding and satisfaction.	624.500	1404.500	-6.549	.000
Proactively resolving potential misunderstandings as part of a communication management strategy maintains a positive perception of me as a patient.	483.500	1263.500	-7.328	.000
Developing an inclusive communication culture contributes to my sense of connection with the healthcare facility.	521.000	1301.000	-6.971	.000
Regular evaluation and adjustment of communication practices as part of strategic management enables continuous improvement and increases my satisfaction.	450.000	1230.000	7.227	.000

(Source: Own research, 2023)

4.4 Kruskal-Wallis test results

Based on a careful analysis of the results of the Kruskal-Wallis test, shown in Table 4, significant statistical differences were observed in the respondents' attitudes regarding age in the context of claims about the connection between strategic communication practices in healthcare institutions and patient satisfaction ($p < 0.05$).

Table 4: Kruskal-Wallis test – The difference in attitudes of respondents in relation to age regarding the claims of the influence of strategic communication practices in health care institutions on patient satisfaction

Statement	Chi-square	df	p
Defining clear communication goals contributes to my satisfaction.	49.011	3	.000
Structured information management increases my satisfaction.	63.243	3	.000
Effective internal communication within healthcare institutions directly affects my satisfaction.	65.496	3	.000
Practicing individualized communication with me through a strategic approach contributes to my satisfaction.	73.037	3	.000
Integrating patient feedback into strategic communication strategies improves my satisfaction.	76.370	3	.000
Transparency regarding the quality of services provided is part of strategic communication management and contributes to my satisfaction.	34.081	3	.000
The focus on my education through strategic communication management contributes to my better understanding and satisfaction.	60.003	3	.000
Proactively resolving potential misunderstandings as part of a communication management strategy maintains a positive perception of me as a patient.	62.241	3	.000
Developing an inclusive communication culture contributes to my sense of connection with the healthcare facility.	78.447	3	.000
Regular evaluation and adjustment of communication practices as part of strategic management enables continuous improvement and increases my satisfaction.	80.637	3	.000

(Source: Own research, 2023)

5 DISCUSSION

As part of the research, three hypotheses were put forward that were the subject of analysis in order to examine the connection between strategic communication practices in healthcare institutions and patient satisfaction, and possible statistically significant differences in the perception of the effectiveness of communication strategies in relation to the gender and age of the respondents.

The first hypothesis (H_0) claims that the implementation of strategic communication practices significantly correlates with increased patient satisfaction. The results of descriptive statistics show high average values for all statements related to the application of strategic communication practices. For example, even 90 % of respondents declared that they agree or completely agree with the statement that defining clear communication goals contributes to my satisfaction. Similarly, high average values were recorded for other claims. These results support the first research hypothesis, indicating a significant positive correlation between the application of strategic communication practices and patient satisfaction.

The second hypothesis (H_1) assumes statistically significant differences in the perception of the effectiveness of communication strategies in relation to the gender of the respondents. Mann-Whitney U test analysis reveals significant statistical differences in respondents' attitudes in relation to gender for all statements about the impact of strategic communication practices on patient satisfaction. This diversity in perception may indicate different needs and expectations of patients according to their gender, which requires adaptation of communication strategies.

The third hypothesis (H_2) implies that there are statistically significant differences in the perception of the effectiveness of communication strategies in relation to the age of the respondents. The results of the Kruskal-Wallis test confirm significant statistical differences in respondents' attitudes in relation to age for all statements. This indicates the need to adapt communication strategies in accordance with different generational preferences and perceptions.

In conclusion, the obtained results confirm all three research hypotheses. These findings have important implications for practice in healthcare institutions, emphasizing the necessity of implementing strategic communication practices that will be adapted to different groups of patients, in order to increase their satisfaction.

We compare our research on the impact of communication in healthcare institutions on patient satisfaction with the works of relevant authors in order to gain a deeper insight into our results. Burgen (2020, 128) emphasizes the necessity of improving communication in healthcare organizations, which perfectly coincides with our conclusions. We recognize the key role of continuous evaluation and adaptation of communication practices, which we share with Burgen. Our analysis coincides with the research of Sari et al. (2021, 241), which emphasizes the importance of effective communication, especially between nurses and patients. Thus, we confirm the importance of building trust through communication as a key factor for increasing patient satisfaction, in accordance with the findings of Sari et al. Pelletier et al. (2019, 9) identify an association between different aspects of communication and overall patient satisfaction, supporting our findings. Both studies emphasize a holistic approach in understanding patient experiences, which further confirms the identified key factors in our research. A comparison with research by Altin and Stock (2016, 8) on the relationship between health literacy, physician orientation and patient satisfaction reveals similarities in approach. Our analysis takes into account the perception of patients by gender and age, suggesting the need to adapt strategies to meet the specific needs of different groups of patients, which is in line with the recommendations of Altin and Stock. Research by Touati et al. (2022, 115) on aesthetic dental treatments supports our conclusions about the importance of involving patients in the decision-making process and applying additional communication tools. Both studies highlight the role of shared decision-making in improving the patient experience. Ultimately, the comparison with relevant authors provides additional context and confirms the key findings of our research on the importance of communication in healthcare institutions to achieve high patient satisfaction.

The first limiting factor relates to the sample size used in the research. Given that the sample consisted of 130 patients, there is a risk that the results are not fully representative of the wider population. Increasing the sample would contribute to increasing the reliability and generalization of the results. Second, the research is focused only on one geographical area, Pula and Rovinj in Istria, Croatia. This limitation may lead to questions about the transferability of the results to other regions or countries, especially considering potential variations in the culture and practices of healthcare facilities. Also, it should be taken into account that the data were collected through self-reporting by the respondents through an assessment scale. This methodology can lead to biased responses, where respondents may tend to give answers that are socially acceptable instead of honest answers. The time limit is also significant, considering that the research was conducted in a certain period of time. This limitation may affect the generalizability of the results to other time periods, given the possible changes in the circumstances in the healthcare facilities over time. Furthermore, although the assessment scale used is specific to the research, there is a possibility that it does not cover all relevant aspects of communication in healthcare institutions, which may affect the overall evaluation.

Bearing in mind the mentioned limitations of the research, relevant recommendations are made in order to overcome the challenges and improve future research and practice of communication management in healthcare institutions. First, in order to overcome the limitation of small sample size, it is recommended to expand the sample of respondents in future research. Increasing the number of participating patients would contribute to greater representativeness of the results and enable the generalization of the findings to a wider patient population. In order to eliminate the limitation of focusing on only one geographical region, it is recommended to expand the geographical scope of the research. The inclusion of more health institutions from different regions or even countries would contribute to a better understanding of the diversity of approaches to communication management. Given the limitation of respondents' self-reporting via assessment scales, the inclusion of different data collection methods is recommended. Combining the rating scale with interviews or focus groups could provide deeper insight into patient experiences and provide additional validation of the results. Regarding the limitation of the time period, it is recommended to conduct longitudinal research that would monitor changes in the perceptions of patients over a longer period. This would enable monitoring the long-term effects of implemented communication strategies. In

order to overcome the lack of normal data distribution, it is recommended to use additional statistical methods adapted to the analysis of non-parametric data, which would ensure the reliability of the results. In order to further enrich the analysis and obtain information about the factors that can influence the perception of communication, it is recommended to include additional variables such as the socioeconomic status of the patients. Furthermore, in order to overcome practical challenges in implementing the results, the development of specific guidelines to improve communication with patients is recommended. These guidelines should be adapted to the specific needs of patients, and healthcare institutions should actively work on implementing the recommendations in their communication management practices.

6 CONCLUSION

This research on strategic communication management in healthcare institutions in Istria provides a deeper understanding of key strategies and challenges in communication, with special emphasis on the specifics of the healthcare sector in the region. Our goal was to explore communication approaches and the implementation of strategic practices with a focus on improving relationships with patients, staff, and the community. The key findings of this research confirm the positive correlation between the application of strategic communication practices and patient satisfaction.

The analysis of the research results provides an insight into the high level of agreement of patients with the claims about the positive impact of strategic communication practices on their satisfaction. For example, over 90 % of respondents agree that defining clear communication goals contributes to their satisfaction, while high marks are also given to statements related to transparency, individualized communication, inclusion of patient feedback and other aspects of communication management.

However, it is important to take into account the identified research limitations that may affect the generalization of the results. Limitations related to sample size, geographic coverage, data collection methodology, and time period suggest the need for future research that will carefully consider these aspects.

In addition, the analysis of differences in the perception of communication according to the gender and age of patients indicates the need to adapt communication strategies according to the specificities of different groups. This has implications for practice in healthcare settings, highlighting the importance of an approach that takes into account the individual needs and expectations of patients.

In accordance with the results obtained, we propose several recommendations for practice and further research. First, an expansion of the patient sample is recommended to increase the representativeness of the results. Also, we suggest including different geographic areas to get a broader perspective. A combination of data collection methods, such as surveys, interviews and focus groups, can provide a deeper understanding of patient experiences. Furthermore, future research should pay attention to a longitudinal approach in order to monitor the long-term effects of implemented communication strategies. In addition, the use of additional statistical methods adapted to the analysis of non-parametric data is recommended to strengthen the analysis.

In order to improve the practice of communication management in healthcare institutions, we suggest the development of specific guidelines adapted to the needs of different groups of patients. These guidelines should be aligned with identified patient satisfaction factors and actively implemented in daily practice.

In the final conclusion, this research contributes to the understanding of the key aspects of communication management in healthcare institutions, providing a basis for improving the quality of services and patient satisfaction. However, further research and practical initiatives should take into account the identified recommendations and limitations in order to achieve sustainable and comprehensive progress in the field of health communication management.

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THE EFFECTIVENESS OF DIGITAL POLITICAL COMMUNICATION IN INFLUENCING VOTER BEHAVIOR¹

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ABSTRACT

The development of digital technologies has changed and improved the methods of political communication. Today, digital political communication has become a powerful weapon of politicians and their parties in political campaigns, which can ensure the desired outcome in political elections. Communication in a digital environment can more effectively influence the building of desired attitudes among voters and additionally motivate them to spread positive electronic word of mouth (eWOM) to other Internet users in order to directly encourage the formation of positive political opinion towards a specific political candidate and/or party. However, digital political content published on social media must be properly and intelligently developed and regularly altered in order to improve communication with voters and have a more comprehensive impact on the ultimate results of political elections. In recent years, political marketing professionals have employed credible political influencers in social media (primarily experts in this field) to influence voter attitudes and, as a result, affect the creation of desired positive political perceptions.

Keywords: Digital Political Communication, Electronic Word of Mouth (eWOM), Political Influencers, Digital Environment, Voters

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1 INTRODUCTION

Communication can be defined as the process of sending messages by one person to other people in order to talk, change attitudes, opinions or behavior, orally (directly) or through the media (indirectly). In this process, a reciprocal relationship is necessary between the communicator and the communicants, that is, between the delivery of messages and the recipients (Hasbullah et al. 2018). Political communication, on the other hand, is an activity that reflects the presentation of real and potential consequences that can regulate people in conflict conditions (Junaedi 2013). In many cultures, however, remaining silent throughout a communication process is a way to avoid conflict, stress, and awkward circumstances

(Baltezarević et al. 2022). Interpersonal relations and politics could not function without the process of communication (Gerstle and Piar 2016). Skilled communication is a feature of good politics, so political communication can be presented as a requirement for the functioning of a broadly defined public space (Wolton 2015).

If there is a clear desire for democracy to function well in a country, citizens need true information about politics. Only in the case when people have knowledge about political actors, or about various social situations, they can act meaningfully and have informed opinions as citizens. However, it is unclear exactly how much people need to be informed in order for democracy to function. Certainly, there is no doubt that those citizens who are well informed are better able to participate in social and political issues and to more adequately choose political representatives who are in line with their political views (Patterson 2013). The modern environment, fueled by the increasing proliferation of digital, mobile and social media, has significantly influenced fundamental changes in the media environment and political communication systems, but also reduced the influence of traditional media (Vowe and Henn 2016). Traditional cultural values and their content appear to be suppressed by digital media and contemporary technologies (Baltezarević et al. 2019a). However, it is not advised to rely solely on technology during the digital transformation process, though, as human-machine coexistence produces superior outcomes (Papakonstantinidis et al. 2021). In today's democratic and political processes, the concept of political marketing, branding and communication goes beyond winning political elections. Strategic communication, in its many forms, is the main success factor in political campaigns. Political communication combines: micro-targeting, (where potential voters are sent highly customized emails, based on previously collected and analyzed personal data), the use of social media in political campaigns to motivate action and voter participation, and the use of social networking platforms (such as Facebook, Twitter or Instagram) for communication and/or fundraising, presenting political candidates, but also for promoting the ideology, vision and values that the political option stands for (Bendle 2018).

Several studies can be found in the literature that show that the mass media is still the most important source of information about current events and politics (Mitchell et al. 2016; Newman et al. 2016). These studies suggest that cross-country differences in political knowledge are partly attributable to differences in the political information environment (Banducci et al. 2016). One of the topics relevant to political communication that certainly deserves more detailed research is a deeper understanding of the determinants of people's reactions to messages on social networks (Bursztyń et al. 2020). There are many benefits of social media, which is considered an excellent marketing tool for retailers and marketers, because it can enable them to engage with existing customers, build good relationships and, of course, create awareness of their brand (Taneja and Toombs 2014). Social media offers unique experiences to its users regarding various political topics, as well. A key role in the exchange of information is represented by random posts shared by users, but also prominent algorithms that work behind the scenes of websites with political themes (Vraga 2016). Social media offers a better and more efficient platform for various political topics than forums or sessions where users attend in person (Bode 2016). As an interactive platform, social media is primarily intended to improve communication through the exchange of photos, videos and ideas, both between individuals and between corporations, have become an integral part of modern marketing strategies and can completely replace traditional marketing activities (Vera and Trujillo 2017).

The digital media and marketing ecosystem has transformed the way companies promote their products and services and influence consumer behavior on a global level, of course this could not bypass

the field of politics and the processes of political campaigns. The technologies, strategies and tools of digital political marketing are today sophisticated, more complex, effective and far-reaching than all the methods that were used in this sphere before. It is, also, evident that the innovations, that are still in the experimental phase, will contribute even more to these processes in the near future (WARC 2017). With the development of internet technologies, political campaign operatives began to use digital technologies and tools to engage members of the younger population, mobilize voter turnout, raise money and support various grassroots operations on the ground (Kreiss 2016). In addition to the above-mentioned advantages that new media offer to political marketing experts, it should be mentioned that more and more attention is being paid to digital games, which, although are not yet in focus as a key political medium, it is only a matter of time when they will be recognized as a place that has the capacity to influence attitudes and generate new voters (Baltezarević et al. 2019b).

The interaction of politicians on social media with Internet users can positively influence the participation of citizens in a certain political topic (Kruikemeier et al. 2013). A study conducted a few years ago, states that politicians use social media to promote themselves, as a political party official, but also as individuals. In interaction with other users, they mainly propagate ideas and policies that they want to put into practice (Enli and Skogerbo 2013). Today, almost all political parties have reformed traditional communication channels and integrated digital communication methods. In addition to their active presence and participation on social media platforms, by creating specific blogs and websites, they convey their political opinions directly and more effectively to the audience (Serrano et al. 2018). The recommendation is that the content on social networks, in connection with political topics, is repeated from time to time, because it can encourage users to express their political opinion more freely. However, it is necessary to adapt the content, so that it is not perceived as offensive or as too sensitive a topic, in order to discuss it openly (Halpern and Gibbs 2013).

Advances in the data industry and in advertising technology have made available the services of a growing infrastructure of specialized companies that offer more extensive data collection resources (like data marketing clouds) and precise voter targeting. Clouds, developed today by well-known global companies such as Adobe, Nielsen and IBM, sell valuable political data together with detailed information about consumers, for example, personal interests, frequency of credit card use, television viewing patterns, etc. (Salesforce DMP 2021). In political operations, Facebook and Google play an important role, offering specialized advertising products, created for political purposes, but also a whole range of commercial digital marketing tools and techniques (Bond 2017). Spending on political advertising in the United States in 2022 will be close to \$10 billion. Only during the midterm elections (in August), the purchase of political advertisements exceeded 3.5 billion US dollars, which surpasses the election cycle of 2020, when the campaigns between Trump and Biden reached a record for advertising expenditures (Statista 2022a).

In the 2016 American elections, the social networking site Facebook played a particularly important role. Facebook, with the help of its registered members (they had to give their correct names), created a powerful identity-based targeting paradigm. In this way, it allowed political parties to access a huge number of users (more than 162 million) and to target them individually according to gender, age, congressional district, and interests. Instagram is also a widely used social networking platform that helps track individuals and collect their data using various tactics. Not surprisingly, today specialized companies are increasingly forming teams of in-house staff aligned with each of the major political parties in order to provide technical assistance or any other services to political candidates and their campaigns at all times (Kreiss and McGregor 2018). Cambridge Analytica (CA), a well-known behavioral communications and data analysis company, was a key player in the 2016 US election, and was instrumental in Donald Trump's victory. In order to determine the personality of every adult in the United States of America, the company used the so-called five-factor personality model (known as OCEAN) (Albright 2016). This model, using digital data, voter history and marketing resources, rated personalities based on five key traits: openness, conscientiousness, extroversion, agreeableness and neuroticism. The digital data used in this assessment was provided by leading companies such as Acxiom, Experian, Nielsen, Aristotle, and Facebook. Based on the analysis of the obtained data, it was possible to understand more precisely the preferences and needs of the voters, and as an epilogue, convincing advertising content was launched on several digital channels (Nix 2017).

In terms of digital political advertising, about US\$700 million was spent in the United States in the first half of 2022 alone. Of the total sum, close to 400 million was allocated to political campaigns on Google and Facebook, while the rest was spent on connected TV (CTV) (Statista 2022b). Over three-quarters of voters polled in 2022 in the United States said they tend to ignore or turn off political ads, while 60 percent of them believe that political advertising is unethical and that regulation of political ads on social media is needed (close to 77 percent). Most importantly, 64 percent of respondents believe that consumer data should not be available to political advertisers, in order to prevent misuse (Statista 2022c).

A less formal means of communication than a typical website is a political candidate's blog, which contains daily entries in a text format (often enriched with images) that can be accessed by all who are interested. Very often a blog of a political party publishes articles by several people who are responsible for activating and stimulating the entire blog community. Those political candidates, who use their blogs in order to express their subjective views on certain political situations, try not to cross the border, so as not to damage their political image. What is not appropriate during a political campaign is to publish a biography or irrelevant details about a political candidate's private life. However, strictly providing only formal election information is also not advised. The recommendation is that the politician should always be socially accessible and available to the people, to create a feeling of intimacy in the relationship between the voter and the candidate, only in this way he/she can significantly strengthen his/her political image (Karwacka 2017). Another advantage of a blog in an election political campaign is that it facilitates contact with journalists. Politicians, with adequate and interesting blog content, can stimulate the interest of the media in all aspects, which is the effect that politicians want to achieve during the pre-election period or during the campaign (Marketingwpolityce 2020).

Political candidates, who want to achieve success in elections, most often communicate with the local community by commenting on current events, using Twitter, live casts and live streaming services (Miotk 2016). The findings of the study show that the use of social networking sites in terms of perceived ease of use, usefulness, but also the need to belong to the community, have a positive effect on the involvement of voters in politics, which can affect their attitude towards voting and their trust in the decisions they made (Lee 2020). Given that the virtual space is, in many cases, the first place where people will look for information in the decision-making process, in order to satisfy their needs and desires, experts in the field of political marketing are increasingly communicating with the public by creating audio-visual content. In addition to social networking sites, blogs and discussion forums, experts have recently been hiring social media influencers, opinion makers, who, due to their expertise and experience in a certain field, are perceived by followers as credible sources of information. However, the audio-visual messages, which they place through the digital environment, and which influence the attitudes of their followers, are in most cases pre-created by the client, and in some cases, the time frame when they should be launched is also precisely defined (Baltezarević 2022). Although influencers most often comment on lifestyle topics with their followers, they have recently begun to increasingly integrate political content into their posts. Given that they have a large audience, this change has started to significantly affect the content of their posts and communication on social media platforms (Riedl et al. 2021). According to a study conducted in Germany a few years ago, traditional influencers are very effective when it comes to product promotion and over 30 percent of social media users discovered a new product through an influencer's recommendation (Wulff et al. 2018). As influencer marketing is still in its infancy, only a few related scientific studies are available in the literature, however, political influencers are not conceptualized uniformly in all studies. In any case, in order to avoid the impression that the content seems superficial or fake, which can damage the reputation, it is necessary to produce content that is more politically significant (Casero-Ripolles 2021).

Among the political influencers of social media there are several examples of those who stood out in the past few years and became part of the global political landscape. What characterizes these influencers are certainly the topics they discuss on their channels, such as issues of sustainability, feminism, the rights of the LGBT community and other current sensitive issues, while others have a more conservative approach or right-wing views (Wood 2021). Some of them engage in institutional politics and encourage their followers to vote, and there are also examples of them publicly supporting a certain political ideology or party (Shmargad 2022). In order for politicians to position themselves as authentic outsiders, and not as part of the populist elite, they need to build the per-

ception of voters towards them as real and reliable (Enli 2017). The same applies to political influencers, authenticity is key if they want to create and maintain their own original and unique personal brand (Whitmer 2021). Although political influencers have a certain influence on their followers, it cannot be claimed that this influence is direct and undeniable (Sinanan et al. 2014). Weeks et al. (2017) showed in their quantitative study that a small number of internet users influence the majority through active mutual sharing of political content. According to this research, more than 23% of Facebook users (members of the younger population) published original political content, almost 32% shared other people's political content, and about 52% regularly followed political news on the social media platform. A study conducted in Australia, USA, and Great Britain by Vromen et al. (2016), had similar conclusions. The proactive younger population influenced the persuasion of their peers with their digital political topics. 34% of them posted links to certain political news, 31% directly persuaded their peers for whom to vote, or not to vote at all, while 35% influenced their colleagues at work to undertake certain activities on a specific political issue. A study conducted in February 2020 among influencers in the United States showed that 65% of respondents confirmed that it is a good idea for presidential candidates to use influencers in their political campaigns (Statista 2020). Electronic word-of-mouth (eWOM), that is, information people receive from social networking sites from other Internet users, can have a stronger influence on a consumer's purchase decision than standard marketing techniques. A message shared by another consumer in a digital environment is considered more authentic and credible than messages sent by an advertiser. Another consumer's review of a particular product or service will always be respected and taken into account in the process of making purchase decisions. The ability of consumers to freely share their experience with a brand at any time with their circle of friends and acquaintances through social media networks (such as Facebook, Twitter and Instagram), makes eWOM a very effective marketing tool. Influencers on social networks are those who, in the process, give their followers guidelines for making the final decision (De Veirman et al. 2017). Companies that hire influencers on social networks to recommend their brands to their followers, in order to have more control over communication activities, often provide in advance the content that they want the influencers to convey to consumers, as well as the time frame when the message should be launched. In this way, the risk of negative electronic word of mouth (eWOM) is reduced (Kwiatek et al. 2021). In order to communicate primarily with the younger population, experts in the field of political marketing are increasingly engaging influencers on social networks and taking advantage of electronic word of mouth (eWOM). If their posts are perceived by followers as credible, then they tend to become viral, and spread exponentially through the virtual environment. Political influencers, who have the power to encourage followers to engage in discussion about a particular political issue, can encourage their audience to share such information with other Internet users, thereby indirectly strengthening the image of political candidates by presenting them as charismatic, ordinary people who do not differ much from other representatives of their community (Baltezarević and Baltezarević 2022).

Content posted on social media platforms is critical to the success of campaigns (Chaudhari and Bhornya 2022). It is believed that over 80% of global internet traffic is reserved for video content (Ahmad 2016). In today's digital environment, information on social media, enriched with multimedia content, is more visual than in previous years. This kind of content has a stronger and more effective influence on Internet users, due to the possibility that through interaction with the content they can contribute to the modifications of the content published by other users. In this way, in cooperation with others, a continuous process of improving information is enabled (Calderaro 2018). Consumers trust the reviews posted on the Internet by experts in a particular field. The recommendation for organizations is to publish the best reviews on their organization's website, but also to enhance the site's attractiveness by further decorating the site with photos, graphs, videos, maps, and the like. Such contents are intended to interest potential consumers and motivate them to visit content-oriented websites more often (Wawrowski and Otolá 2020). Marketing experts must find a way to use the brand to provoke consumers to talk about it among themselves and, based on the conversation, to better understand the needs and desires of consumers. To motivate continuous consumer conversations, published content must be captivating and embellished with infographics, videos and images, newsletters, and the like (Du Plessis 2017). Images play a very important role in online content and are considered key to engaging companies with their target market (Feldman 2016). According to marketing experts, if the

audience identifies with the story you are telling, there is a greater chance that user engagement will be significantly higher. Most importantly, this goal is much easier to achieve when images are used. According to one study, 93% of the most interesting posts on Facebook are reserved for posts containing photos (Walter 2014). Internet users will spend more time on a post if it contains a relevant image, thus the probability that they will be engaged increases significantly. Information will be easier to remember if it is accompanied by an image, according to research, 65% of information with images will be remembered three days after encountering it, in the case of text that is not accompanied by an image, the percentage drops to only 10% (Lifelearn 2015).

The purpose of the research in this paper is to determine the impact of digital political communication on the creation of positive perceptions of voters towards a certain political party or candidate during a political campaign. The main goal of this study is to offer political and marketing experts new knowledge that would help them create more effective political content in the digital environment, and to communicate more purposefully with Internet users (their voters), in order to increase their chances and have better results in political elections.

2 METHODS

The research for the purposes of this paper was conducted through a closed questionnaire that was sent electronically to email addresses saved in the research database. 234 questionnaires were sent, of which 185 were correctly and completely filled in, and they were used for further processing. The second part of the Questionnaire contained statements (15 in total) that tested the respondents' attitudes. To verify the research questions posed in this paper, three hypotheses were defined, the justification of which was checked with the help of SPSS software for research in the field of social sciences.

3 RESULTS

The first part of the questionnaire, which asked for demographic data on the respondents, indicated that n=85 (45.9%) male respondents, and n=100 (54.1%) female respondents participated in the research. The age structure shows that most respondents n=90 (48.6%) are from the youngest age group, which participated in the research 18-25 years old, n=43 (23.2%) aged 26-35 years, n=23 (12.4%) aged 36-45, while the representation of older respondents is significantly lower, i.e. n=21 (11.4%) aged 46-55 and n=8 (4.3%) aged 56-65. Regarding the educational structure, the analysis of the questionnaire showed that among the respondents, the most represented respondents were those with secondary education n=61 (33.0%), with a university degree n=57 (30.8%), with a master's degree n=55 (29.7%) and the least, with a doctorate n=12 (6.5%).

The results of the hypothesis testing are as follows:

H1: If digital political communication is applied for the purposes of a political campaign, the greater the chance that voters' perceptions of the political party will be positive.

Testing H1 showed that the hypothesis was founded and confirmed because the results of the Chi-Square Tests $\chi^2 (16, 1) = 172.344^a$, $p < 0.01$ indicated that there is a statistically significant correlation between the tested variables.

Table 1: Symmetric Measures for H1

Symmetric Measures		Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Ordinal by Ordinal	Gamma	.715	.056	9.262	.000
	Spearman Correlation	.590	.054	9.884	.000 ^c
Interval by Interval	Pearson's R	.591	.061	9.910	.000 ^c
N of Valid Cases		185			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.
c. Based on normal approximation.

Pearson R= .715 shows that there is a positive high correlation and H1 is confirmed. Spearman Correlation of ranks also gives positive high correlation. A Gamma value of .715 indicates that knowing the level of acceptance of the first claim improves the prediction of acceptance of the second claim by 71.5 %.

H2: If credible political influencers on social networks are engaged in a political campaign, the more likely it is that positive electronic word of mouth (eWOM) will be initiated among voters in the digital environment.

Testing H2 showed that the hypothesis was founded and confirmed because the results of the Chi-Square Tests $\chi^2 (16, 1) = 226.019^a$, $p > 0.01$ indicated that there is a statistically significant correlation between the tested variables.

Table 2: Symmetric Measures for H2

Symmetric Measures					
		Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Ordinal by Ordinal	Gamma	.578	.081	6.896	.000
	Spearman Correlation	.516	.080	8.155	.000 ^c
Interval by Interval	Pearson's R	.503	.080	7.867	.000 ^c
N of Valid Cases		185			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.
c. Based on normal approximation

Pearson R= .503 shows that there is a positive high correlation and H2 is confirmed. Spearman Correlation of ranks also gives positive high correlation. A Gamma value of .578 indicates that knowing the level of acceptance of the first claim improves the prediction of acceptance of the second claim by 57.8 %.

H3: If during the political campaign the multimedia content posted on social networks is adapted to the needs of the target market, the more likely it is that the political party will have more votes in the political elections.

Testing H3 showed that the hypothesis was founded and confirmed because the results of the Chi-Square Tests $\chi^2 (16, 1) = 112.592^a$, $p > 0.01$ indicated that there is a statistically significant correlation between the tested variables.

Table 3: Symmetric Measures for H3

Symmetric Measures					
		Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Ordinal by Ordinal	Gamma	.619	.064	7.811	.000
	Spearman Correlation	.518	.059	8.187	.000 ^c
Interval by Interval	Pearson's R	.536	.061	8.590	.000 ^c
N of Valid Cases		185			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.
c. Based on normal approximation

Pearson R= .536 shows that there is a positive high correlation and H3 is confirmed. Spearman Correlation of ranks also gives positive high correlation. A Gamma value of .619 indicates that knowing the level of acceptance of the first claim improves the prediction of acceptance of the second claim by 61.9%.

4 DISCUSSION

The results of the research in this paper are in line with the data that can be found in the available scientific literature. In general, the use of digital political communication can be considered a powerful tool that can influence the positive perceptions of voters towards a political party, especially if it is used for the purpose of a political campaign. Political experts have been using public opinion makers for many years to influence other members of the community and their views on various political issues. Now they have got the opportunity to engage such personalities in the virtual world, and if such personalities (influencers) are people of credibility on social networks involved in a political campaign to support a certain political option, there is a high probability that they will start positive electronic word of mouth (eWOM), that is, to encourage their followers (voters) to share information and their political beliefs with other Internet users. Of course, it is recommended that the party ordering the services, choose the political influencer wisely (to be adapted to the preferences of the target audience), in order to avoid any unforeseen situation (negative electronic word of mouth), which could damage the political campaign and the image of the political party and/or candidate. It is also recommended that the party ordering services from a political influencer independently and in a timely manner, creates and delivers content to him/her and determines the best timing for posting that content. Finally, as can be seen both from the literature and from the results of the research, it is necessary to enrich political posts on social media with multimedia content, because in this way the message will be differentiated and remembered for a longer time, and it will occupy the user's attention longer than simple text content, which can directly affect obtaining a greater number of votes and the success of the political party in the elections.

Unfortunately, it seems that insufficient studies have been done in the specific field of digital political communication, which is certainly a limitation, however, considering that this whole field is still in its infancy, the near future will, with new research, eliminate the current ambiguities.

5 CONCLUSION

New digital communication and the creation of an interactive relationship with voters can have a positive effect on the target audience, on their attitudes towards certain political issues, on a positive perception towards political candidates and parties and influence a favorable outcome in the elections. Of course, the content offered to the public must be accurate and purposeful, and politicians are expected to build their image by presenting themselves as a "man of the people", who does not differ in many respects from an ordinary member of the social community, in order to be more easily accepted by the masses. Such an approach is a good way for democracy to survive in a country. However, studies show that each market has its own preferences, for this reason, it is necessary to adequately adapt the political content that is placed through social media to each audience.

From the review of the literature, it can be seen that digital technology has been of great help in this regard for the past few years, that is, that the huge databases on the specific characteristics and needs of voters, which specialized companies collected, enabled a more precise and efficient design of political activities. In addition to political websites, social network platforms such as Twitter, Facebook, Instagram, LinkedIn, above all, but also the creation of political blogs, have become a means of regular two-way communication with voters. It is recommended, based on the review of the literature, but also on the results of the research in this paper, that such content should be enriched with multimedia content, because in that way it will attract more attention of the audience, but will also be remembered for a longer time. Political influencers can provide great help towards achieving political success in the elections. If their communication is adapted to the needs of their followers on many political issues, there is a real chance that this type of interaction will motivate eWOM, that is, that Internet users (voters) will continue to spread positive information among themselves. Political parties, in order to have this process under control, often deliver content to political influencers and define the exact time when they want such content to be launched, in order to avoid the possible appearance of negative word of mouth, which is difficult to control and which can threaten the intended political goal in the elections.

Current early experimental research, which with the help of virtual reality devices and neuromarketing methods, tries to analyze the hidden needs of consumers (that is, voters). A better understanding of their needs and desires would improve political digital communication and political promotional activities before and during the campaign, which would become far more effective, and the outcome of political elections would be less uncertain.

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SOCIOLINGUISTIC DEVELOPMENT OF DIGITAL COMMUNICATION STYLE: SLANGS, MEMES, AND TRANSLATION ISSUES

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ABSTRACT

In the vast tapestry of human communication, the emergence of the Internet has proven to be a transformative force. The Internet is a thriving melting pot of cultures, and within this digital cosmos, memes and slangs stand as powerful symbols of modern communication. They capture the zeitgeist, condensing complex societal sentiments into easily digestible, often humorous formats. However, their cultural specificity presents unique challenges for translation.

In this article we will try to elaborate translation challenges because of Memes, Slangs and the linguistic labyrinth that they create. Memes, often humorous and always relatable, convey complex societal sentiments through images and limited text. The rapid evolution and virality of memes lead to quick adoption and adaptation of new words or phrases, some of which make their way into everyday language. Digital communication's speed often means relying on these tools, leading to misunderstandings or the stripping away of cultural nuance.

To conclude, memes and slangs are emblematic of the digital age's dynamic linguistic landscape. For translators, this represents an exciting yet challenging frontier. As we continue to forge a global digital community, the art of translating will need to evolve, ensuring that in the midst of laughter and shared moments, no one is left out of the joke.

Keywords: Sociolinguistic, Translation challenges, Memes, Slangs

1 INTRODUCTION

The advent of the internet has revolutionized communication, particularly with the emergence of memes and internet slang, which have become integral to the way we interact in digital spaces. These phenomena are not merely fleeting trends but represent powerful sociolinguistic tools that capture the essence of contemporary culture. Memes, with their humorous and often relatable content, and internet slang, with its rapid evolution, embody a unique blend of language, image, and shared cultural knowledge. However, this digital linguistic landscape poses significant challenges for translation, as these expressions are often deeply embedded in specific cultural contexts. As memes and slang transcend national borders and language barriers, they require translators to navigate the complexities of meaning, humor, and cultural nuances. This article aims to explore the translation challenges posed by internet memes, slang, and their sociolinguistic evolution, highlighting the need for creative adaptation in the process of global digital communication.

Aim:

The aim of this research is to explore the sociolinguistic evolution of internet memes and slang and the challenges they present for translation. Through a comparative study of digital language use across cultures, particularly focusing on Albanian, the research will investigate how the rapid spread of memes and slang affects language and identity. It will also explore the translation strategies required to maintain the essence and humor of these digital expressions, taking into account cultural specificity, multimodality, and the evolving nature of online communication.

Research Questions:

1. How do internet memes and slang reflect and influence sociolinguistic identity in digital communication?
2. What are the primary translation challenges associated with conveying the humor, cultural references, and context of internet memes and slang across languages?
3. How can translators adapt multimodal elements (e.g., images, text, and cultural context) in memes and slang to ensure effective communication and cultural relevance in target languages?

2 LITERATURE REVIEW

2.1 The Rise of Internet Language

As digitalization reshapes language and identity, language learning also continues to evolve. Students participate in the new spaces of socialization offered by the digital and continue to discover and engage in new ways of representing themselves through language and other modalities. For Norton (2013: 4), when students talk, they not only exchange information, but also reorganize their sense of who they are and how they relate to the world.

Recognizing how technology has dramatically transformed language, identity and learning in the 21st century, this article will outline key ideas and issues in language and identity research that have emerged from an ever-changing digital landscape. How have new language structures evolved from digitally mediated communication?

The evolution of digital media with its shift from page to screen (Snyder 2003) intensifies the use of a multiplicity of modes, including the visual, aural, gestural and spatial, for conveying meaning. Language loses its privileged position in the digital world as the meaning of a message is increasingly constituted by a range of modes such as videos, clips, images etc. One specific example through which learners have been able to express themselves using multiple modes is digital storytelling. Through brief personal narratives told through images, sounds and words and assembled using new media (Norton 2013), learners are able to identify and reflect on pivotal moments of their life and find new opportunities for creation and collaboration.

2.2 Sociolinguistic Insights

In the digital age, the study of sociolinguistics has found itself at the forefront of an evolving linguistic landscape, driven in large part by the influence of internet memes and slang. These linguistic phenomena are not just humorous or trendy expressions; they provide unique insights into how

language evolves, how it reflects social identities, and how it shapes our interconnected world. This article delves into sociolinguistic insights gleaned from the world of memes and internet slang, accompanied by examples that illustrate the changing linguistic landscape.

Internet memes have redefined how we communicate complex ideas and emotions. They represent a condensed form of language and culture, often relying on shared knowledge and references. For sociolinguists, memes showcase how language can be repackaged to fit the digital age. An Internet meme is considered to be a complex, multi-layered, and intertextual combination of image and text that is mimicked, copied, and circulated on the internet through social media networks via digital participatory culture (Laineste and Voolaid 2017). The term Internet meme originates from the Meme theory proposed by biologist Richard Dawkins in his groundbreaking book, *The Selfish Gene*, first published in 1976 (Dawkins 2006).

Internet slang is a dynamic linguistic phenomenon. It emerges and evolves rapidly in response to digital culture. It's not just about linguistic innovation; it's about identity and community. Sociolinguists have noted how online communities use slang to create a sense of belonging.

In the linguistic context, memes are units of culture that spread from person to person, developing and adapting along the way, mostly through the use of images and keywords. This memetic transmission has accelerated the rate of language change. Through digital opportunities, people are able to create multiple identities online, such as blogger, photographer, or designer, having the opportunity to transmit feelings, thoughts or even desires through different modalities. Bringing in this way the embodiment of the famous expression, 'a picture is worth 1000 words'.

The evolution of digital media with its shift from page to screen (Snyder 2003) intensifies the use of a variety of modes, including visual, auditory, gestural, and spatial, for conveying meaning. Language loses its privileged position in the digital world, as the meaning of a message is increasingly created in a variety of ways.

"LOL" (Laughing Out Loud) is one of the most iconic and widely used internet acronyms that has transcended online communication to become a part of everyday speech. It originally emerged in early internet culture, specifically within text-based communication platforms like chat rooms, forums, and later, social media, as a way to convey laughter or amusement in response to something funny.

Sociolinguistic Implications of "LOL":

- *Universal Appeal:* "LOL" has achieved global recognition and is often used across cultures and languages. In fact, many languages have adopted "LOL" directly into their lexicon, even when the literal translation of "laughing out loud" doesn't exist in the same form. It's a perfect example of how internet culture creates linguistic phenomena that can bypass traditional language barriers, making it an international form of expression. This is part of the shift in sociolinguistic norms driven by the internet: an emphasis on speed, ease, and universal understanding.
- *Changing Use and Meaning:* While "LOL" originally signified actual laughter, over time, its meaning has become more nuanced. It can now indicate light amusement, sarcasm, or even be used in situations where the person isn't literally laughing at all but rather acknowledging something humorous in a casual way. In many contexts, "LOL" is often used as a filler in conversation, akin to saying "haha" or "smiling" in a face-to-face chat, regardless of whether the person is actually laughing.
- *Language Evolution:* The spread of "LOL" reflects a larger trend in internet language where abbreviations and acronyms are used to quickly express emotions, ideas, or reactions. This change in language is driven by the need for efficiency in digital communication, where brevity and speed are often prioritized over formal language use. It also reflects how social media and messaging platforms shape communication by encouraging shorthand and informal expressions.
- *Translation Challenges:* When it comes to translation, "LOL" can present challenges because its meaning often goes beyond the literal "laughing out loud." It may be used in a context where laughter isn't literal but is meant to convey a lighthearted acknowledgment of something. In some languages, it's not simply a matter of finding an equivalent phrase but also considering the cultural context in which humor is expressed. Translators must understand whether the intent is to reflect genuine laughter or just a casual, digital way of expressing amusement, which might not always be easily conveyed in another language.

- *Cultural Impact:* "LOL" has contributed to the digital lexicon and influenced how people interact on the internet. It's part of a larger trend of internet slang, memes, and acronyms that redefine how language functions in a connected, globalized world. This slang shapes both formal and informal interactions, as seen in advertising, media, and even in academic or professional contexts, where the influence of internet culture seeps into language practices.

2.3 Translation Challenges

In a globalized world, where digital interactions connect people from diverse linguistic backgrounds, accurate translation is essential for effective communication. Misunderstandings arising from poorly translated memes or slang can lead to confusion or even offense.

Sociolinguists and translators are tasked with deciphering the cultural and linguistic subtleties embedded in these digital expressions. They must consider cultural references, wordplay, and humor that are inherent to memes and slang. This often involves creative adaptation rather than literal translation to ensure that the essence and impact of the original content are preserved.

In order to further develop the research related to the translation challenges related to the foreign language, I would like to analyze the word "troll". The first meaning of the word "troll" is "a dwarf or giant in Scandinavian folklore that lives in caves or hills." The transformation that the meaning of this word has undergone in the age of social networks is still a little far from the original meaning.

After the 2000s, 'trolls' are widely known on the Internet as people (and again here we are dealing with a new concept, where in the Internet language, individuals are known as "personal accounts"), i.e. individuals, who deliberately publish inflammatory comments, or offensive or other disruptive content. During the translation of the book *Putin's Trolls - In the Frontline of the information war against west* (Aro 2022a, cf. 2022b), there was a need to translate the term troll.

The first challenge was obviously conveying the message in the right way without damaging its original meaning. So, we had to take into account the connotation of this word and the way it would describe later in the book not only the meaning but also the connotation with which it would be colored, as the events were presented.

The second challenge was to adapt the word in the Albanian language, which would also give the meaning of almost the entire message of the book (that is, the fact that Mr. Putin uses social networks to attack the truth of the information of the West through propaganda) and to achieve this goal he used falsely created personal accounts to publish false information.

The third challenge was to find a word that would include both first challenges, but this time, given the fact that it would be used for the title of the book, it would also have to be attractive to the reader's interest. Under these conditions, 'Trolls' was brought into the Albanian language as Putin's Bait (Karrem). We also noticed that for the sake of a more direct impact on the reader, since we are talking about the title, 'Trolls' is used in the singular.

2.4 Translation and multimodality

Multimodality in composition writing refers to the integration of multiple literacies—textual, auditory, linguistic, spatial, and visual—within a single medium to convey meaning. Examples include comic books, advertisements, brochures, posters, digital slide presentations, and social media. Claire Lutkewitte defines multimodal composition as "using multiple modes that work purposely to create meaning" (Lutkewitte 2013, 2). Similarly, Gunther Kress emphasizes that multimodal texts use a combination of modes, such as written language, imagery, and spatial design, where each mode serves a specific function (Kress 2010, 423).

With the rise of the internet, multimodality has grown significantly as text presentation shifted from print to digital screens. Modern writers often create fragmented, informal texts using images, colors, and sounds (Kress 2003).

In translation studies, multimodality explores how non-verbal semiotics and meaning-making resources affect translation and interpreting behavior. Research areas include audiovisual translation (Gambier & Gottlieb 2001) and comic translation (Kaindl 2004). Sara Dicerto addresses the gap in analyzing multimodal source texts with her model in *Multimodal Pragmatics and Translation: A New*

Model for Source Text Analysis. She defines multimodal texts as combining at least two semiotic systems, verbal, visual, or aural (Dicerto 2018, 18). Dicerto argues that understanding multimodality is essential for translators and proposes a framework based on Relevance Theory for multimodal analysis (Dicerto 2018, 51).

3 METHODOLOGY

The methodology combines qualitative analysis with comparative sociolinguistic and translation case studies. The study adopts a content analysis approach to identify linguistic patterns, cultural nuances, and challenges in translating internet memes and slang. Data is sourced from digital platforms, including popular Albanian and global memes, online slang usage in forums and social media, and published translations of books or articles dealing with digital communication.

The research employs a comparative framework, contrasting the sociolinguistic and translation challenges observed in global contexts with those specific to Albania. This is complemented by interviews with Albanian translators, linguists, and sociolinguists, as well as analysis of translated texts. The aim is to uncover how cultural and linguistic subtleties are navigated in translation, and how global phenomena, like memes and internet slang, are localized into the Albanian context.

4 EMPIRICAL ANALYSIS

Dicerto's approach (used in this empirical part) is designed to work with all types of multimodal texts and to be adaptable to the needs of translators. For dynamic moving text and audio information, the entire model additionally consists of the columns phase and Aural. However, in Dicerto's book, the focus is on static, non-dynamic text, which is relevant to this study, and these columns are left out owing to redundancy. The following table and explanation are based on Dicerto approach:

Table 1: Translation Challenges and Strategies in Memes and Multimodal Texts

Meme	Content	Relevance/Context	Multimodal Analysis (Dicerto's Approach)	Translation Challenges and Strategies	Albanian Translation Example
Meme with the Confused Boyfriend	"you all the serious news stories this trivial article about a meme"	Highlights the contrast between serious news and trivial content (e.g., memes).	Text-Image Interaction: The meme relies on the interplay between text ('serious news' vs. 'trivial article') and the image. The humor arises from the juxtaposition of formal and informal registers.	Cultural Adaptation: Translators must consider how the contrast between serious and trivial content is perceived in the target culture. The image may need to be modified to align with the translated text.	"Ti / Të gjithë lajmet serioze / Ky artikulli i parëndësishëm për meme" (The translation preserves the contrast between "serious news" and "trivial article," adapting it to Albanian while maintaining the humorous tone.)
Meme with Crying Woman and the Cat	"You said I said, No more plants! No, more plants!"	Represents a playful or conflicting dialogue, possibly about plants or sustainability.	Dialogue and Visual Context: The text is part of a dialogue, and the image likely provides visual context (e.g., facial expressions, gestures).	Pragmatic Equivalence: Translators must ensure the playful tone and conflict in the dialogue are preserved. The visual context may need to be adapted to match the translated text.	"Ti s'ka me barishte, Jo, unë thashë, më shumë barishtel!" (The translation captures the playful tone and repetition in the dialogue, adapting it to Albanian while preserving humor and conflict.)
Empirical Analysis	Dicerto's approach works with multimodal texts, adaptable for translators. For dynamic text/audio, columns 'phase' and 'Aural' are added.	Describes the methodology used in the study, emphasizing adaptability and focus on static text.	Static vs. Dynamic Text: Dicerto's framework distinguishes between static (e.g., images, text) and dynamic (e.g., audio, moving text) elements.	Modality-Specific Translation: Translators must consider the limitations of static text and ensure that translated text aligns with the visual elements.	Dicerto's approach works with multimodal texts, adaptable for translators. For dynamic text/audio, the columns 'phase' and 'Aural' are added. (The translation explains Dicerto's approach in Albanian, maintaining the technical and empirical tone.)

Translation of 'Jargon'	'Troll': Refers to individuals posting inflammatory or disruptive content, e.g., 'Putin's Trolls.'	Karremi i Putinit ('Putin's bait'), emphasizing the metaphorical meaning.	- Linguistic Layer: Translating 'troll' as 'karrem' loses the folkloric meaning while focusing on the metaphorical 'bait.' - Cultural Layer: Including folkloric associations could resonate with Albanian traditions, where mythical creatures symbolize mischief. - Adaptation Challenge: Balancing modern internet slang with traditional connotations ensures full comprehension and tone consistency.		
Digital Storytelling	Personal narratives on platforms like TikTok, Instagram, or YouTube, combining visuals, text, and audio.	Short clips humorously addressing Albanian daily life, e.g., traffic jams or bureaucracy.	- Linguistic Layer: Humor and colloquial expressions tied to dialects must be adapted to maintain impact. - Visual Layer: Gestures, facial expressions, or cultural background elements (e.g., traffic chaos) need localization for foreign audiences. - Cultural Layer: Stories rely on shared experiences, requiring explanation or substitution to ensure relatability in translation.		

(Source: Author's analysis based on Dicerto 2018)

Dicerto's multimodal pragmatics approach provides a valuable framework for analyzing and translating various types of multimodal texts, including memes, internet slang, terms, and digital storytelling. This approach emphasizes the interaction between linguistic, visual, and cultural layers in static, non-dynamic texts to ensure accurate and culturally resonant translations. Below is an analysis of translation challenges within four categories, highlighting the complexities of multimodal translation. The analysis of the memes using Dicerto's approach illustrates the intricate interplay between text, image, and cultural context, emphasizing the significance of multimodal elements in translation. The meme with the confused boyfriend highlights the contrast between serious news and trivial content, where the humor emerges from the juxtaposition of formal and informal registers, compelling translators to consider cultural perceptions of seriousness.

In contrast, the crying woman and cat meme showcases a playful dialogue that relies on visual context, such as facial expressions, to enhance the humor and conflict present in the text. This necessitates pragmatic equivalence in translation, ensuring that the playful tone is preserved while adapting to cultural nuances. Furthermore, Dicerto's framework distinguishes between static and dynamic texts, with a primary focus on static elements in this analysis. The approach underscores the need for modality-specific strategies in translation, as visible interactions in memes require careful consideration to maintain the original message's integrity and humor when rendering it into a target language. Overall, Dicerto's adaptable methodology provides a comprehensive framework for navigating the complexities inherent to translating multimodal texts effectively.

The translation of the term "troll" illustrates the complexities of maintaining dual meanings. In English, "troll" refers to both an online agitator and a mythical creature. Translating it into Albanian as "karrem" ("bait") captures the metaphorical meaning of internet trolling but loses the folkloric association. This challenge highlights the importance of balancing modern connotations with traditional meanings. Retaining the folkloric undertone might better resonate with Albanian audiences, where mythical creatures symbolize mischief or disruption, aligning with the essence of the original term.

Finally, digital storytelling integrates visuals, text, and audio to share narratives, often reflecting cultural realities. Global platforms like TikTok and Instagram host personal narratives that require cultural and linguistic adaptation during translation. For example, Albanian clips humorously addressing daily life—such as traffic jams or bureaucratic inefficiencies—rely on local colloquialisms, gestures, and shared experiences. Translating these narratives requires not only linguistic adaptation but also localization of visuals and non-verbal cues to ensure they resonate with the target audience. These elements are culturally embedded, making direct translations insufficient without contextualization.

Dicerto's approach underscores the need to consider linguistic, visual, and cultural elements in multimodal translation. By addressing these layers holistically, translators can maintain the integrity, humor, and meaning of texts, ensuring effective communication across cultures.

5 CONCLUSION

In the realm of cross-cultural communication, the translation of internet language takes on a heightened significance. Misinterpretations or failures to capture the nuances of memes and slang can lead to confusion, miscommunication, or, at worst, cultural insensitivity. As our world becomes increasingly interconnected through digital channels, the ability to bridge linguistic and cultural divides becomes paramount.

Translators and sociolinguists undertaking the challenge of internet language translation must embrace creativity, adaptability, and a deep appreciation for the nuances of digital culture. Translation is not merely a mechanical process of rendering words from one language into another; it is an art that requires an understanding of cultural references, wordplay, and humor, as well as the ability to preserve the impact and essence of the original content.

In conclusion, the translation challenges posed by internet language are a testament to the dynamic nature of language itself. As our digital world continues to evolve, so too must the field of translation adapt to these challenges, ultimately serving as a bridge that connects people, cultures, and ideas in an increasingly interconnected global society. Embracing these challenges with creativity and cultural sensitivity will ensure that the essence of internet language is not lost in translation but rather becomes a vibrant and integral part of our diverse linguistic tapestry.

The comparative analysis underscores the dynamic interplay between global and local digital linguistic phenomena. While memes, slang, and digital storytelling share universal features, their cultural embedding significantly influences how they are understood, adapted, and translated. For Albanian translators and sociolinguists, embracing cultural nuances and creative adaptability is essential to preserving the essence of these digital expressions. This highlights the broader sociolinguistic principle that language is not only a tool for communication but also a reflection of cultural identity and shared experiences.

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THE NEED TO BUILD RESILIENCE AGAINST CLICKBAIT AS CONTROVERSIAL TACTICS IN ONLINE MEDIA

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ABSTRACT

As new technologies continue to shape journalism, media outlets face increasing pressure to adopt controversial tactics, such as clickbait, to attract readers and sustain their business models. This paper explores the urgent need to build resilience against the growing reliance on clickbait in online media. It investigates how the trust of readers is increasingly exploited by advertisers and how journalists, in turn, are often compelled to use such tactics due to the market-driven demands of modern journalism. Focusing on Slovenian media, the research examines the role of clickbait, its origins, and the underlying business models that make it a necessary evil for media survival. It delves into how these clickbait practices shift journalism away from objective reporting toward a focus on sensationalism and marketing-driven content. Furthermore, the study assesses current self-regulatory measures in Slovenia, including the Slovenian Chamber of Advertising (SOZ) and the Slovenian Journalistic Honorary Tribunal (NČR), and explores the public's perception of clickbait. Through a questionnaire ($N = 150$), the research seeks to understand whether citizens recognize the prevalence of clickbait and whether they believe stronger regulations are needed to counter its negative impact on journalism. This study highlights the importance of fostering resilience against such tactics to preserve the integrity and credibility of the media.

Keywords: Resilience, Clickbait, Media regulation, Online advertising, Market-oriented journalism, Commercialisation, Controversial tactics

1 INTRODUCTION

1.1 Scoping and Problem Description

Recent analyses of Slovenian digital journalism show that the contemporary online news environment is shaped by a rapid flow of information, intensified competition for audience attention and a growing reliance on audience metrics. Kaluža and Slaček Brlek (2020) demonstrate that real-time analytics now inform decisions about which stories are highlighted and how homepages are structured, and that this can foster the growth of trivial and banal content as well as "controversial ways of attracting audiences", including clickbait headlines (Kaluža and Slaček Brlek 2020). Building on a broader historical perspective, Amon Prodnik (2020) shows that sensational and misleading headlines have long been tied to commercial pressures and the advertising-funded model of the press, but that in the digital environment each click can be precisely measured and converted into advertising income, making clickbait a structurally attractive strategy for online media (Amon Prodnik 2020). Taken together, these accounts suggest that the boundary between journalism oriented towards the public interest and content primarily optimised for market performance is increasingly difficult to maintain.

The widespread use of clickbait—sensational headlines or content crafted to provoke curiosity and drive traffic—has become a significant concern for media ethics. The reliance on metrics like clicks and views as key indicators of success places financial survival at the forefront, often compromising the integrity of journalistic practices (Scott, 2021). This shift from traditional, objectivity-focused journalism to market-driven content threatens the credibility of news sources and undermines the trust of readers, as the lines between factual reporting and marketing blur (Hamada 2018).

As Poler Kovačič (1997) notes, the growing influence of advertisers, multinational corporations, and public relations firms on journalism leads to a gradual erosion of editorial independence. In this environment, clickbait tactics proliferate, often leading to exaggerated or distorted content designed to attract attention rather than inform. The challenge, therefore, is not just to recognize the problem but to build resilience against these tactics in order to safeguard the quality and reliability of journalism.

This study aims to investigate the recognition of clickbait as a phenomenon in Slovenia and to evaluate the current regulatory frameworks in place to address its use. By examining the role of self-regulation and ethical codes in the Slovenian media landscape, this research seeks to explore the urgent need for stronger measures to resist the commercialization of journalism and the negative impact of clickbait on public trust and media integrity.

1.2 Purpose and Objectives of the Research

This study is situated within the field of communication studies, focusing on the critical analysis of contemporary media tactics and their influence on public communication. By addressing the growing concern of clickbait as a controversial tactic in online media, this research also incorporates Slovenian legal frameworks to explore the current state of regulation and legal accountability regarding online content. In addition, the study will delve into the role of online advertising in shaping these media tactics, as content dissemination strategies in online platforms are often driven by commercial interests.

The primary goal of this research is to investigate whether the phenomenon of clickbait is recognized as a problem within Slovenia and to evaluate the legal landscape surrounding its use. The research will focus on the urgent need to build resilience against clickbait by highlighting its detrimental impact on journalistic integrity and public trust.

The specific objectives of the study are as follows:

1. To examine whether the clickbait phenomenon is recognized in Slovenia and how this lack of recognition contributes to the absence of a legal framework.
2. To explore how insufficient regulation of clickbait paves the way for the use of other controversial tactics in online media.
3. To emphasize the need for stronger legal and regulatory measures that can help build resilience against clickbait and protect the integrity of online journalism.

By addressing these objectives, the study aims to underscore the critical need for a clear legal stance against controversial tactics like clickbait, fostering a more resilient and ethically responsible online media environment.

2 THEORETICAL BASIS

In the evolving landscape of digital media, clickbait has emerged as one of the most controversial tactics, fundamentally reshaping how information is consumed online. Clickbait refers to sensationalized headlines or misleading content designed to attract clicks and drive traffic, often without delivering on the promises made. While it has proven effective in generating ad revenue and increasing page views, its widespread use has led to significant concerns regarding the integrity and credibility of online journalism. The need to build resilience against clickbait and similar tactics is critical to restoring trust in media and ensuring that journalism maintains its core principles of truth, transparency, and public service.

Clickbait operates by exploiting human curiosity (Loewenstein's 1994, 75) and using exaggerated, often misleading headlines that compel users to click on the link. These headlines typically promise sensational, shocking, or highly emotional content, which may not be reflected in the article itself. According to Scott (2021, 56) and Chen et al. (2015, 15) this tactic thrives on the "curiosity gap," a psychological trigger that motivates people to seek closure by clicking on content that purports to answer an intriguing question or offer critical information.

This process of exploiting this gap is best described in a step-by-step model in Bazaco et al. (2019, 98-99)

Table 1: Analytical model for the defining variables of clickbait

A. PRESENTATION VARIABLES	1. Incomplete information	<ul style="list-style-type: none"> Absence of the most relevant data Unanswered questions Use of enumeration and lists Deliberate ambiguity
	2. Appeals expressions	<ul style="list-style-type: none"> Vocative Imperative Singularisation of reader
	3. Repetition and serialisation	<ul style="list-style-type: none"> Thematic reiteration Reiteration of frames Dosage of data in successive deliveries
	4. Exaggeration	<ul style="list-style-type: none"> Hyperboles Comparisons of superiority and superlatives Neologism formed with prefix "super" Intensifying adjectivisation
B. CONTENT VARIABLES	5. Soft news	<ul style="list-style-type: none"> Soft or sensational content Personal, emotional, episodic or anecdotal representation frames
	6. Striking audiovisual elements	<ul style="list-style-type: none"> Shocking and/or odd photos and videos Use of funny memes Image manipulation

(Source: Bazaco et al. 2019, 98- 99)

While clickbait may result in high engagement rates, it diminishes the value of the content itself, prioritizing profit over meaningful, well-researched reporting. Although 'clickbait' can bring more attention in the short term, research shows that such content does not provide substantial business benefits and can lower a news outlet's perceived credibility; in advertising-driven models, newsrooms therefore often sacrifice content quality for reach. (Muddiman & Scacco 2019; Filloux 2016; McManus 1994)

The rise of clickbait is symptomatic of the financial pressures on digital media outlets. As traditional advertising revenue wanes, news organizations have increasingly turned to page views and user engagement as their primary metrics for success. This has led to a focus on short-term gains, often at the cost of journalistic integrity (Filloux 2016; McManus 1994). Journalists and editors, faced with the challenge of generating revenue in an oversaturated digital market, are often pushed to prioritize viral content over substantive reporting. Research shows that while sensational, 'clickbait'-style headlines can capture short-term attention, they are associated with lower perceived credibility and diminished assessments of journalistic quality—pressuring outlets to privilege attention over more balanced, thoughtful reporting (Muddiman & Scacco 2019; Molyneux & Coddington 2020; Jung et al. 2022).

The prevalence of clickbait has a detrimental impact on the public's trust in journalism. As repeated exposure to misleading or exaggerated headlines—often packaged as clickbait—erodes confidence in news outlets by lowering perceived credibility and contributes to broader distrust across the media ecosystem (Muddiman & Scacco 2019; Molyneux & Coddington 2020). This erosion of trust extends beyond individual news organizations to the broader media ecosystem. Evidence shows that exposure to misleading or clickbait-style headlines reduces perceived credibility and can spill over into lower trust in news more broadly, reinforcing a cycle of skepticism that weakens the media's public-forum role (Muddiman & Scacco 2019; Molyneux & Coddington 2020). This creates a cycle of distrust that undermines the ability of the media to serve as an informed, democratic public forum.

Building resilience against clickbait requires a multifaceted approach. First, media literacy must be emphasized to help audiences recognize and resist misleading headlines. Educating readers on how to critically evaluate the credibility of sources and the quality of information is essential to reducing the impact of clickbait (Council of Europe 2023; Guess et al. 2020; Moore & Hancock 2022; Jones-Jang et al. 2021; Kanižaj et al. 2022). Second, media organizations must reevaluate their business models. As online ad revenue ties payouts to traffic metrics like pageviews, many publishers optimize for attention—fueling the use of sensational, 'clickbait'-style headlines at the expense of quality (Christin 2018). By diversifying revenue streams and investing in quality journalism, outlets can prioritize substance over sensationalism. Lastly, stronger regulatory frameworks are needed to ensure that ethical standards are upheld in digital media. As Poler Kovačič and Kerševan (2020), Čufar (2021) suggest, self-regulation within the media industry, combined with external oversight, can help mitigate the harmful effects of clickbait and protect the public interest.

In conclusion, clickbait represents a significant threat to the credibility and trustworthiness of online journalism. Its prevalence underscores the need to build resilience against these controversial tactics through public education, ethical media practices, and regulatory efforts. By prioritizing integrity over profit and fostering critical media literacy, society can better navigate the complexities of the digital age and ensure that journalism remains a pillar of democracy.

2.1 Lack of proper regulation of online media

The lack of proper regulation in online media, particularly concerning clickbait, is a significant issue that undermines the credibility and integrity of digital journalism. As noted in the preceding chapter, clickbait remains a poorly defined phenomenon, especially in Slovenia, where it is not recognized in the national dictionary (SSKJ) nor universally acknowledged as a specific online media tactic. This lack of a clear, unified understanding of clickbait complicates the challenge of regulating it effectively. Without a formal legal definition, it becomes difficult to regulate clickbait in a way that ensures accountability and safeguards journalistic standards.

Kristina Čufar's work *Legal Aspects of Content Moderation on Social Networks in Slovenia* (2021) offers a partial understanding of clickbait, defining it simply as flashy headlines designed to attract attention and clicks, often followed by inconsequential content. Čufar suggests that while clickbait does not necessarily spread misinformation, it can contribute to the spread of disinformation and infringe on personal rights, especially when readers consume information uncritically. However, this definition fails to account for the broader context in which clickbait operates, particularly its role as an advertising tactic rather than merely a journalistic tool. This distinction is critical, as clickbait often stems from the marketing-driven objectives of online media outlets, prioritizing revenue generation over ethical journalism (Poler Kovačič 2002).

The research into Slovenia's media and legal landscape reveals that the country's legal framework does not adequately address the issue of clickbait. As Čufar observes, Slovenian and European media regulations remain consistently behind the development of social networks and the corporate practices of online platforms (Čufar 2021, 188). Traditional media in Slovenia are governed by the Media Law (ZMed), which imposes certain obligations and penalties. However, online content, especially content published by social media platforms, remains largely unregulated. The fact that social networks like Facebook are not subject to the same regulatory oversight as traditional media creates a significant gap in the legal system.

An illustrative example of clickbait can be seen in a post by the Slovenian online media outlet Siol.net, published on Facebook. This misleading post showcases the challenges posed by the "double nature" of online media, where traditional media operate within Slovenia's legal framework while platforms like Facebook, based in the United States, adhere to their own set of rules. Due to the lack of clarity in Slovenian and European legislation, the Siol.net post does not violate any existing laws or regulations.

The example we have obtained for the purpose of showing the nature of clickbait is a post by the online media Siol.net on Facebook.

Figure 1: Example of clickbait on Siol.net



(Source: Facebook page of Siol.net Novice, obtained on December 18, 2023)

The issue of regulating clickbait is further complicated by the reliance on self-regulation. Čufar suggests that social networks should take more responsibility for the content they host, advocating for increased transparency and user control over the algorithms that dictate the content they see (Čufar, 2021). Meanwhile, Zhou (2021), Kerševan Smokvina and Poler Kovačič (2020, 194) and Čufar (2021) argue that the responsibility should be placed on the individual, promoting rational thinking and media literacy to help users critically evaluate content. However, both views share the recognition that regulation by technology companies alone is unlikely to address the problem of clickbait without significant changes to business models and media practices.

Kerševan Smokvina and Poler Kovačič (2020) highlight that self-regulation is problematic due to its voluntary nature and the lack of enforceable sanctions. The industry's commitment to self-regulation is crucial, but its effectiveness depends on widespread acceptance and public awareness. Unfortunately, self-regulation in Slovenia's digital media space is largely ineffective when it comes to clickbait, as evidenced by the lack of official recognition or legal action against such practices. Even institutions like the Slovenian Advertising Arbitration Court (SOZ) and the Journalistic Honorary Tribunal (NČR) do not address clickbait as a legal or ethical issue.

In conclusion, the absence of clear regulation in the Slovenian legal framework, coupled with the reliance on ineffective self-regulation, creates a significant gap in the media landscape. To tackle the issue of clickbait, Slovenia must develop more robust regulations that address the complexities of online content, ensuring that media outlets and social networks are held accountable for their practices. Furthermore, a stronger emphasis on media literacy and public awareness is necessary to empower users to recognize and resist clickbait, ultimately reducing its influence in the digital media ecosystem.

3 EMPIRICAL RESEARCH

3.1 Summary of the study

This study explores the growing need to build resilience against clickbait as a controversial tactic in online media. It assumes that clickbait is a deceptive practice originating from online advertising, which undermines public trust in media. The research highlights the absence of effective regulation and legal frameworks in Slovenia, where self-regulation is insufficient to address the problem. The study's theoretical section reviews contemporary journalism and the prevalence of clickbait, testing the hypothesis that it is not recognized as a significant issue in Slovenia. It also examines the current regulatory framework and its failure to prevent controversial tactics like clickbait.

The empirical section of the study involves a survey ($N = 150$) we used a Likert scale to assess the frequency of clickbait exposure and public opinions on the need for stronger regulation. Using Spearman correlation analysis, the study tests the hypothesis that clearer legal regulation is necessary to control clickbait. The conclusions of the study suggest that effective regulation is essential to protect journalistic integrity and public trust, proposing solutions for better legislative frameworks and media accountability.

The research calls for greater resilience against clickbait through legal and regulatory measures that prevent its harmful impact on the credibility of online media.

3.2 The results

3.2.1 Introduction

This research investigates the absence of appropriate regulations concerning clickbait in Slovenia's media space. The study confirms the following hypotheses:

1. Clickbait is widely present and recognized as misleading content.
2. There is a general public consensus that clickbait contributes to misinformation.
3. A clearer legal framework is required to regulate online media tactics.

3.3 Research Methodology

A survey with 150 participants was conducted through the portal <https://1ka.arnes.si/>. The survey was divided into three sections:

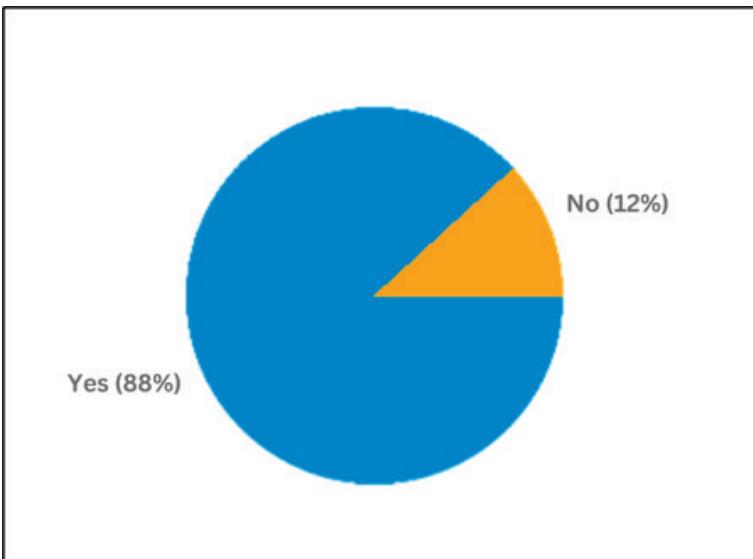
1. Clickbait recognition (Q1 - Q6)
2. Regulatory awareness and need for intervention (Q7 - Q9)
3. Demographics (Q10 - Q12)

3.4 Key Findings

3.4.1 Clickbait Recognition

- **Q1:** 88% of respondents have encountered clickbait and identified it as misleading.

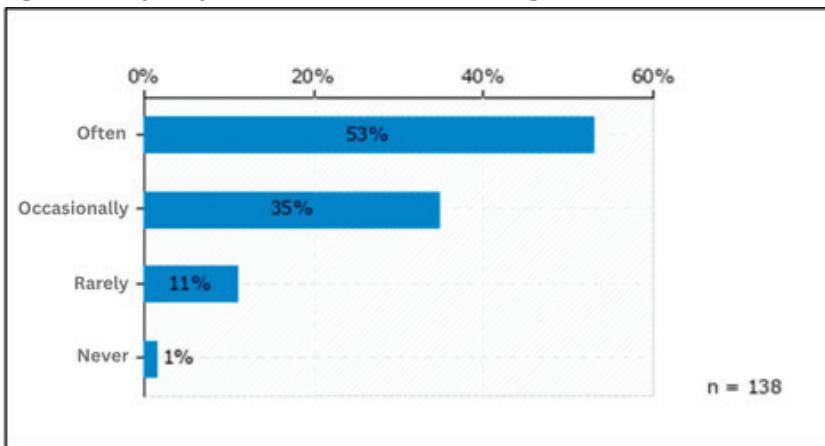
Figure 2: How many people has encountered with clickbait?



(Source: Author's own research. This applies to all subsequent figures.)

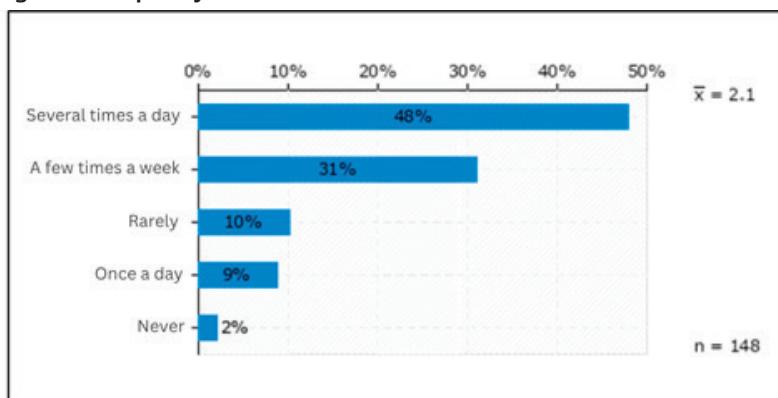
- **Q2:** Among those who encountered clickbait, 53% reported frequent encounters, and 35% reported occasional encounters.

Figure 3: Frequency of encounters with misleading news



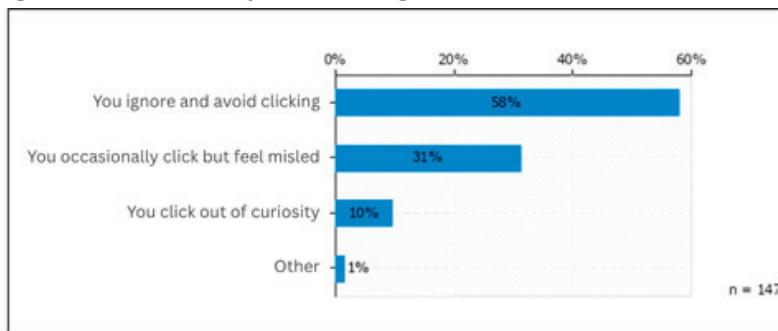
- **Q3:** 48% of respondents come across clickbait several times a day, closely aligning with Q2 findings.

Figure 4: Frequency of encounters with clickbait



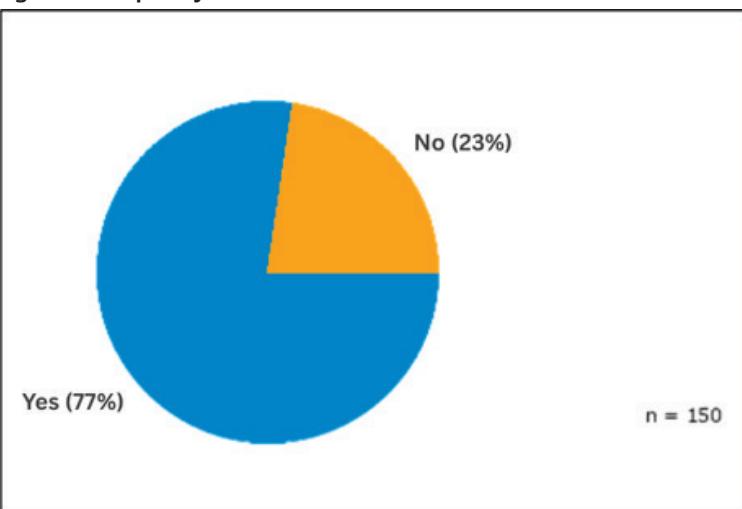
- **Q4:** 58% of respondents avoid clicking on clickbait content.

Figure 5: How often they avoid clicking on clickbait



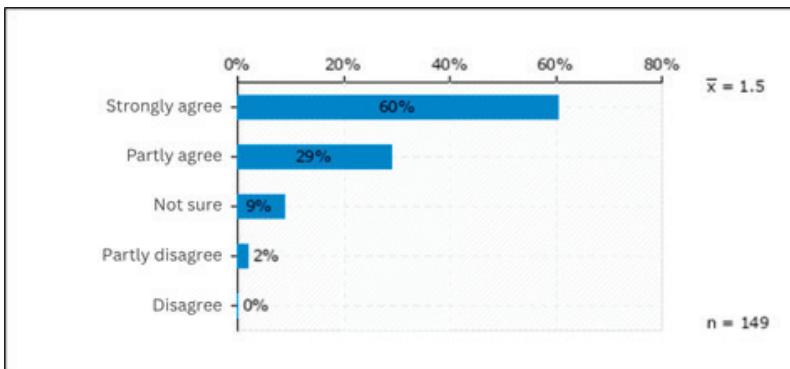
- **Q5:** 77% reported encountering clickbait in Slovenian media, a high percentage compared to the 88% for all web content.

Figure 6: Frequency of clickbait in Slovenian media



- Q6: Most respondents agreed that clickbait contributes to misinformation.

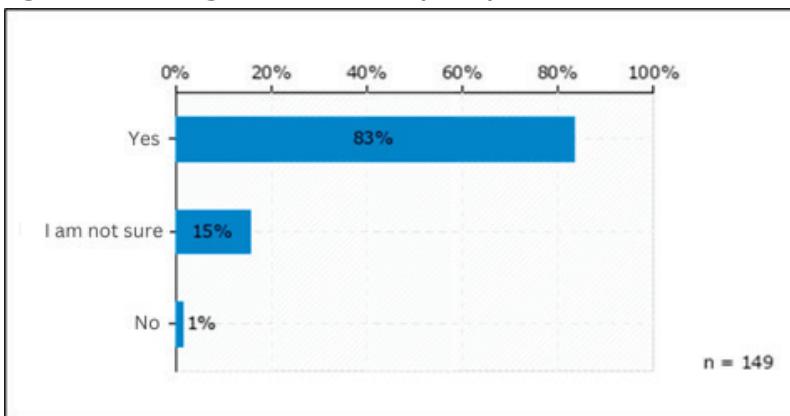
Figure 7: Clickbait headlines/content contribution to the spread of misinformation



3.4.2 Regulatory Needs

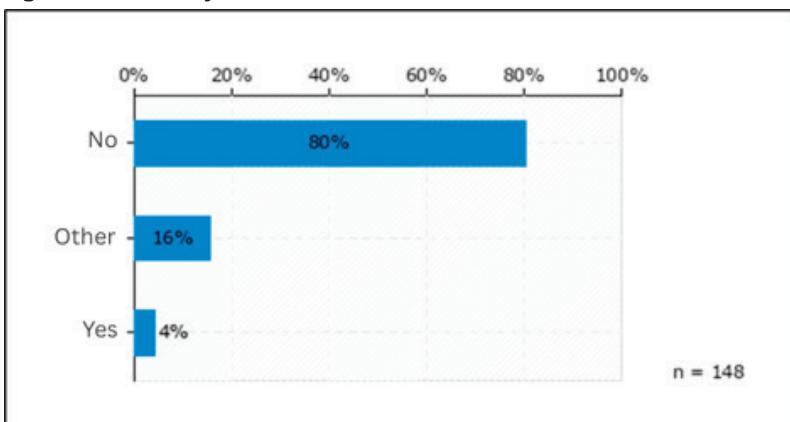
- Q7: 124 out of 150 respondents (82.6%) believe stricter regulations are necessary.

Figure 8: Stricter regulations should be put in place to deal with clickbait in Slovenian media



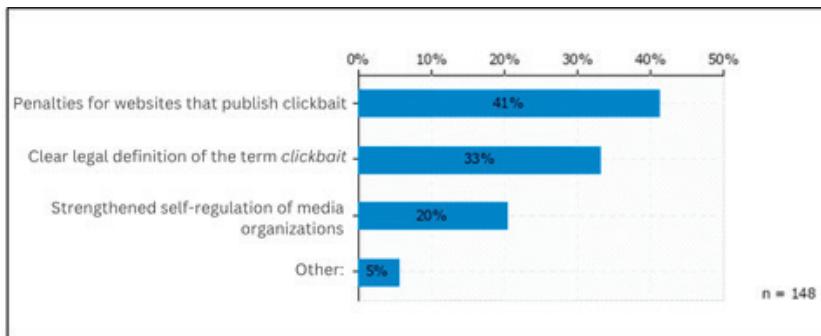
- Q8: Only 4% believe current regulatory authorities adequately address clickbait.

Figure 9: Sufficiency of clickbait treatment in Slovenia



- **Q9: Respondents suggested various regulatory measures:**
 - 41% advocate penalizing sites using clickbait.
 - 33% support a clear legal definition of clickbait.

Figure 10: Regulatory measures that would be effective in combating clickbait



3.5 Statistical Analysis

The study used Spearman correlation analysis to examine the relationship between experiencing clickbait (Q5) and supporting stricter regulations (Q7). The correlation coefficient (0.968) indicates a very strong positive correlation, confirming that those who frequently encounter clickbait strongly support regulation.

3.6 Conclusion

The study confirms that clickbait is a significant issue in Slovenian media. The majority of respondents believe that clickbait spreads misinformation and that current regulations are insufficient. Most respondents support stricter legal measures, including penalties and clearer definitions. Given the strong statistical correlation, the study concludes that Slovenia needs an improved regulatory framework to address clickbait in online media.

4 DISCUSSION

The growing prevalence of clickbait in online media represents a significant challenge to the integrity of journalism, with its roots deeply tied to the commercialization of the industry. As Poler Kovačič (2003) emphasizes, the commercialization of journalism, driven by oversaturation of content, has led to a deprofessionalization of the field. This process undermines the core values of journalism, including objectivity and investigative rigor. According to Poler Kovačič (2003), experienced journalists warn that the commercialization of journalism could lead to the decline of investigative reporting, which, despite its value, no longer captivates the contemporary audience. The rise of clickbait, a tactic designed to maximize clicks and engagement, exacerbates this issue by prioritizing sensationalism over substantive content.

Kaluža and Slaček Brlek (2020) further show that in a 24/7 digital production cycle the homepage of a news site must be continuously updated so that returning users are repeatedly presented with new stories, a pressure that has intensified with the rise of mobile access and short, frequent visits (Kaluža and Slaček Brlek 2020). Web analytics play a central role in this process: editors monitor clicks, reading time and user paths through the site in order to decide which items to move up or down the page and how to adjust titles and formats. While such metrics can help refine the user experience, the authors stress that in tightened market conditions they are never neutral; they increase the temptation to prioritise highly clickable content, to produce clickbait and to shift attention towards popular topics that are not necessarily the most relevant, thereby encouraging the spread of trivial and banal content and controversial ways of attracting audiences (Kaluža and Slaček Brlek 2020). This diagnosis resonates with broader critiques of the commercialisation of news, which

argue that journalism is increasingly evaluated according to engagement metrics and advertising value rather than normative standards such as truthfulness, relevance and independence (Splichal 2020; Vobič 2021; Pickard 2020).

Fisher (2021) raises critical questions about the current definition of journalism and its funding model, pointing out that the industry's reliance on advertising revenue has led to a situation where the content created is heavily influenced by market interests. Journalism, once a tool for informing the public, now operates within a market-driven framework where content must cater to the interests of advertisers rather than uphold the ethical standards that have traditionally guided the profession. This transformation of journalism into a market-oriented enterprise contributes to the rise of clickbait as a controversial and manipulative tactic, undermining its credibility and ethical foundations.

Analysts argue that falling ad revenues pushed many outlets to optimize for pageviews and engagement, encouraging clickbait tactics and short-term gains at odds with editorial standards (Fil-loux 2016). Contend that the commercialization of journalism has led the industry to the "ethical brink," where practices like clickbait pose serious challenges to journalistic integrity (Pickard 2020; McManus 1994; Esser 1999; ONA Ethics). As journalists are increasingly driven to produce high volumes of content to meet the demands of the digital advertising economy, the pressure to deliver sensationalized headlines intensifies. This process inevitably erodes the quality of journalism, as the pursuit of clicks and engagement supersedes the production of accurate, reliable news.

This thesis has explored the implications of clickbait in the Slovenian media landscape, demonstrating that the phenomenon is not sufficiently recognized or regulated within the existing legal and regulatory frameworks. The research revealed that both the Zmed and regulatory bodies like the NČR have not adequately addressed clickbait as a distinct issue. This oversight allows clickbait to thrive unchecked, further complicating efforts to protect journalistic integrity.

Through empirical research, this thesis has confirmed that Slovenian media consumers are highly aware of the misleading nature of clickbait and overwhelmingly support stronger regulations to combat it. The results of the survey indicate that the public perceives clickbait as a harmful tactic that spreads misinformation, calling for clearer definitions and more robust regulatory measures.

In conclusion, building resilience against clickbait in online media is essential to protect the ethical values of journalism. The commercialization of journalism has led to the rise of clickbait as a controversial tactic that undermines trust in the media. As the findings of this research indicate, stronger regulations, clearer legal definitions, and a commitment to journalistic ethics are crucial in curbing the influence of clickbait. Only through these efforts can the media industry reclaim its role as a trusted source of information and build resilience against the commercial pressures that threaten its integrity.

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THE PERCEPTION OF THE STRUGGLE FOR WOMEN'S RIGHTS ON SOCIAL MEDIA: ATTITUDES OF USERS IN CROATIA

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ABSTRACT

The struggle for women's rights represents a very long and complex story about achieving equality for women that can be observed in different contexts - individual, economic, educational, professional and social. With the development of social networks, it seems that the topic of women's rights is more present in the media space, but also in people's minds. At the same time, social networks are increasingly used for social activism in order to draw attention to the position of vulnerable groups in society, but also to strengthen the resistance of social network users to the use of socially harmful forms of communication such as sexism and hate speech. The paper is divided into two parts - theoretical and research. The theoretical part of the paper analyzes the significance of the concept of gender equality, as well as the issue of the struggle for women's rights in the real, but also in the virtual environment. Furthermore, an analysis of the role of social networks in monitoring social unrest in Iran in 2022 following the death of Mahsa Amini as a consequence of the global struggle for women's rights is also presented. The second part of the paper presents the results of a study aimed at investigating user preferences for the use of social networks in Croatia, users' perceptions of the struggle for women's rights in Iran, and the role of social networks in monitoring the aforementioned case. The study was conducted using an online survey questionnaire in 2022 on a sample of 118 respondents. The results showed a positive correlation between social networks and the struggle for women's rights, as well as that the majority of respondents see social networks as an important channel for spreading awareness about gender equality.

Keywords: Gender equality, Social networks, Attitudes, Users, Survey

1 INTRODUCTION

The topic of this paper is the role of social networks in the fight for women's rights as one of the longest-standing and most important topics in the social sciences, encompassing a wide range of perspectives - from women's individual autonomy to social and institutional equality. The first part of the paper is based on a theoretical framework that encompasses the state of women's rights in the real environment, then the fight for women's rights in the virtual environment, and the social unrest in Iran in 2022 as a consequence of the global fight for women's rights.

Social networks are an inevitable part of everyday life, and in addition to entertainment, they are increasingly used as a tool in social activism and public mobilization. A special example of their power was recorded during the protests in Iran in 2022, sparked by the death of Mahsa Amini, when the protests pointed to the key role of digital platforms in spreading information, encouraging solidarity and raising awareness about gender inequality.

The second part of the paper presents the results of a survey conducted among social network users in Croatia. The aim of the research was to investigate user preferences for using social networks in Croatia, users' perceptions of the fight for women's rights in Iran, and the role of social networks in monitoring the aforementioned case. The research was conducted using an online survey questionnaire in 2022 on a sample of 118 respondents.

2 THEORETICAL FRAMEWORK

The theoretical framework is divided into three main thematic units: women's rights in the real environment, the struggle for women's rights in the virtual environment, and social unrest in Iran as a consequence of the global struggle for women's rights.

2.1 Women's rights in the real world

Prejudice and discrimination against an individual based on their sex or gender is a behavior that is unfortunately often observed in modern society. It affects all spheres of society, from institutions and governments, to private and interpersonal relationships. Given the common occurrence of sexist behaviors in society, it can be said that it has consequently greatly influenced women's rights. When it comes to professional development, women often earn less than men in the same or similar positions, which is the result of systematic differences in salaries and promotions in the workplace. Assumptions or beliefs according to which women and men should behave or look are the result of deeply rooted values, attitudes and norms in society, and serve to justify and maintain historical relations between men and women, i.e. relations in which men have dominance over women, which prevents progress in terms of gender equality. Gender stereotypes are closely linked to violence against women (Bates 2019; Barilli, Grembi & Rosso 2021), stereotypical notions of masculinity and femininity negatively affect all genders, promote women's inequality in the labor market (Rosenfeld & Kallenberg 1991; Blau 2024) and encourage further marginalization of women and other groups, and also influence the portrayal of women in the media and the spread of hate speech (cf. Dujmović 2020).

Furthermore, the difference in the portrayal of women and men in the media is more than obvious (Žene i mediji 2020), while men are mostly masculine, muscular, superior and ready for conquering new challenges, the portrayal of women is reduced to different parts of her body or presents certain ideals of beauty in order to "sell" a certain product or service (Giles 2003; Globan, Plenković & Varga 2018). By continuously reinforcing gender stereotypes in the media, society internalizes them, shaping an image of women that is often inaccurate or not representative of all individuals of that gender. However, once these gender stereotypes become entrenched in the minds of the recipient, they are very difficult to change, and a "manipulated" image of a woman can have harmful consequences on the recipient and their perception of themselves and their environment (Bubalo & Jelić 2015), and thus on the system of values that we cherish as a society (cf. Lubina & Brkić Klimpak 2014: 214).

What can be said with certainty is that the presentation of women in the media (Sever & Andraković 2013; Car et al. 2017) is a reflection of their position in contemporary society - a society that is still

patriarchal and in which male principles and needs come first, while the role of women is to satisfy these principles and needs. For this reason, women are subordinate to men, most often portrayed as sexual objects, and thus their own identity is taken away.

2.2 The fight for women's rights in the virtual environment

Women are generally underrepresented in the media, and the emergence of social media has also created an opportunity for a more equal distribution of representation, thus providing women of different backgrounds and appearances with a space in which their voices can be heard:

"Social media has the potential to advance the feminist movement by giving women's rights issues greater visibility, enabling effective communication, helping people organize, educating about women's history and current events, and inspiring people to fight for greater equality for all. However, social media can also potentially endanger the movement by exposing it to online harassment and misinformation, constant comparison with others, and a distorted image of one's own body due to imposed beauty standards and weakened critical thinking." (Kamei 2022)

The social media phenomenon #MeToo is a global social movement that emerged in response to the high prevalence of sexual assault and harassment in today's society, especially in the workplace (Zhang et al. 2020), which could lead to revolutionary cultural changes, as stated by Cossins (2020). It highlighted sexism in many industries and gave women a platform to speak out about sexual assault. The movement became globally visible in 2017 when many women, but also men, dared to share their experiences on social media (Stubbs-Richardson et al. 2023). The movement has also sparked numerous discussions about consent to sexual acts, patriarchal patterns of power and its abuse, and the importance of providing support to victims of sexual violence and/or harassment. Many celebrities and people in positions of power in various industries (Field et al. 2019; Franssen 2020) have been accused of sexual assault after victims decided to go public with their stories (Field et al. 2019).

As a result, the movement has sparked major changes around the world, with the number of people coming forward with their experiences of sexual harassment raising awareness of the pressing issue. This is evidenced by the increase in Google searches for the terms sexual harassment and sexual assault (Kaufman et al. 2021), as well as the growth in media interest in the topic, although the way in which coverage is monitored varies depending on editorial policy and context (Ghosh et al. 2022). However, the greatest impact that the #MeToo revolution has had is cultural (Cossins. 2020), although the perception of the revolution by gender differs, as do the motives for joining it (Mengatti et al. 2022). Thanks to the stories of brave women, people have realized how widespread sexual harassment really is and how big a problem it is in society, other women have finally realized that they are not alone and that they can share their story with others, and people who have not encountered this form of violence so far have realized that their numerous acquaintances, colleagues, family members - unfortunately, have (cf. North 2019). The #MeToo movement is still active, and continues its fight for social change regarding sexual abuse and harassment, both in the workplace and in other life situations.

2.3 Social unrest in Iran as a consequence of the global struggle for women's rights

In recent years, Iranians have been protesting across their country, resisting the government's radical moves, and the protests, which have been surprisingly long-lasting and led by women, have been triggered by the death of a young girl named Mahsa Amini; Mahsa was arrested for not wearing a hijab (Arafat & Khamis 2025) (a hair covering, mandatory for all women in Iran), and was declared dead after three days in custody. Given the unclear circumstances of the young girl's death, the unrest quickly spread to the rest of the country, and grew into the largest demonstrations in recent years. The Iranian authorities have been particularly brutal in their efforts to quell the protests - the police have responded to the protests with gunfire and tear gas, and the media has reported the presence of bloodshed on campuses. At the same time, they are trying to downplay the seriousness of the situation by controlling the media, and the BBC and other independent media outlets are prohibited from reporting from Iran (cf. BBC 2023).

Despite or perhaps because of media control, censorship, and internet shutdowns, social networks are of great importance during demonstrations in Iran (Marks 2023) because they allowed people to exchange opinions, ideas and openly criticize the regime under which they live (Alami Fariman & Hakiminejad 2024), and that is exactly why the authorities control them in detail and occasionally shut down access to the Internet. The biggest role of social networks during the demonstrations in Iran is the development of the feminist idea (Cai 2023) and the strengthening of transnational digital activism in the fight against the violation of women's rights (Elmore 2024). On the other hand, it is creating an opportunity for humanity to witness such events and thereby calls for solidarity on a global level, while on the level of Iran it encourages action and mobilization, but it would be unrealistic to expect social networks to shape the movement and determine its direction. (cf. Alterman 2022).

3 RESEARCH METHODOLOGY

The conducted research examined user preferences for the use of social networks in Croatia, users' perceptions of the fight for women's rights in Iran, and the role of social networks in monitoring the aforementioned case.

3.1 Objective and research questions

The objective of the conducted research is to gain insight into the attitudes and experiences of respondents regarding social networks, gender equality and the state of women's rights in Iran. With the help of the survey, the aim is to check the habits of respondents as users of social networks, how respondents perceive the struggle for women's rights in Iran and how they perceive the role of social networks themselves in this struggle. The research questions that underlie the research itself are as follows:

1. What is the role of social networks in today's society?
2. What is the connection between social networks and the fight for women's rights?
3. What is the role of social networks in spreading awareness about the problem of inequality?
4. How do social network users in Croatia perceive the fight for women's rights in the example from Iran?

3.2 Hypotheses

Given the previously stated subject of the research and the research questions, suitable research hypotheses were set and tested as part of the research.

The main hypothesis in the research is the following - H1: There is a positive connection between social networks and the fight for women's rights.

In addition to the main hypothesis, auxiliary hypotheses were set:

- H1.1. The fundamental role of social networks in today's society is to inform users.
- H1.2. Social networks have become a platform for the fight against inequality in society.
- H1.3. Social network users in Croatia actively follow the case of the fight for women's rights in Iran, thus supporting the movement to stop violence against women.

3.3 Method and sample

The study involved 118 respondents from the Republic of Croatia aged at least 18 to 55+. The data was collected via an online survey, and the questionnaire consists of 3 groups of questions. The first group of questions are socio-demographic, the second group of questions examines habits, and the third group of questions examines the attitudes and opinions of the respondents on the fight for women's rights and the current situation in Iran.

3.4 Analysis of the research results

This research included five different age groups – 18-25 years, 26-35 years, 36-45 years, 46-55 years and 55+ years. Of the total of 118 respondents who participated in the research, 63.6% were female and 36.4% were male. The largest number of respondents had completed high school, 38.1%, fol-

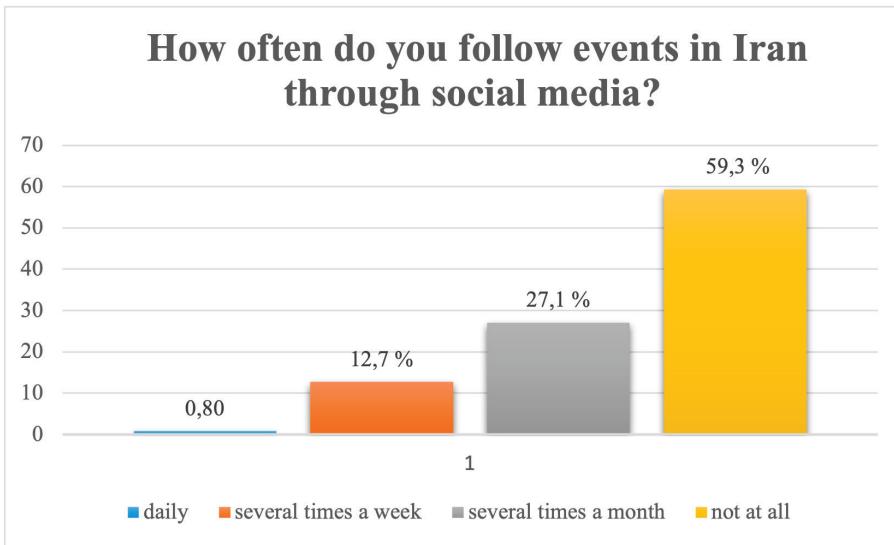
lowed by 37.3% with postgraduate studies, an equal number of respondents, or 11.9%, completed undergraduate studies (professional and university), and only 0.8% of respondents completed post-graduate doctoral studies.

The next group of questions examines the participants' habits as users of social networks. More than 90% of respondents have profiles on social networks, of which 48.3% of respondents spend up to an hour a day on social networks, 39.8% between two and three hours a day, and only 11.9% of respondents spend more than three hours a day on social networks. Over 60% of respondents do not follow the topic of gender equality on social networks, of the almost 40% of respondents who follow this topic - 4.2% of respondents follow it daily, 19.5% several times a week, 29.7% several times a month. 46.6% of respondents do not follow this topic on social networks at all.

Finally, the third group of questions focuses on the social unrest in Iran, the perception of the fight for women's rights in Iran by users in Croatia, and the role of social networks in following the aforementioned case. The first question in this set is: How well are you informed about the events in Iran in the last few years (murder of Mahsa Amini, street protests, fight for equality)? 33.9% of respondents estimated that they are well informed on the events in Iran, an equal number of respondents (33.1%) have a neutral opinion, i.e. they believe that they are neither informed nor not informed, 22.9% believe that they are poorly informed of the situation, and only 10.2% think that they are very well informed on the events. The next question shows how ignorant the respondents are about the situation, considering that only one person said that they follow what is happening in Iran every day, the largest number of respondents, as much as 59.3% do not follow current events at all, 27.1% follow on a monthly basis, and 12.7% on a weekly basis.

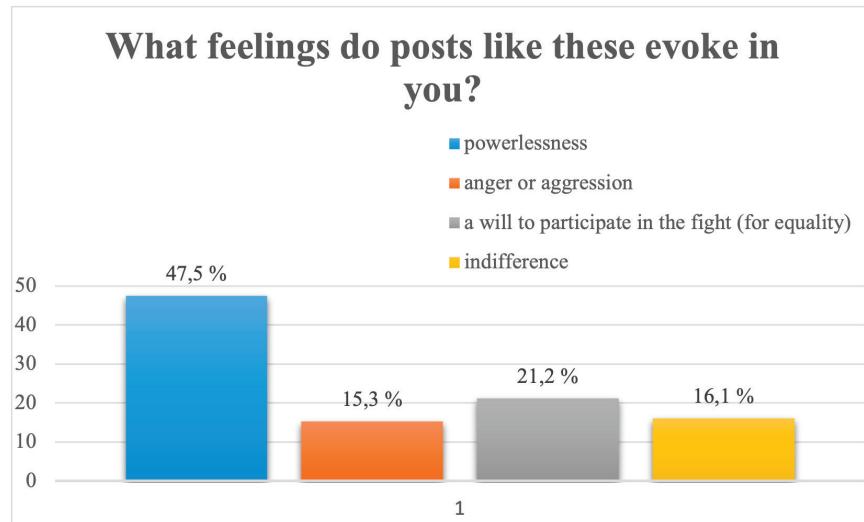
What is interesting is that in almost half of the respondents, this type of announcement arouses a feeling of powerlessness (47.5%), 21.2% feel a desire to participate, 16.1% are indifferent, and in 15.3% of the respondents, it arouses anger or aggression.

Figure 1: Frequency of following the events in Iran



(Source: Author's work)

Figure 2: Respondents' reaction to events in Iran

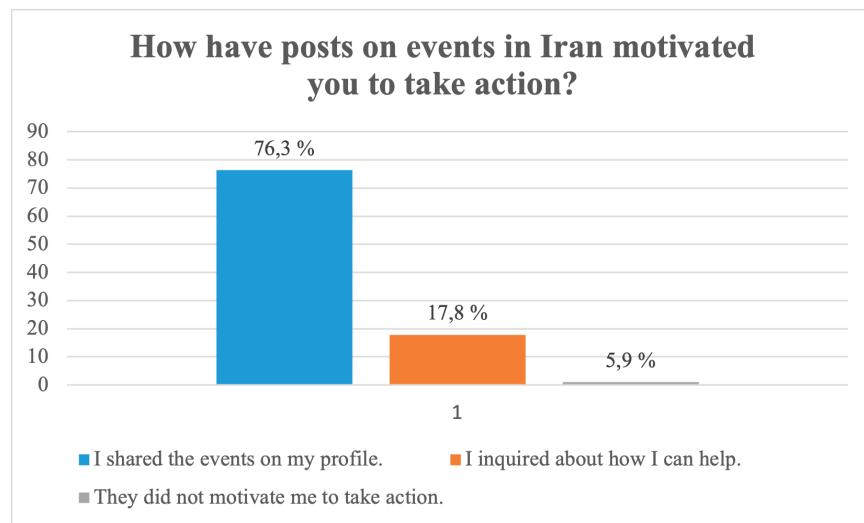


(Source: Author's work)

The next question further confirms that respondents really feel powerless when it comes to this topic, because when asked: "How did the posts about the events in Iran inspire you to take action?" they answered as follows - 76.3% claim that the posts about the events in Iran did not inspire them to take action, 17.8% shared the posts on their profiles, and 5.9% went a step further and asked how they could help.

Most respondents consider topics such as gender equality, equality and discrimination to be very important (45.8%) or important (41.5%) topics, 8.5% have a neutral opinion, and 2.5% see them as less important topics, or 1.7% as unimportant topics.

Figure 3: Respondents' actions regarding the events in Iran



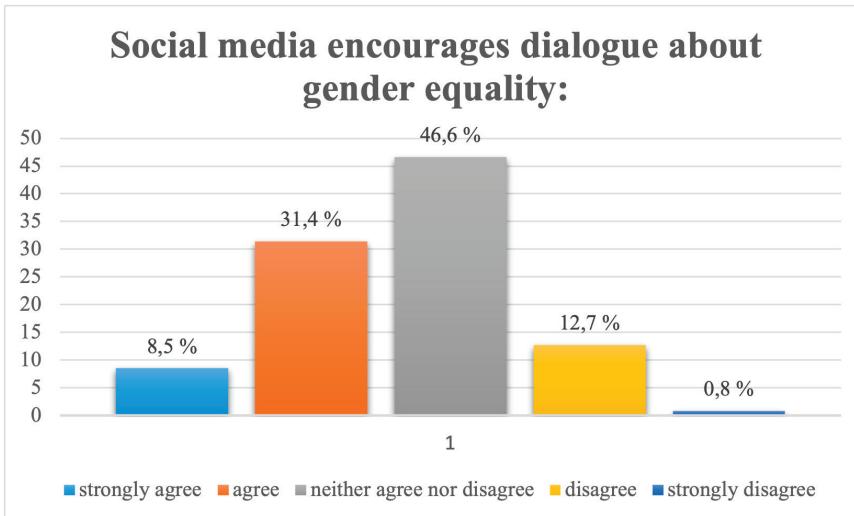
(Source: Author's work)

Regarding the visibility of events in Iran on social media, the majority of respondents consider it poor (48.3%), and 10.2% very poor. Then 36.4% consider it moderately visible, 4.2% good, and only

0.8% very good. 46.6% of respondents believe that social media neither encourages nor discourages dialogue on gender equality. 31.4% agree that social media encourages dialogue on gender equality, while 12.7% disagree with the statement. Furthermore, 8.5% completely agree with the statement, and 0.8% completely disagree with the statement.

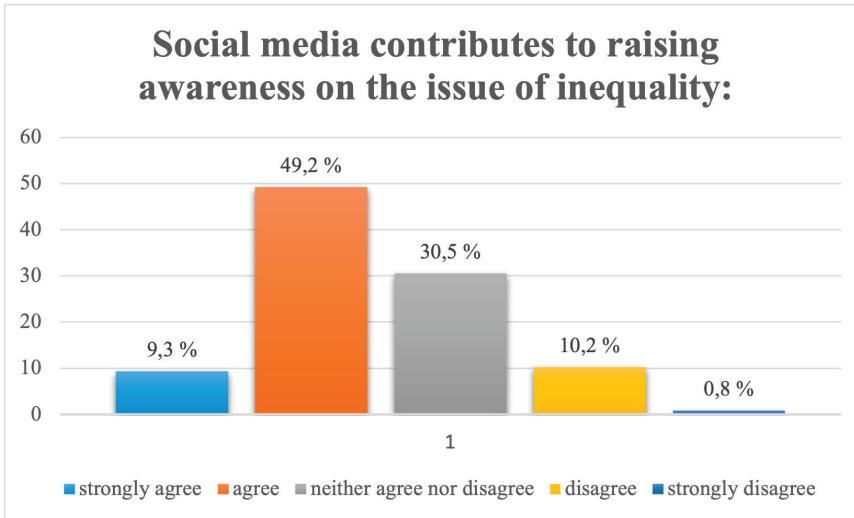
On the other hand, 49.2% of respondents agree that social media contributes to raising awareness about the problem of inequality, and 30.5% neither agree nor disagree with the statement. At the same time, 10.2% disagree with the statement, and 9.3% of respondents completely agree with the statement. 0.8% of respondents disagree at all with the statement that social networks contribute to spreading awareness about the problem of inequality.

Figure 4: Gender equality on social media



(Source: Author's work)

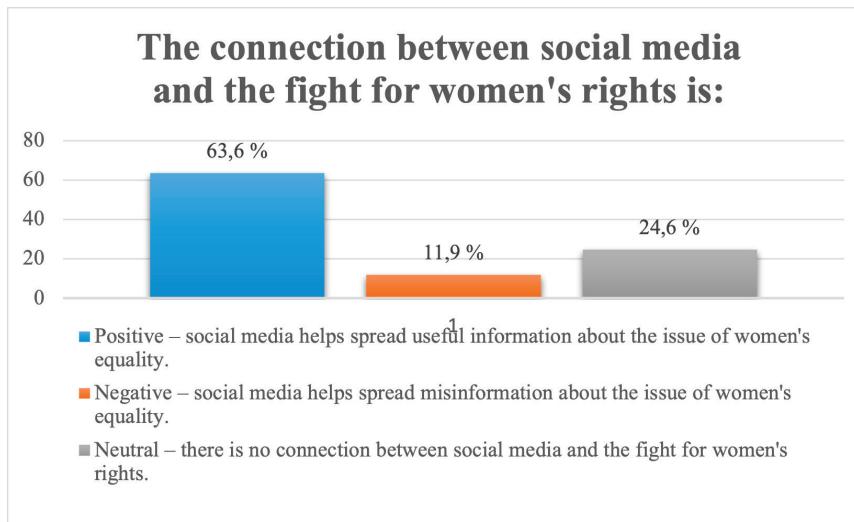
Figure 5: Raising awareness of the issue of inequality



(Source: Author's work)

In general, the majority of respondents (63.6%) believe that the connection between social networks and the fight for women's rights is positive, that is, that social networks help in spreading useful information about the problem of women's equality. Almost a quarter of respondents (24.6%) maintained a neutral attitude and believe that there is no connection between social networks and the fight for women's rights, and the smallest number of respondents (11.9%) see a negative connection because they believe that social networks help spread misinformation about the problem of women's equality.

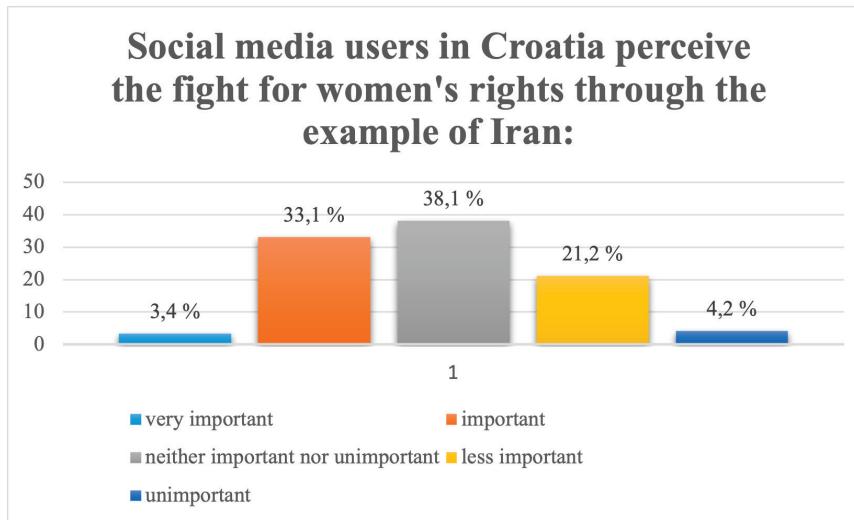
Figure 6: The connection between social media and the fight for women's rights



(Source: Author's work)

Finally, social media users in Croatia mostly perceive the fight for women's rights, as in Iran, as neither important nor unimportant (38.1%), 33.1% consider it important, 21.2% less important, 4.2% unimportant, and only 3.4% of respondents consider it very important.

Figure 7: Perception of the fight for women's rights through the example of Iran



(Source: Author's work)

4 CONCLUSION

Despite long-standing efforts to achieve gender equality, the struggle for women's rights continues, with particular emphasis on access to healthcare, equality in the workplace, combating gender-based violence, and reducing prejudice. Organizations and individuals continue to work to ensure gender equality and create a more inclusive society. The conducted survey confirmed the hypothesis that there is a positive association between social networks and the struggle for women's rights, but the auxiliary hypotheses were not confirmed.

It is a fact that a large number of people consider social media to be a source of information, but it is important to note that an equal number are aware that social media has become a marketing tool. Although social media has often been used to raise awareness about social issues such as gender equality, activism on social media is limited to superficial engagement. Finally, the assumption that social media users in Croatia are actively following the fight for women's rights in Iran, thus supporting the movement to end violence against women, may be exaggerated. Social media enables global connectivity and communication, but the majority of social media users actively follow and participate in discussions on topics that are closer to their everyday lives.

Social networks provide undeniable value in connecting people and facilitating dialogue on important topics, but they are only one of many tools in information and activism. In order to achieve real changes in society, it is necessary to be aware of their limitations and the need to act outside the virtual space.

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1.08 Objavljeni znanstveni prispevek na konferenci
Published scientific conference contribution

CRISIS COMMUNICATION IN HEALTHCARE: IMPLEMENTING THE IDEA-COMMTRUST MODEL FOR TECHNOLOGICAL RESILIENCE

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ABSTRACT

Health crises, such as pandemics and other public health emergencies, highlight the importance of effective crisis communication between healthcare institutions, the media, and the general public. This paper explores the application of the IDEA-CommTrust model, developed to enhance communication and strengthen trust between healthcare institutions and the public during health crises.

The IDEA-CommTrust model is based on an integrated approach that includes identifying key stakeholders, defining clear communication strategies, and utilizing technological tools to improve transparency and the availability of information. The focus of this paper is on technological solutions such as chatbots, online platforms, and artificial intelligence systems that can be used to enhance community communication and reduce the "infodemic"—the spread of misinformation that undermines public trust.

This review analyzes existing communication practices and provides guidelines for implementing the IDEA-CommTrust model in future crises, aiming to improve the resilience of healthcare systems and maintain public trust during times of crisis. The paper is grounded in literature and analysis of existing practices, contributing to an understanding of how technology and appropriate communication strategies can enhance healthcare resilience.

Keywords: Crisis communication, Public trust, COVID-19, IDEA-CommTrust, Technology, Healthcare resilience

1 INTRODUCTION

Crises and emergencies, such as pandemics, require timely and effective communication to ensure public safety and trust. Effective crisis communication facilitates informed decision-making, mitigates public fear, and enhances cooperation with public health measures (Plenković 2015). Research underscores that the absence of coordinated crisis communication allows misinformation to spread, leading to increased uncertainty and public distrust (Bačić 2010).

Modern communication channels, including traditional media, social networks, and digital platforms, offer unprecedented opportunities to engage with the public. However, they also present challenges, particularly in managing the rapid dissemination of information, both accurate and misleading (Avery 2010). The COVID-19 pandemic has demonstrated the crucial role of structured crisis communication in countering misinformation and fostering public trust in health authorities (Alhassan and AlDossary 2021).

This paper presents the IDEA-CommTrust model as a structured approach to improving crisis communication in healthcare. By integrating strategic communication principles with technological advancements, the model seeks to enhance public trust and resilience during health crises.

2 LITERATURE REVIEW

2.1 Crisis Communication and the Role of Media

Crisis communication in healthcare requires rapid, accurate, and transparent dissemination of information to prevent panic and promote responsible behavior (Plenković 2015). Research has shown that the absence of coordinated crisis communication leads to the spread of misinformation, decreased institutional trust, and reduced public compliance with recommended measures (Bačić 2010).

Both traditional and digital media play a key role in disseminating crisis information. Research by Avery (2010) found that individuals select communication channels based on their perception of credibility and personal preferences, with social media emerging as a dominant tool for crisis information. However, social media platforms also facilitate the rapid spread of false information (Day et al. 2019).

The situational theory of problem-solving (Avery 2010) highlights how factors such as involvement, constraints, and problem recognition influence the choice of communication channels. Studies have emphasized the need to understand how people select and process crisis-related messages to optimize communication strategies.

2.2 Misinformation and the Infodemic Phenomenon

The COVID-19 pandemic has demonstrated the dangers of misinformation in crisis communication. The World Health Organization (WHO) introduced the term "infodemic" to describe the excessive spread of both accurate and false information, which complicates crisis response efforts (WHO 2017).

During the pandemic, conspiracy theories and misinformation spread rapidly through social media, undermining trust in health institutions and reducing adherence to public health measures (Alhassan and AlDossary 2021). One notable example was the controversy surrounding hydroxychloroquine, which was publicly endorsed as a "game changer" by former U.S. President Donald Trump. The media attention surrounding this claim led to global drug shortages, price spikes, and harmful self-medication practices (Anwar et al. 2020). This case highlights the urgent need for structured communication models that rely on verified scientific data to counteract misinformation.

2.3 The IDEA Model and Its Application in Crisis Communication

Sellnow et al. (2017) introduced the IDEA model, which stands for Internalization, Distribution, Explanation, and Action, as a framework for improving crisis communication effectiveness. Their research demonstrated that messages structured according to this model enhance public risk perception and motivate individuals to adopt protective measures.

Sellnow-Richmond, Amiso, and Sellnow (2018) analyzed the application of the IDEA model during the Ebola epidemic and found that a combination of clear communication and proper channel selection was critical for increasing trust and reducing uncertainty in crisis situations.

2.4 Development of the IDEA-CommTrust Model

Despite the effectiveness of the IDEA model, the analysis of crisis communication during the COVID-19 pandemic revealed the need for a stronger emphasis on trust-building. As a response to these challenges, the IDEA-CommTrust model was developed, expanding upon the IDEA model by emphasizing credibility, transparency, and engagement with diverse social groups (Petričević 2024).

A comparative study of crisis communication practices during the COVID-19 pandemic analyzed official government communication (Koronavirus.hr) and media reports, revealing significant discrepancies in message clarity and timeliness. Applying the IDEA-CommTrust model highlighted the importance of consistency in messaging, the use of multiple communication channels, and proactive efforts to counter misinformation.

Implementing technological solutions such as AI-driven chatbots, real-time fact-checking tools, and interactive online platforms can further enhance crisis communication in healthcare by ensuring timely information exchange and reinforcing public trust in health institutions.

Existing research confirms that clear, transparent, and consistent communication strategies are essential for effective crisis management. The IDEA-CommTrust model provides a structured framework for improving crisis communication, particularly in the context of healthcare system resilience. The next section will outline the methodology used in the analysis of communication strategies during the COVID-19 pandemic.

3 METHODOLOGY

This study employs a review and theoretical approach, relying on an analysis of literature and existing research in the field of crisis communication in healthcare. The methodological objective is to explore the application of the IDEA-CommTrust model as a framework for improving communication during health crises and to identify technological solutions that can enhance the resilience of healthcare systems.

3.1 Research Approach

This paper is based on a review study that includes:

- A literature analysis on crisis communication, public trust, and the application of technological solutions in health crises,
- A critical evaluation of existing crisis communication models, with a particular focus on the IDEA model and its enhancement through IDEA-CommTrust,
- The identification of recommendations for future crisis communication strategies in healthcare systems.

3.2 Data Sources

This review study relies on secondary data sources, including:

- Scientific papers and academic literature in the field of crisis communication, particularly those focusing on the application of the IDEA model,
- Documents from health institutions and regulatory bodies such as the World Health Organization (WHO), the European Commission, and national health authorities,
- Empirical research and reports on communication strategies during the COVID-19 pandemic and other public health crises.

3.3 Analytical Framework

The analysis is based on the theoretical framework of the IDEA-CommTrust model, which includes four key elements of crisis communication:

- Internalization – how the public understands risks and threats,
- Distribution – the effectiveness of selected communication channels,
- Explanation – the clarity and consistency of messages,
- Action – the impact on public behavior and compliance with recommended measures.

The IDEA-CommTrust model was originally conceptualized in research on public relations in the Croatian healthcare system during health crises, where it was applied to analyze crisis communication strategies and their impact on public trust (Petričević 2024).

Additionally, the study explores technological innovations in crisis communication, such as:

- Chatbots and automated systems for responding to public inquiries,
- Artificial intelligence for fact-checking and combating misinformation,
- Digital platforms for direct interaction between healthcare institutions and the public.

3.4 Research Limitations

Since this is a review study, its limitations include:

- Lack of primary data, as the paper relies on available literature and reports,
- Potential changes in technological trends, requiring continuous updates to the model,
- Dependence on the quality and availability of sources, as some relevant data may be restricted by regulatory or institutional limitations.

This paper provides a theoretical foundation for the application of the IDEA-CommTrust model in health crises, with an emphasis on technological solutions that can enhance system resilience. The analysis of literature and existing research enables the identification of best practices and recommendations for future crisis communication strategies.

4 RESULTS AND DISCUSSION

4.1 Key Findings

The analysis of crisis communication strategies during the COVID-19 pandemic reveals significant discrepancies in the timeliness, clarity, and consistency of information disseminated by official institutions and media sources. Applying the IDEA-CommTrust model as an evaluative framework highlighted key strengths and weaknesses in communication practices, emphasizing the importance of public trust, message consistency, and technological solutions in managing health crises.

4.1.1 Internalization: Public Perception of Risk

One of the fundamental elements of effective crisis communication is ensuring that the public internalizes the severity of a crisis and understands the necessary protective measures. Studies indicate that clear, science-based messaging significantly improves public adherence to health recommendations (Sellnow et al. 2017). However, during the COVID-19 pandemic, conflicting messages from media sources and political figures often undermined this process.

For example, the case of hydroxychloroquine misinformation (Anwar et al. 2020) demonstrated how unverified claims can distort public understanding of risk, leading to inappropriate self-medication, supply shortages, and severe health consequences. Similarly, the analysis of Saudi Arabia's Twitter-based crisis communication (Alhassan and AlDossary 2021) showed that public engagement was highest when messages focused on reducing uncertainty, emphasizing scientific credibility, and reinforcing institutional trust.

4.1.2 Distribution: The Role of Media and Digital Platforms

The distribution of crisis communication messages is crucial in ensuring broad accessibility and engagement. Social media platforms played a pivotal role in the COVID-19 pandemic, providing real-time updates and serving as a primary source of information for many individuals (Day et al. 2019). However, social media also facilitated the rapid spread of misinformation and conspiracy theories, undermining the credibility of official sources (Goggin and Ellis 2020).

Findings indicate that government agencies and public health organizations that adopted multi-channel distribution strategies – including social media, traditional media, and interactive digital platforms – were more successful in maintaining public engagement and countering misinformation. The Koronavirus.hr initiative in Croatia, for instance, effectively centralized official updates, but lacked sufficient interactive features to directly address public concerns and misinformation (Petričević 2024).

4.1.3 Explanation: Clarity and Consistency of Messages

Effective crisis communication requires messages to be clear, consistent, and accessible to diverse populations. Research on communication strategies during past pandemics (Jones et al. 2010) highlights the importance of avoiding contradictory statements and ensuring that messages are culturally and linguistically adapted.

However, during the COVID-19 crisis, an analysis of media reports and institutional statements revealed significant inconsistencies. For example, variations in mask-wearing guidelines across different countries led to public confusion and decreased compliance (Paek et al. 2008). Similarly, research on crisis communication for vulnerable populations (Crouse Quinn 2008) emphasizes that disability-inclusive messaging and alternative communication formats were often overlooked, resulting in limited access to crucial health information (Goggin and Ellis 2020).

4.1.4 Action: Public Trust and Behavioral Compliance

Trust in health institutions plays a central role in motivating public action during crises. The findings support previous studies (Ransom 2007) that stress the importance of long-term relationship-building and transparent engagement with diverse communities to foster institutional trust.

The IDEA-CommTrust model emphasizes the proactive inclusion of local community leaders, behavioral scientists, and crisis communication specialists to tailor messages that resonate with different population groups (Parveen et al. 2016). The COVID-19 crisis demonstrated that governments that maintained open, two-way communication and involved civil society organizations in their messaging efforts had higher levels of public trust and compliance (Lin et al. 2016).

4.2 Implications for Crisis Communication and Technological Resilience

Findings from the analysis underscore the urgent need for integrated technological solutions to improve crisis communication in healthcare. Digital innovations such as AI-powered chatbots, automated misinformation detection tools, and real-time interactive platforms can significantly enhance the effectiveness of public health messaging.

4.2.1 The Role of Artificial Intelligence in Crisis Communication

AI-powered tools, such as chatbots for public health inquiries, can improve the distribution of verified information and reduce the burden on healthcare professionals. During the pandemic, some governments integrated AI-driven virtual assistants to address frequently asked questions, debunk misinformation, and provide localized health guidance (WHO 2020). However, these tools were underutilized in many regions, leaving information gaps and increasing public reliance on unverified social media sources.

4.2.2 Strengthening Trust through Transparent Communication

One of the key recommendations from this study is the need for continuous transparency in crisis communication. The IDEA-CommTrust model proposes that institutions should focus not only on providing information but also on actively engaging with the public, responding to concerns in real-time, and fostering an ongoing dialogue.

4.2.3 Addressing Vulnerable Populations through Inclusive Communication Strategies

Crisis Communication strategies must be inclusive to ensure that linguistic, cognitive, and technological barriers do not prevent certain groups from accessing life-saving information (Crouse Quinn 2008). Findings from past crises indicate that health institutions often fail to provide accessible content for individuals with disabilities, non-native speakers, and marginalized communities (Goggin and Ellis 2020). Future crisis communication plans should integrate tailored outreach efforts that address the specific needs of vulnerable populations.

4.3 Summary of Key Findings

The results of this study confirm that effective crisis communication depends on message clarity, trust, and technological adaptability. The IDEA-CommTrust model provides a framework for addressing these challenges by integrating strategic message structuring, proactive misinformation management, and public engagement strategies.

Key recommendations include:

- Adopting multi-channel distribution strategies that leverage traditional media, social networks, and AI-driven tools.
- Ensuring message clarity and consistency across all communication platforms to minimize public confusion.
- Building long-term trust through transparent and inclusive engagement with local communities and key stakeholders.
- Integrating technological solutions such as automated misinformation detection systems and AI-powered chatbots to enhance public health communication.
- Prioritizing accessibility and inclusivity in crisis communication, ensuring that marginalized and vulnerable populations receive timely and comprehensible information.

The following section will present concluding remarks and recommendations for future crisis communication frameworks in healthcare.

5 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study underscores the critical role of crisis communication in healthcare and highlights the necessity of structured, trust-centered messaging during public health emergencies. The analysis of communication strategies during the COVID-19 pandemic demonstrates that clear, transparent, and consistent messaging plays a crucial role in shaping public perceptions, fostering institutional trust, and encouraging compliance with health measures.

The IDEA-CommTrust model, developed as an extension of the original IDEA framework, provides a structured approach to improving crisis communication by emphasizing four core elements:

- Internalization – ensuring that the public understands the risks and consequences of a crisis,
- Distribution – selecting appropriate communication channels for effective outreach,
- Explanation – delivering clear, science-based, and culturally appropriate messages,
- Action – encouraging proactive behavior based on reliable and transparent information.

Findings from this study indicate that governments, healthcare institutions, and media organizations must adopt a multi-faceted approach to crisis communication that integrates traditional and digital platforms while actively combating misinformation. The infodemic observed during the COVID-19 pandemic highlights the need for proactive and technology-driven crisis communication solutions to counteract misinformation, build trust, and ensure public health resilience.

5.2 Recommendations for Future Applications

The findings support several key recommendations for enhancing crisis communication strategies and strengthening the resilience of healthcare systems:

1. Strengthening Technological Resilience in Crisis Communication

- Governments and public health institutions should invest in AI-powered communication tools, including chatbots, automated misinformation detection systems, and real-time digital platforms to improve the accessibility and accuracy of crisis-related information.
- AI-driven fact-checking mechanisms should be integrated into media and government platforms to detect and counter misinformation before it spreads.

2. Enhancing Trust and Transparency through Inclusive Communication

- Institutions should prioritize two-way communication strategies that allow real-time engagement with the public through Q&A platforms, live updates, and transparent policy discussions.

- Crisis communication plans should account for vulnerable populations, including those with disabilities, language barriers, and limited digital access, ensuring that messages are accessible in multiple formats.

3. Standardizing Crisis Communication Protocols

- Public health organizations should develop standardized crisis communication frameworks based on evidence-based models such as IDEA-CommTrust, ensuring message consistency and clarity across different institutions and media channels.
- Crisis messaging should be coordinated globally to prevent conflicting guidance and reduce public confusion, particularly during pandemics and large-scale health crises.

4. Strengthening Collaboration Between Health Authorities and Media

- Governments should establish clear partnerships with media organizations to facilitate accurate reporting and prevent the spread of sensationalism or misinformation.
- Media literacy initiatives should be promoted to educate the public on verifying sources and distinguishing between credible and misleading information.

5. Continuous Evaluation and Adaptation of Crisis Communication Strategies

- Post-crisis evaluations should be conducted to analyze the effectiveness of communication strategies and refine future crisis response plans.
- Governments and healthcare organizations should regularly update crisis communication strategies to align with emerging digital trends and evolving public health challenges.

5.3 Final Thoughts

The findings of this study emphasize that crisis communication is not just about delivering information but also about fostering trust, ensuring accessibility, and leveraging technology to build a resilient healthcare communication infrastructure. The IDEA-CommTrust model offers a structured, trust-centered approach that can guide future crisis communication strategies, helping healthcare institutions navigate public health emergencies with greater efficiency, transparency, and public engagement.

By integrating technological advancements, inclusive messaging, and proactive misinformation management, future crisis communication efforts can improve public trust, enhance compliance with health measures, and mitigate the impact of future health crises. The lessons from the COVID-19 pandemic highlight the urgent need for adaptive, science-based communication strategies that not only inform but also empower communities to act responsibly in times of crisis.

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THE RELATIONSHIP BETWEEN MEDIA AND HEALTHCARE INSTITUTIONS IN THE CONTEXT OF CRISIS COMMUNICATION: TECHNOLOGICAL AND SOCIAL RESILIENCE DURING HEALTH CRISES

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ABSTRACT

Health crises, such as pandemics and other public health emergencies, underscore the importance of effective crisis communication between healthcare institutions, the media, and the general public. This review paper explores the relationship between the media and healthcare institutions in the context of crisis communication, with a special emphasis on technological and social resilience. The paper analyzes existing theoretical frameworks of crisis communication, including Situational Crisis Communication Theory (SCCT) and trust management models, to examine key strategies and challenges in communication during health crises.

The study draws on theoretical and empirical insights from the fields of crisis communication and institutional trust, utilizing relevant research from literature as well as original research conducted as part of the dissertation. It analyzes the challenges faced by healthcare institutions, including the spread of misinformation, loss of public trust, and the need to adapt communication strategies to different groups. The paper also presents examples of best and worst practices in crisis communication, with a particular focus on the role of the media in shaping public perception.

The conclusion of the paper emphasizes the need for proactive communication strategies, collaboration with the media, and adaptation of technological solutions to enhance the resilience of healthcare systems in future crisis situations. The paper also provides recommendations for strengthening trust between healthcare institutions and the public through transparent and timely communication.

Keywords: Health crisis, Crisis communication, Media, Public trust, Technological resilience, Social resilience

1 INTRODUCTION

Health crises, such as pandemics and public health emergencies, highlight the critical role of effective crisis communication in ensuring public safety and maintaining trust in healthcare institutions. The interaction between healthcare institutions and the media significantly influences public perception, adherence to health guidelines, and overall crisis management effectiveness.

Mass communication theories emphasize the media's power to shape public discourse, frame health crises, and influence policy responses (McLuhan 2008; Vreg 1975). Media channels, including traditional and digital platforms, serve as primary sources of health information, making their role crucial in crisis communication strategies (Labaš and Marinčić 2018). However, misinformation, conflicting messages, and varying degrees of media credibility can either support or undermine public trust in healthcare institutions (Krelja Kurelović et al. 2021).

The COVID-19 pandemic provided a contemporary case study on the strengths and weaknesses of crisis communication between healthcare institutions and the media. The rapid dissemination of information through multiple channels led to both positive outcomes, such as timely public health guidance, and negative effects, such as the proliferation of misinformation and increased public skepticism towards official sources (Paulik et al. 2020).

This paper examines the relationship between media and healthcare institutions in crisis communication, with a focus on technological and social resilience. The study builds upon theoretical frameworks, including Situational Crisis Communication Theory (SCCT) and trust management models, to analyze key strategies and challenges in health crisis communication. The paper also reviews best and worst practices in media engagement during crises, emphasizing the role of digital resilience in managing public perception.

By understanding these dynamics, healthcare institutions can develop more effective communication strategies that enhance transparency, foster trust, and improve overall crisis response. This research contributes to the ongoing discourse on strengthening resilience in healthcare communication systems, particularly in times of public health emergencies.

2 THEORETICAL FRAMEWORK

Effective crisis communication between healthcare institutions and the media plays a crucial role in public health emergencies, shaping public perception, influencing behavioral responses, and managing misinformation. Various theoretical models explain the complexity of this interaction, particularly in terms of trust, media influence, and crisis response strategies. This section outlines key frameworks relevant to health crisis communication, focusing on Situational Crisis Communication Theory (SCCT), trust management models, media framing theory, and public relations approaches.

2.1 Situational Crisis Communication Theory (SCCT) in Healthcare

The Situational Crisis Communication Theory (SCCT), developed by Coombs (2007), provides a structured approach to understanding how organizations should respond to crises based on their level of responsibility and public perception. In healthcare crises, where credibility is paramount, SCCT suggests that institutions must carefully tailor their communication strategies to minimize reputational damage and maintain public trust.

SCCT emphasizes that crisis responses should align with the type of crisis and the level of organizational culpability. If an institution is perceived as directly responsible for a crisis, it must prioritize corrective actions and transparent communication. Conversely, if external factors contribute to the crisis, communication should focus on clarifying facts while reinforcing trust. Studies show that delayed, inconsistent, or defensive responses tend to heighten public skepticism, whereas early, data-driven messaging fosters credibility (Coombs 2021). The COVID-19 pandemic demonstrated the importance of these principles, as highlighted by the WHO RCCE guidance, which emphasizes that transparent and proactive communication by governments and healthcare agencies fosters higher levels of public compliance (WHO 2020).

2.2 Trust Management in Crisis Communication

Trust is a cornerstone of crisis communication, particularly in the healthcare sector, where institutional credibility directly affects public adherence to health recommendations. The trust management model identifies transparency, credibility, and consistency as fundamental elements in maintaining trust (Reynolds and Seeger 2005).

During health crises, uncertainty often fuels misinformation, making open and frequent communication essential. Institutions that acknowledge unknowns, provide timely updates, and engage in two-way dialogue with the public tend to maintain stronger credibility. The COVID-19 pandemic exemplified how conflicting statements from public health authorities led to confusion and reduced vaccine confidence (Paulik et al. 2020). A coherent communication strategy, built on scientific evidence and coordinated messaging across different institutions, is vital in sustaining trust, particularly in the face of evolving public health threats.

2.3 Media as a Double-Edged Sword in Crisis Communication

The role of mass and social media in crisis communication is complex. While these platforms serve as primary sources of public health information, they also facilitate the rapid spread of misinformation and fear amplification (Krelja Kurelović et al. 2021).

Historically, miscommunication has led to severe societal consequences. The Kantō Massacre (1923) in Japan, fueled by false media reports following an earthquake, resulted in violent attacks against marginalized groups. Similarly, the Battle of Karansebeš (1788) demonstrates how a simple misinterpretation of commands led to internal chaos and casualties, underscoring the need for precise and unambiguous crisis messaging.

In modern times, digital platforms have redefined crisis communication, making real-time information dissemination both an advantage and a challenge. Studies indicate that emotionally charged content—particularly fear-based narratives—spreads significantly faster than neutral or factual information (Xu et al. 2022). The COVID-19 infodemic showcased how viral misinformation about vaccines and treatments often overshadowed official health guidelines, complicating crisis response efforts (Vozab and Peruško 2021).

To mitigate misinformation risks, healthcare institutions must actively monitor digital discourse, engage with audiences, and leverage fact-checking mechanisms. Strategic partnerships with social media platforms and media organizations can enhance information accuracy while minimizing the reach of misleading content.

2.4 Media Framing and Public Perception of Health Crises

The way a crisis is framed in the media has a profound impact on public perception and response behaviors. Framing theory suggests that the emphasis placed on specific aspects of a crisis—whether preventive measures, casualties, or institutional responsibility—shapes audience interpretation (Lee 2014).

During the COVID-19 pandemic, diverse media framing approaches influenced public attitudes and adherence to guidelines. Coverage that focused on scientific explanations and prevention strategies fostered rational public responses and higher compliance. Conversely, reporting that sensationalized uncertainty and conflict contributed to heightened fear and misinformation spread.

Media narratives also influence the public's willingness to trust institutions. Studies show that prolonged exposure to crisis sensationalism often results in "news fatigue", reducing engagement with vital public health messages. Addressing this requires proactive collaboration between healthcare institutions and journalists, ensuring that fact-based, solution-oriented reporting is prioritized over fear-driven narratives.

2.5 Public Relations and Crisis Communication in Healthcare

Public relations (PR) strategies are integral to building and maintaining institutional credibility during crises. The International Public Relations Association (IPRA) defines PR as an ethical practice aimed at fostering trust between organizations and the public (Babić 2019).

In the healthcare sector, PR-driven crisis communication involves more than just media engagement—it requires strategic planning, community involvement, and ongoing reputation management. Healthcare institutions that successfully navigate crises typically implement:

- Crisis preparedness plans, ensuring that communication strategies are in place before crises occur.
- Media training for healthcare professionals, equipping them with skills to handle public messaging effectively.
- Community engagement initiatives, leveraging local health workers and trusted figures to enhance credibility.

By integrating these elements, healthcare institutions can enhance transparency, minimize misinformation, and reinforce public confidence in their response strategies.

2.6 Conclusion of Theoretical Framework

The theoretical insights outlined in this section highlight the interconnectedness of crisis response strategies, trust management, media influence, and misinformation control. By applying these frameworks, healthcare institutions can develop resilient crisis communication strategies that mitigate public anxiety, prevent misinformation spread, and enhance institutional credibility. The subsequent sections will explore empirical insights and practical applications that build upon this theoretical foundation.

3 METHODOLOGY

This study employs a qualitative research approach, focusing on a thematic review of existing literature and empirical insights related to crisis communication in health emergencies. The methodology is structured to analyze the interaction between healthcare institutions and the media through the lens of Situational Crisis Communication Theory (SCCT) and trust management models. This framework enables a systematic evaluation of crisis response strategies, media influence, and public trust dynamics in the context of health crises.

3.1 Data Collection

This study relies on secondary data sources, including:

- Peer-reviewed literature and books on crisis communication, media influence, and institutional trust.
- Reports from international health organizations, such as the World Health Organization (WHO) and national public health agencies, providing authoritative insights into crisis response strategies.
- Case studies from past health emergencies, with a particular focus on COVID-19, which serves as a contemporary model for evaluating crisis communication effectiveness.
- Media content analysis, examining how traditional and digital media have framed health crises, the role of misinformation, and its impact on public trust.
- Empirical insights from research on public relations in the Croatian healthcare system during the health crisis (Petričević 2024).

By synthesizing academic research, institutional reports, and real-world case studies, this study aims to identify patterns, challenges, and best practices in crisis communication.

3.2 Data Analysis

A qualitative content analysis is used to systematically examine the collected data, focusing on four key thematic areas:

1. Media Framing of Health Crises – Investigating how different media outlets structure crisis narratives, the prevalence of thematic vs. sensationalist framing, and its impact on public perception.
2. Public Trust in Healthcare Institutions – Identifying the factors that influence credibility, transparency, and institutional trustworthiness during health crises.
3. Impact of Digital and Traditional Media – Comparing the effectiveness of different media channels in information dissemination, including their role in spreading or counteracting misinformation.

4. Best and Worst Practices in Crisis Communication – Evaluating successful communication models used by healthcare institutions and identifying common failures that contribute to public mistrust or crisis mismanagement.

By applying thematic categorization and cross-case comparison, this analysis ensures a structured and in-depth understanding of the evolving relationship between healthcare institutions and the media during crises.

3.3 Study Scope and Limitations

This study does not involve primary data collection, such as surveys or interviews, but instead synthesizes existing research to generate evidence-based recommendations. While this approach allows for a broad, comparative perspective, it also presents certain limitations, such as reliance on available literature and the potential for contextual variations in crisis communication effectiveness across different countries and health systems.

Despite these limitations, this methodological framework ensures a comprehensive and structured analysis of media-healthcare relations during crises while aligning with the overall objectives of the study.

4 RESULTS

The findings of this study highlight key aspects of the relationship between media and healthcare institutions in crisis communication. The analysis focuses on how media framing influences public perception, the role of trust in institutional credibility, the spread of misinformation, and the effectiveness of various communication strategies.

4.1 Media Framing and Crisis Communication

Media framing plays a crucial role in shaping public understanding and response to health crises. The analysis reveals that different framing approaches significantly impact public attitudes, trust in institutions, and adherence to health guidelines.

Fact-based, prevention-oriented thematic framing fosters public compliance with health recommendations by providing clear, data-driven information that encourages rational decision-making (Lee 2014). In contrast, sensationalist framing, characterized by exaggerated risks, emotional appeals, and alarmist narratives, tends to amplify misinformation and fear (Xu et al. 2022).

Historical examples illustrate the consequences of miscommunication in crisis contexts. The Kwantu Massacre (1923) resulted from media-driven panic following an earthquake, leading to violent public reactions. Similarly, the Battle of Karansebeš (1788) highlights how ambiguity and misinformation can escalate crises, causing unnecessary casualties. These cases underscore the need for precise and responsible messaging in public health emergencies.

4.2 Trust Dynamics Between Media and Healthcare Institutions

Public trust in healthcare institutions is directly shaped by the credibility, transparency, and timeliness of their communication efforts. The findings indicate that delayed or inconsistent messaging erodes institutional credibility and fuels public uncertainty (Reynolds and Seeger 2005).

Healthcare institutions that engage in proactive, evidence-based communication build stronger public trust. Trust management models emphasize the importance of regular updates and timely corrections of misinformation, as these actions reinforce institutional reliability. However, during the COVID-19 pandemic, conflicting statements from government agencies and media outlets contributed to widespread skepticism, reducing adherence to public health recommendations (Paulik et al. 2020).

To sustain trust, clear and coordinated messaging across institutions is essential, ensuring that public health communication remains consistent, factual, and accessible to diverse audiences.

4.3 The Role of Digital and Traditional Media in Misinformation Spread

The rise of digital media has transformed crisis communication, presenting both opportunities and challenges. Social media platforms enable rapid dissemination of health information, but also accelerate the spread of misinformation, often outpacing official corrections (Krelja Kurelović et al. 2021).

Misinformation is particularly potent when linked to emotional narratives, as studies show that emotionally charged content spreads significantly faster than neutral or factual information (Vozab and Peruško 2021). Algorithm-driven news selection reinforces misinformation bubbles, creating echo chambers that make it difficult for evidence-based health messaging to reach skeptical audiences.

The COVID-19 crisis highlighted the importance of digital resilience in crisis communication. Fact-checking mechanisms, AI-driven misinformation detection, and institutional media monitoring are crucial tools in counteracting false narratives and restoring public confidence in official sources.

4.4 Best and Worst Practices in Crisis Communication

An assessment of past health crises reveals clear patterns in effective and ineffective crisis communication strategies.

Best practices include:

- Proactive media engagement – Transparent and consistent updates help prevent misinformation from gaining traction.
- Cross-sector collaboration – Partnerships between health institutions, media organizations, and digital platforms enhance information credibility.
- Real-time digital communication – Leveraging social media and direct messaging ensures that accurate health information reaches the public quickly.

Conversely, ineffective communication strategies are often characterized by:

- Conflicting messages from authorities, leading to public confusion and distrust.
- Delayed official statements, allowing misinformation to dominate the public discourse.
- Lack of clear media engagement protocols, resulting in unchecked speculation and misinterpretation.

These findings underscore the necessity of a structured crisis communication framework that integrates trust-building measures, strategic media partnerships, and technological solutions to enhance public resilience during health emergencies.

5 DISCUSSION

The findings of this study highlight the complex interplay between media and healthcare institutions during health crises, underscoring their interdependence and the challenges they face in ensuring effective crisis communication. This section critically examines these dynamics, focusing on media influence, trust dynamics, misinformation, and resilience-building strategies.

5.1 The Dual Role of Media in Health Crisis Communication

Media serves as a primary conduit for disseminating health information, but also a vehicle for misinformation and public confusion. Healthcare institutions depend on media channels to communicate vital guidelines, yet the rapid spread of unverified content—particularly on digital platforms—complicates crisis response efforts.

The COVID-19 pandemic provided a stark illustration of this challenge. While official guidance from health authorities reached large audiences, misinformation propagated at an even faster rate, fueled by emotionally charged narratives and algorithm-driven content selection (Krelja Kurelović et al. 2021). The prevalence of viral misinformation about vaccines, treatments, and infection risks further demonstrated how unverified claims can undermine public trust in official sources.

Historical examples reinforce these risks. The Kwanto Massacre (1923), triggered by media-driven panic following an earthquake, and the Battle of Karansebeš (1788), which resulted from miscommunication within military ranks, illustrate how ambiguity in messaging can escalate crises with severe consequences. In today's context, where social media enables real-time information ex-

change, healthcare institutions must not only communicate swiftly but also ensure precision and clarity in their messaging.

5.2 Trust as the Cornerstone of Crisis Communication

Public trust in healthcare institutions is one of the most critical determinants of effective crisis management. The findings reaffirm that transparency, consistency, and proactive engagement are key to maintaining credibility. However, the COVID-19 pandemic exposed significant weaknesses in institutional trust-building strategies.

A major challenge was the lack of unified messaging among governments, health agencies, and expert bodies. Conflicting statements and evolving guidelines created confusion, skepticism, and, in some cases, public resistance to health measures (Paulik et al. 2020). Institutions that maintained higher levels of public trust were those that engaged in regular updates, acknowledged uncertainties, and fostered two-way communication instead of relying on top-down messaging. This approach aligns with the trust management model, which emphasizes the importance of ongoing, interactive communication to sustain credibility (Reynolds and Seeger 2005).

Restoring and maintaining trust requires long-term investment in clear and inclusive communication strategies. It is not enough for healthcare institutions to be reactive in times of crisis; they must continuously build public confidence through consistent engagement, transparency in decision-making, and acknowledgment of public concerns.

5.3 The Power of Media Framing

The way a crisis is presented in the media significantly impacts public risk perception and response behavior. Framing theory suggests that news reports emphasizing scientific explanations, preventive measures, and collective responsibility tend to foster rational public decision-making (Lee 2014). Conversely, episodic and conflict-driven framing, which amplifies uncertainty and individual tragedies, fuels public anxiety and misinformation spread.

The COVID-19 pandemic vividly illustrated these effects. Media outlets that prioritized expert-driven, solution-oriented narratives contributed to higher levels of public compliance with health recommendations. In contrast, those that focused on conflicting expert opinions, worst-case scenarios, and unverified claims created divisions and heightened mistrust.

This fragmentation in media narratives highlights the need for stronger collaboration between healthcare institutions and journalists. Equipping media professionals with accurate health information, facilitating transparent press briefings, and discouraging sensationalist reporting are essential measures to ensure that public discourse remains fact-based and constructive.

5.4 Strengthening Technological and Social Resilience

A key takeaway from recent health crises is that both technological and social resilience are fundamental to effective crisis communication. Digital misinformation, exacerbated by social media algorithms that prioritize engagement over accuracy, has proven to be one of the greatest challenges in controlling health narratives (Vozab and Peruško 2021).

Traditional fact-checking mechanisms alone have struggled to match the speed and virality of misinformation. This reality necessitates a shift toward preemptive communication strategies, where accurate information is disseminated before false narratives gain traction.

Beyond technological interventions, social resilience—particularly through media literacy initiatives—is crucial. Public education programs aimed at enhancing critical thinking, teaching individuals to identify reliable sources, and fostering digital literacy skills can help reduce susceptibility to misinformation. Healthcare institutions should engage not only during crises but also in stable periods, fostering public trust and preparedness through continuous outreach and education.

5.5 Rethinking Crisis Communication Strategies

The findings of this study emphasize the importance of a proactive and integrated approach to crisis communication. Rather than reacting to misinformation, healthcare institutions must adopt stra-

tegic, evidence-based messaging frameworks that ensure accurate information reaches the public ahead of misleading narratives.

A centralized, coordinated messaging system, reinforced by real-time digital monitoring, can prevent confusion and enhance institutional credibility. Additionally, fostering collaborative relationships between health institutions, media organizations, and technology platforms can streamline information flow and mitigate misinformation risks.

Efforts to improve journalistic standards in health reporting, including fact-checking partnerships and ethical journalism training, can further strengthen crisis communication effectiveness. These initiatives not only enhance the quality of media coverage but also contribute to greater public confidence in institutional messaging.

By integrating these strategies, healthcare institutions can improve crisis response, enhance public cooperation, and build long-term trust in health systems. In an era of rapidly evolving communication technologies and information landscapes, resilience in crisis communication is no longer optional—it is essential.

6 CONCLUSION

This study has explored the complex relationship between media and healthcare institutions in crisis communication, emphasizing the central role of trust, media framing, misinformation, and resilience-building strategies. The findings confirm that while media serves as a vital conduit for public health messaging, it also introduces risks when information is misrepresented, manipulated, or sensationalized.

6.1 The Need for Strategic, Trust-Centered Communication

One of the key takeaways from this study is that public trust in healthcare institutions is not static—it must be actively nurtured and safeguarded. The COVID-19 pandemic demonstrated that trust is highly sensitive to communication clarity, consistency, and responsiveness. When public health institutions provided coherent, data-driven updates, compliance with health measures remained high. In contrast, when messaging was contradictory or politically influenced, misinformation flourished, leading to hesitancy, confusion, and resistance to guidelines (Paulik et al. 2020).

To maintain and restore trust, healthcare institutions must prioritize transparent, proactive, and interactive communication. This includes acknowledging uncertainties, correcting misinformation promptly, and fostering two-way dialogue with the public rather than relying solely on top-down messaging. The trust management model highlights that sustained engagement and credibility-building efforts must be embedded in long-term public health strategies, ensuring that institutions remain reliable sources of information even outside crisis periods.

6.2 Addressing the Challenges of Media Framing and Misinformation

The way crises are framed by the media has a profound impact on public perception and decision-making (Lee 2014). Thematic, solution-oriented reporting, which emphasizes scientific consensus, prevention strategies, and factual clarity, encourages rational public responses and fosters greater adherence to health measures. In contrast, episodic, conflict-driven, and emotionally charged narratives contribute to panic, distrust, and misinformation spread.

A major challenge in crisis communication is the speed at which misinformation circulates in digital spaces. The COVID-19 infodemic highlighted the limitations of traditional fact-checking mechanisms, which were often too slow to counter viral misinformation in real time. Addressing this challenge requires a comprehensive and multi-layered strategy, including:

- Preemptive communication efforts that ensure factual information is established before misinformation takes hold.
- Strengthened partnerships with media outlets and technology platforms to reinforce ethical reporting standards and prevent the amplification of misleading content.
- Improved public education on media literacy, equipping individuals with critical evaluation skills to discern reliable health information from misinformation.

By proactively addressing how crises are framed and how misinformation is mitigated, healthcare institutions can better control the crisis narrative and reinforce public trust in science-based communication.

6.3 Strengthening Technological and Social Resilience

The study emphasizes the importance of both technological and social resilience in crisis communication. Technological resilience includes:

- AI-driven misinformation detection tools to identify and counter false claims in real-time.
- Enhanced digital communication platforms that provide direct access to verified health information.
- Real-time media monitoring to track emerging misinformation trends and respond preemptively.

However, technological solutions alone are insufficient without social resilience—a well-informed public that can critically engage with health information. Media literacy education, aimed at enhancing critical thinking skills and promoting fact-checking behaviors, is an essential tool for strengthening public resistance to misinformation. Furthermore, fostering a culture of trust and accountability between institutions and citizens ensures that health communication efforts are more effective and widely accepted.

By integrating technological innovation and community engagement, healthcare institutions can develop a proactive, evidence-based crisis communication framework that minimizes misinformation risks and enhances public cooperation.

6.4 Future Directions and Recommendations

To improve crisis communication strategies in future health emergencies, this study highlights several key recommendations:

- Strengthening collaboration between healthcare institutions and the media to ensure accurate, science-based reporting and prevent the spread of misinformation.
- Developing rapid response misinformation countermeasures, including AI-powered monitoring systems and public engagement initiatives to correct misleading narratives in real time.
- Enhancing crisis communication training for health professionals, equipping them with effective media interaction skills and the ability to convey complex health information in accessible ways.
- Implementing nationwide digital literacy programs, empowering the public to critically evaluate health information, recognize misinformation tactics, and make informed decisions.

While crises are inevitable, their societal impact is shaped by the effectiveness of crisis communication strategies. A well-prepared, data-driven, and trust-centered approach is crucial in ensuring that media serves as a tool for public good rather than a vehicle for fear and misinformation.

By adopting these principles, healthcare institutions, media organizations, and policymakers can foster greater public resilience, ultimately safeguarding health outcomes and societal stability in future crises.

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WEB AND INFORMATION TECHNOLOGIES

1.08 Objavljeni znanstveni prispevek na konferenci
Published scientific conference contribution

STEADY-STATE ANALYSIS OF ONLINE SYSTEMS USING NEURONAL MODELS: APPLICATIONS IN REAL-TIME SIMULATIONS

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ABSTRACT

The study of steady states in online systems through neuronal models offers valuable insights into the dynamic behavior of complex systems. This research focuses on applying classical neuronal models, such as FitzHugh-Nagumo (FN) to analyze the steady-state responses of online systems subjected to various external stimuli. By examining the system's equilibrium points and the conditions under which they occur, we explore the stability of these systems in real-time scenarios. Through numerical simulations and bifurcation analysis, we investigate how different stimulus magnitudes and parameters influence the steady-state behavior, providing a deeper understanding of the nonlinear dynamics governing these systems.

The application of these models extends beyond theoretical neuroscience, offering potential for advancements in web-based technologies and real-time system simulations. By integrating these models into online platforms, we enable scalable, interactive simulations that can be applied to fields such as brain-computer interfaces, neural networks, and real-time data processing. This work contributes to the development of more efficient computational tools for analyzing and predicting the behavior of complex, online systems, bridging the gap between theoretical modeling and practical technological applications.

Keywords: Steady state analyses, Neuronal models, Real time simulations

1 INTRODUCTION

The idea of using neuronal models like FitzHugh–Nagumo (FN) (FitzHugh 1961; Nagumo, Arimoto, and Yoshizawa 1962; Izhikevich 2007) to study online social networks is intriguing and, while there is some related work, it is not yet a mainstream approach in the social dynamics literature.

Researchers have long used nonlinear models to describe how information, behaviors, or opinions spread in networks through social contagion (Barabási 2016; Strogatz 2014; Vasilenko and Vyshinski 2018) and activation models. Neuronal Models in Non-Neural contexts (Zhang and Zhang 2017; Wang and Zhang 2019; Goh and Kim 2001) are examples where excitable system models have been adapted to model social or economic phenomena, but the direct application of the FN model to describe user engagement, fatigue, or online activation is less common. Leveraging the well-established theory behind neuronal dynamics and bifurcation analysis offers a fresh perspective and a novel approach. It provides a robust mathematical framework to investigate stability, critical thresholds, and multi-stability in social network dynamics. Through bifurcation analysis, (Goh and Kim 2001; Brown 2021; Jackson 2020) and comparisons with alternative numerical integration methods, we explore how changes in stimulus parameters influence the stability and oscillatory behaviour of these systems. Notably, this work highlights the oscillatory phenomena, a phenomenon that has been extensively studied but continues to present new challenges and opportunities for computational advancements.

2 METHODS

2.1 Mapping Fn Model To A Social Network

The purpose of this study is to explore the application of classical neuronal models, particularly (FN) to analyze the behavior of online complex systems subjected to external stimuli (FitzHugh 1961; Nagumo, Arimoto, and Yoshizawa 1962). By using numerical simulations and bifurcation analysis, the study aims to understand the nonlinear dynamics and steady-state responses of these systems in real-time environments (Strogatz 2018; Izhikevich 2007) and to contribute to the development of more efficient computational methods for analyzing the behavior of complex, nonlinear systems in online platforms (Barabási 2016; Goh and Kim 2001). The extended FN equation to a networked system is given by the equation:

$$\frac{dv_i}{dt} = v_i - \frac{v_i^3}{3} - w_i + I_{ext,i} + \sum_{j \neq i} (A_{ji})(v_j - v_i) \quad (1)$$

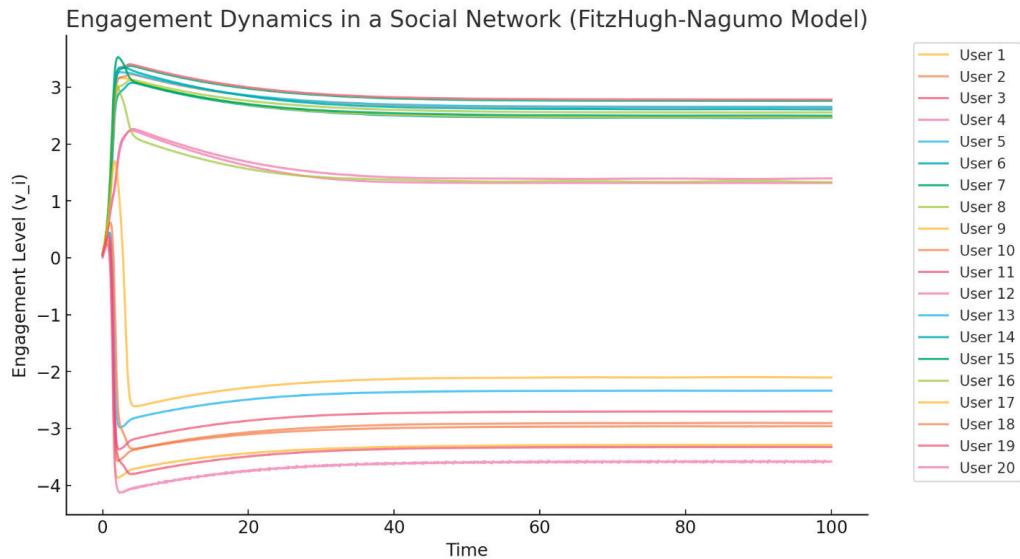
$$\frac{dw_i}{dt} = \varepsilon(v_i + a - bw_i) \quad (2)$$

Here, each node represents a user or an entity in the network. v_i is the activation level- how actively a user interacts, w_i is the loss of interest over time (Izhikevich 2007), $I_{ext,i}$ are the viral trends, or external stimulus to the nodes (Wang and Zhang 2012). Network connections introduce interaction terms, meaning a user's engagement depends not just on their own state but also on their neighbors (Zhang and Zhang 2010; Goh and Kim 2001). A_{ji} is the adjacency matrix defining the social network structure and, the last summated term models peer influence, where users tend to mimic already connected users (Jackson 2008; Brown 2014). The use of numerical integration techniques, such as MATLAB's ODE45 and ODE23 solvers, provides efficient and accurate simulations of these complex systems (Vasilenko and Vyshinski 2019). We have performed detailed analyses of the FN model, examining their responses to various current inputs and the resulting bifurcation diagrams (Strogatz 2018). These solvers were chosen for their accuracy and efficiency in modeling the dynamic behavior of the systems (Izhikevich 2007). Various external stimuli were introduced to the system, and the resulting responses of the neuronal models were simulated over time. During the study we have generated bifurcation diagrams to map the steady-state behavior of the systems as a function of parameters such as stimulus magnitude and time. These diagrams help us to identify transitions between different system states and the points at which stability changes (FitzHugh 1961; Nagumo, Arimoto, and Yoshizawa 1962) (e.g., from stable oscillations to chaotic behavior).

2.2 Bifurcation Analysis In Social Networks

First we simulate the network dynamic for different network structure, strating with the small-world network topology, obtaining the results as in Figure 1. On average, each node has roughly the same number of connections, then the overall "coupling strength" each node experiences can be similar. For instance, if the ring network connects each node to 2 neighbors and the ER network is tuned (with p) such that the average degree is close to 2, then their diffusive coupling effects can be very similar.

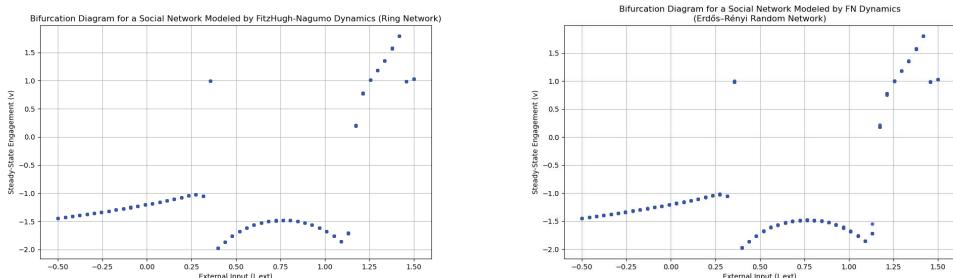
Figure 1: Engagement Dynamics in a Social network



Here we can see the simulation of engagement dynamics in a small social network using the F-N model where each curve represents a user's activity level over time.

The network connection creates interdependencies between users, leading to synchronized and de-synchronized activity patterns. Some users stabilize at different activity levels, while others fluctuate, suggesting nonlinear interactions in the network.

Figure 2: Left side bifurcation diagram for a social network with a ring topology, right side bifurcation diagram for a random social network modeled by FN dynamics

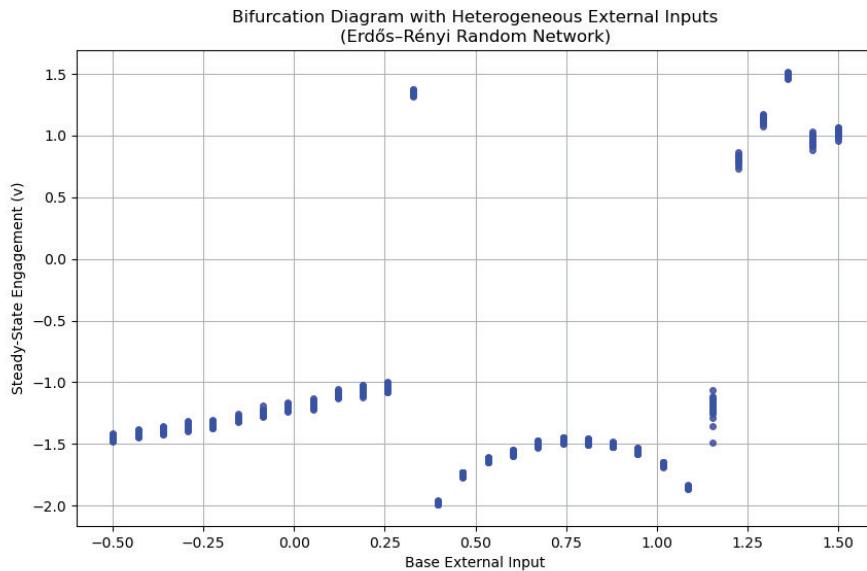


By observing figure 2, we can notice similar simulation results across the two network types. This might happen for different reasons, where we can underline the networks size and similar average connectivity. If both networks (the ring network and the Erdős–Rényi network) have a similar average degree, each node has roughly the same number of connections, then the overall "coupling

strength" each node experiences can be similar. For instance, if the ring network connects each node to 2 neighbors and the ER network is tuned with the same probability, such that the average degree is close to 2, then their diffusive coupling effects can be very similar.

At this step, we propose to modify the model using **heterogeneous external inputs**. Instead of a single scalar applied to all nodes, we define an array of length N , where each entry corresponds to the external input for a given node. This can help reveal differences in network behavior because nodes with different inputs may evolve differently based on their position in the network.

Figure 3: Bifurcation Diagrams with Heterogeneous External Inputs, applied on a random network, modelled by FN equation.



The bifurcation diagram displays each node's steady-state activity level plotted against the base external input, revealing how individual nodes respond differently due to the added heterogeneity. The dispersion of points at each base input level illustrates that even with a common base input, variability in external stimulation causes diverse outcomes across the network. Overall, the simulations indicate that as the base input increases, nodes transition through various activity states, highlighting potential regions of multi-stability influenced by both network connectivity and external stimulus variability.

3 DISCUSSION

One of the key findings of this study is the identification of bifurcation phenomena and the transition from stable states to oscillatory or chaotic behavior as external stimuli are varied. The FN model exhibited nonlinear responses to changes in stimulus magnitude, demonstrating the rich complexity inherent in these systems. The occurrence of bifurcations, particularly the transition from stable fixed points to oscillatory behavior, underscores the sensitivity of online systems to small variations in external stimuli. This sensitivity reflects the underlying complexity of systems that, while appearing simple at first, can undergo drastic qualitative changes in response to external conditions. The ability to predict such bifurcations is essential for real-time system analysis, where stability and behavior can shift abruptly due to changing inputs. This oscillatory behavior is directly related to the fundamental processes in real-time systems, such as the rhythmic signaling in neurons, and is also analogous to the periodic or chaotic behavior that may be observed in real-world systems subjected to feedback loops and external perturbations. The ability to simulate and predict these oscillations

provides crucial insights into system behavior, especially for applications that require precise timing, such as signal processing, communications, and real-time control systems.

In **real-time data processing**, for example, understanding how a system behaves under varying stimuli can help in predicting potential failure points or identifying optimal configurations. By integrating the neuronal models into online platforms, we create scalable tools for studying the dynamics of complex systems in diverse fields, from neuroscience to engineering and beyond.

The results of this study focus on the steady-state behavior, bifurcations, and oscillatory dynamics of the neuronal FN model when subjected to various external stimuli. The findings highlight the system's response to changes in stimulus magnitude, parameter variations, and the occurrence of bifurcations and transitions in system behavior. The key results are summarized as follows:

Steady-State Behavior: For varying stimulus magnitudes, the FN model demonstrated transitions between different steady states, including stable oscillations and resting states. As the stimulus amplitude increased, the system exhibited more complex oscillatory patterns, eventually leading to chaotic behavior at higher input values.

Bifurcation Diagrams: In the FN model, a bifurcation diagram revealed a transition from stable fixed points to limit cycles (oscillatory behavior) and further increase in the stimulus led to a chaotic regime. The study found that small changes in the stimulus amplitude or duration could lead to significant shifts in the system's behavior, including the loss of stability and the onset of chaos. The bifurcation points were highly sensitive to changes in the external stimulus, highlighting the nonlinear nature of the system.

Exploring System Stability: Sensitivity to variations in external stimulus parameters (e.g., stimulus duration, amplitude) was analyzed to identify the conditions under which bifurcations, oscillations, and stability changes occur.

These results also demonstrate the potential for *applying* these neuronal models to a wide range of *online systems* that require dynamic adjustment. The insights gained from this study can be directly applied to the design of systems that must handle real-time data processing, including **brain-computer interfaces or neural networks, where multiple states may need to be stabilized based on external stimulus**.

4 CONCLUSION

In conclusion, this study demonstrates the utility of classical neuronal models in analyzing the nonlinear dynamics of online systems subjected to external stimuli. Incorporating network coupling via various network topologies like Eror small-world into the FN model to capture peer influence and diffusion of engagement is a relatively novel twist compared to more traditional social contagion models. Future work could focus on extending these combined models to incorporate more complex networks and interactions, which would be especially useful in studying large-scale complex social systems. Furthermore, while the study provides a thorough numerical analysis of bifurcations and system behavior, real-world applications require consideration of noise, uncertainty, and external perturbations, which may not have been fully addressed in this theoretical approach.

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DIGITAL MARKETING AND PROMOTION OF SLOVENIAN HIGHER EDUCATION PROGRAMMES IN INFORMATION AND COMMUNICATION TECHNOLOGIES AT THE UNDERGRADUATE LEVEL

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ABSTRACT

This research investigates digital marketing and other strategies to promote first-cycle Bologna programmes in information and communication technologies (ICT) in Slovenia. The topic is under-researched, as only a few universities and higher education institutions in Slovenia offer such programmes. Given the rapid evolution of digital marketing and technology, the study draws from best practices at European, non-European, and American universities that employ advanced marketing approaches. The study is divided into two sections: a theoretical review of best practices from different universities and an empirical analysis focused on the needs of key target groups. These groups include high school students, undergraduate students, and marketing personnel. The research highlights the fact that Slovenian universities do not fully utilize the potential of digital marketing, particularly in leveraging precise metrics and targeting tools. Advanced analytics, which could help create detailed psychographic profiles of target groups, are largely absent, limiting the effectiveness of marketing strategies. These marketing gaps contribute indirectly to the significant shortage of ICT professionals in Slovenia. According to Eurostat, Slovenia has the highest deficit of ICT professionals in the European Union. Although approximately 2,500 ICT professionals are trained annually, this number is only half of what the market demands, leaving a considerable gap in the workforce.

Keywords: Digital marketing, Educational marketing, Higher education ICT, Recruitment marketing, Target audience psychology.

1 INTRODUCTION

Information and Communication Technology (ICT) plays an increasingly significant role in both the economic and academic sectors, highlighting the need for more effective strategies to attract students to related higher education programmes. This study explores optimal digital and other marketing strategies for increasing enrolment in first-cycle Bologna ICT programmes in Slovenia. The analysis focuses on key target groups—high school students, university undergraduates (aged 18–30), and working adults (typically aged 30–40) who are considering career transitions or reskilling opportunities in the ICT sector (Limna et al. 2023; Matz et al. 2017). This study expands on earlier work exploring digital marketing of ICT study programmes in Slovenia (Brodschneider 2024).

For successful marketing targeting of these groups, it is necessary to understand their needs and expectations and to present a clear picture of their predispositions, the current state of the job market, and employment opportunities for such technological personnel both locally and globally through marketing channels (Taken Smith 2012, 86–92). This is all the more crucial given that the shortage and demand for ICT professionals is increasing. Slovenia is currently leading in this issue within the European Union (Eurostat 2023), with an estimated annual shortfall of over 6,000 ICT professionals, while only approximately 2,500 are trained each year, indicating that at least twice as many ICT professionals need to be trained annually. Some Southeast European countries, such as Serbia, Bosnia and Herzegovina, and North Macedonia, have also surpassed Slovenia in meeting the demand for ICT personnel (Eurostat 2023). Digitalisation represents a new industrial revolution, without which we cannot remain competitive. Companies should therefore invest at least twice as much in the development and mastery of computer skills, and schools should incorporate computer science as a mandatory subject in the curriculum. Responsible management of ICT education is essential to ensure we prepare our future workforce (Lačan and Tomažin 2023). Consequently, solutions and considerations are linked to more effective engagement and recruitment of potential undergraduate students, or to more effective promotion of ICT study programmes, which educational institutions have recognised in recent years and have thus begun to cater to every potential student. This indeed enhances competitiveness but requires new innovative marketing approaches (Taken Smith 2012, 89–91). Balanced economic management of marketing resources and objective targeting of appropriate audience segments is also necessary, with no room for subjective assumptions or presumptions, as marketing resources are limited. Any imprudent investment or erroneous judgement by an institution can lead to a drastic or negative cumulative process, potentially jeopardising its operation, especially if the institution is relatively new to the educational market, smaller, and lacks a recognised brand. The problem is also evident in the formulation of buyer personas to reach target groups, given the broad spectrum encompassing high school students, undergraduate students, and employed adults (Erudera 2024). This generational diversity poses a significant challenge in developing marketing campaigns, strategies, and balanced allocation of financial resources, as well as in the development of university and college websites, which must be cohesively designed to integrate both psychological and sociological elements for target groups with different psychographic and demographic segmentations (Naumovska 2017, 123–133).

The use of digital promotion tools has become largely standardised, as both digital (e.g., websites, social media) and traditional channels (e.g., radio, television, print media, billboards, live events) are now widely adopted and considered commonplace (Harbi and Maqsood Ali 2022, 463–468). Due to this standardisation, there is a need to focus on more specific areas of digital marketing, namely: communication, educational (instructional) and content marketing, and recruitment marketing, as their optimal use provides more sustainable and innovative solutions. Besides attracting the attention of potential undergraduate students in target groups, they also enable long-term engagement and consequently create loyal users (Chaffey and Ellis-Chadwick 2019, 26–28). Such marketing approaches operate on a deeper level of communication, displaying social and societal benefits and functioning less aggressively than other marketing methods (Mongoose 2022).

1.1 Aims and objectives

The purpose of this study is to examine the digital and other marketing strategies of higher education institutions offering ICT programmes at the first Bologna cycle level in Slovenia, with the aim of

determining how to optimise their promotion, given that Slovenia is ranked first in terms of ICT professional shortage within the European Union (Eurostat 2023). To achieve this, we have formulated five research questions through preliminary interviews and online research of both Slovenian and foreign higher education institutions with ICT programmes:

- R1: What are the differences among the target groups of potential undergraduate ICT students at the first Bologna cycle level?
- R2: How do higher education institutions understand the target groups of ICT study programmes at the first Bologna cycle level?
- R3: What digital and other marketing approaches do higher education institutions use to address potential target groups for ICT study programmes at the first Bologna cycle level?
- R4: Is tailoring the target message to the parents of potential undergraduate students (currently in high school) also an important factor in reaching this target group?
- R5: Did students (currently in high school) choose their studies based on personal interest, career prospects, marketing, or the potential for high paid jobs?

The methodological approach (Chapter 2) will include quantitative and qualitative methods, sampling, and data collection, which will then be presented in the results chapter (Chapter 3). The quantitative part will involve the use of questionnaires for high school and undergraduate students, and the analysis of responses in the form of tables and graphs, allowing us to identify patterns and trends. The qualitative part will focus on a deeper understanding of phenomena through textual data analysis. This part will include online research of institutions or their digital channels as well as interviews with HR personnel from marketing departments of higher education institutions with ICT programmes, and the analysis of interview transcripts, which will provide insights into subjective experiences and opinions related to the research questions. Sampling and data collection with both methods will be crucial for ensuring the representativeness and relevance of the study. The discussion (Chapter 4) will present all findings and connections between secondary research results in the theoretical section and primary research in the empirical section through: an overview, research limitations, and conclusions. The research will be consolidated through descriptive statistical analysis, providing a detailed insight into the results and the specificity of the research findings.

2 METHODOLOGY

The research builds on theoretical foundations presented in the introductory part of the study. To gain a broader perspective and a more in-depth view, as well as to optimally design the strategy for both its development and the creation of questionnaires and methods, we considered a wider context. This included a general overview of various higher education institutions and their marketing activities in the international arena. In addition to Slovenia, which was the primary focus of the research, we also incorporated perspectives and practices from abroad, including Bosnia and Herzegovina; Finland; Germany; Austria; and the United States of America. This contributed to guiding the setup of the online research on higher education institutions, interviews with their marketing personnel, and surveys of high school and undergraduate students. The methods and techniques used in the research are detailed below.

2.1 Methods and Techniques for Data Collection

The research employed various research methods and types of analyses, which in some elements overlap. However, the predominant method used was descriptive research with comparative data analysis. The types of analyses used in data collection, literature review, and interpretation of results:

- Longitudinal analysis of social media posts (pre-study year, academic year, holidays);
- Utilisation of secondary statistical analysis (surveys, statistics, archives, social media, literature);
- Quantitative, qualitative, and meta-analysis (integration of results from independent studies);
- Historiographical analysis (impact of trends on digital marketing over the years);
- Correlational analysis (relationship between the effectiveness of promotions and the decision of a potential student to enrol).

In addition to the traditional (static) approach, where all elements of the process are predetermined, an agile (dynamic) development approach was also used. This involved continuously improving the methods and techniques based on feedback from respondents (institutional personnel, high school students, and undergraduate students).

2.2 Description of Instruments

For measuring digital and traditional marketing of higher education institutions, we utilised the analysis of institutional websites and social media.

For understanding the perspective of ICT institutional personnel at the first Bologna cycle level, we used open-ended interviews. This represented the qualitative aspect of the research. The interview questions were aimed at the marketing personnel of higher education institutions with ICT study programmes and addressed the five research questions.

For understanding the perspective of high school students from ICT institutions and undergraduate students at the first Bologna cycle level, we used surveys, representing the quantitative aspect of the research. Their responses provided real-time insights into the specifics of the study, enabling us to coherently adjust the direction, breadth, and depth of the research. Both questionnaires were developed based on insights, guidelines, and findings from the theoretical part of the research, as well as an online analysis of six ICT-focused higher education institutions from Slovenia; one from Finland, Germany, Austria; Bosnia and Herzegovina; and three ICT-focused higher education institutions from the USA. This was further supplemented by interviews with marketing personnel from the mentioned Slovenian institutions and the Bosnian-Herzegovinian institution. The questions in the questionnaires for high school and undergraduate students were designed to verify the reliability of responses from institutional personnel interviews, as these interviews were conducted first. This approach aimed to ensure credibility, transparency, complexity, relevance, and a holistic view of the research process.

The questionnaires were designed based on the stated parameters, literature review, captured insights, and consultations with other experts, with the aim of better understanding responses to the issues described in the research questions. The interview questionnaire for higher education personnel and the surveys for various target groups included between 10 and 14 open-ended questions related to the perspectives, desires, values, and practices of the respondents. Analyses and interpretations of responses from these questionnaires were useful in addressing results and findings, enabling us to answer the research questions and address the issues raised in Slovenia in Chapter 4 – Discussion.

2.3 Description of the sample

The research sample included 172 respondents, namely: six representatives from ICT higher education institutions in Slovenia and one from Bosnia and Herzegovina for international perspective; 80 high school students from ICT institutions; and 85 undergraduate students from ICT programmes at the first Bologna cycle level. The sample also comprised an online analysis of six higher education institutions in Slovenia and seven abroad, including international higher education institutions with ICT programmes from Central, Northern, and Western Europe, and the United States of America. A preliminary interview with a personnel member from SUM in Bosnia and Herzegovina helped us understand the functioning of Southeast European higher education institutions. This broader international perspective provided insights into the level and direction of marketing strategies for ICT study programmes at Slovenian higher education institutions.

The sample was used for both quantitative and qualitative research. For quantitative research, responses were obtained from 80 high school and 85 undergraduate students from ICT programmes in Slovenia, providing a systemic view of the issue from their perspectives, understanding, and desires.

For qualitative research, interviews were conducted with marketing personnel from all six higher education institutions identified in Slovenia, two of whom wished to remain anonymous. These interviews explored current marketing approaches, including strategies and experiences in promoting their institutions and ICT study programmes. One of the anonymous personnel members also requested that their institution remain unnamed due to personal reasons.

The research involved 4 primary and 1 secondary sample:

Sample 1 – The online research of Slovenian institutions involved 6 higher education institutions in Slovenia, both public and private. These include faculties or some Slovenian universities specialising in the ICT sector: AMEU (private), FAMNIT (public), FERI (public), FRI (public), FIŠ (public), and an anonymous higher education institution.

Sample 2 – Personnel interviews included 6 employees, one from each of the previously mentioned Slovenian ICT higher education institutions. The interviews provided insights into their positions, goals, and values. The questionnaire, in the form of an oral interview, consisted of 10 questions related to the 5 research questions.

Sample 3 – High school student surveys included 80 participants from ICT-focused secondary institutions in Slovenia. The open-ended questionnaire consisted of 13 questions addressing the research questions.

Sample 4 – Undergraduate student surveys included 85 participants from ICT programmes at the first Bologna cycle level in Slovenia. The open-ended questionnaire contained 12 questions related to the research questions.

The sample of other international (EU and US) higher education institutions with ICT programmes and the interview with a personnel member from a higher education institution in Bosnia and Herzegovina helped provide a broader context for the research.

2.4 Description of Data Processing

Data processing occurred in four stages:

1. Analysis of institutional websites and digital and other marketing practices of higher education institutions with ICT study programmes from Slovenia and other countries.
2. Interviews with marketing and communication personnel from Slovenian institutions, analysed in the previous stage using open oral questions. One personnel member was interviewed from each institution.
3. Surveys of high school students from ICT-focused institutions in Slovenia using an open written questionnaire.
4. Surveys of undergraduate students from higher education institutions with ICT programmes at the first Bologna cycle level in Slovenia using an open written questionnaire.

The online analysis of institutions was conducted from August 16, 2023, to November 15, 2023. Interviews with personnel from higher education institutions and universities with ICT programmes were conducted between November 16, 2023, and March 15, 2024. High school ICT students and undergraduate ICT students from higher institutions and universities were surveyed online or through social media. The questionnaire (open type) was available online and on social media from December 29, 2023, to March 21, 2024. The obtained data were then categorised into 4 sections:

1. Online research of Slovenian higher education institutions with ICT study programmes at the first Bologna cycle level.
2. Research on marketing personnel practices (of the previously mentioned institutions) through interviews.
3. Research on the perspective of high school students from ICT-focused institutions in Slovenia.
4. Research on the perspective of undergraduate students from higher education institutions with ICT programmes at the first Bologna cycle level in Slovenia.

The results were subsequently organised based on the frequency of responses – the mode.

3 RESULTS

This chapter presents the results of the research project, which directly relate to the five research questions outlined in the theoretical section. Table 1 summarises some of the key findings and guidelines regarding the research questions obtained from the conducted study.

Table 1: Key Findings of the Research

Question Theme	Key Finding 1	Key Finding 2	Key Finding 3
R1 Differences between Target Groups (high school and undergraduate students)	Despite belonging to the same Generation Z, there are psychographic differences between high school and undergraduate students.	High school students are more career-oriented in their studies.	Undergraduate students are more interested in their studies due to personal interest.
R2 Understanding of Target Groups by Institutional Personnel	Incomplete, lack of personalised approach (buyer persona).	Lack of use of analytical tools and ongoing surveys of target groups.	Lack of connection between undergraduate and graduate students.
R3 Digital and Marketing Approaches to Target Groups	Most important digital channels: e-mail, Facebook, Instagram.	Word of mouth and live events are among the most significant approaches for target groups.	Insufficient promotions, information, and live events.
R4 Influence of Parents on Decision-Making	Generation Z (high school and undergraduate students) is independent.	Parents have less influence on Generation Z.	Generation Z is influenced by teachers, acquaintances, and live events.
R5 Personal or Career Motivation	Undergraduate students are primarily motivated by personal reasons.	High school students are primarily motivated by career reasons.	Many cite both reasons.

(Source: Authors').

3.1 Study Limitations

The study aimed for a more comprehensive investigation of higher education institutions in international markets, including interviews with their personnel and target groups, in search of optimal solutions, marketing patterns, and best practices from more developed Western countries. However, this was unfeasible due to time constraints and poor responsiveness from foreign higher education institutions. The research may exhibit shortcomings in objectivity and congruence, potentially reflecting methodological, temporal, geographical, cultural, theoretical, practical limitations, as well as limitations of the researcher and participants. Methodological limitations are reflected in the sample size, as 80 high school and 85 undergraduate students not constitute a large proportion of the population. Geographical and cultural limitations are apparent as most respondents were from northeastern Slovenia, particularly Maribor, which could negatively impact the interpretation and generalisation of results and their applicability to other regions in Slovenia. The lack of research in the specified ICT field in Slovenia represents an additional practical limitation, as there were few sources and limited access to necessary data.

4 DISCUSSION

The findings show that although high school and undergraduate students both belong to Generation Z, they differ significantly in psychographic profiles and motivational factors. There are noticeable differences in their primary reasons for choosing ICT studies: high school students are more career-oriented, while undergraduate students are more personally motivated. Both groups indicated that their preferred primary digital channel for receiving information from institutions is email. Among social media platforms, Facebook was selected as the most useful, closely followed by Instagram. The educational institutions in question have also noted that these social media platforms are among the most effective, as they regularly use them to reach their target groups. Factors such as product, price, promotion, place, people, process, and packaging (institutional architecture, visual presentation of services), which are used in the construction of standardised 7P systems, also influence high school and undergraduate students' choices when selecting a higher education institution.

Personnel at higher education institutions offering ICT programmes believe they have a good understanding of their target groups. However, it has been revealed that this understanding is not

entirely accurate, as nearly half of the undergraduate students are unfamiliar with the alumni club, which personnel have highlighted as an important tool for connecting undergraduate with graduate students. High school and graduate students lack additional information about the study process, content of study programmes, experiences during and after the study, and career specifics in the job market. Initial information about higher education institutions was mostly received through word of mouth, secondary school teachers, competitions, friends, and acquaintances. Parents generally do not influence their decisions, as Generation Z, high school and undergraduate students are independent. Many believe that internal motivation and the institution's self-promotional integrity are crucial in selecting a higher education institution, and that more aggressive promotion does not significantly impact their decisions.

Institutional personnel use both traditional and digital marketing approaches, which have become standardised. However, there is a noticeable lack of understanding in analytical approaches and consequently in the psychographic spectrum of target groups, as they do not utilise specialised analytical tools essential for maximising the potential of digital marketing. Collaboration between marketing personnel and the business sector, employment agencies, and other departments within the institution is crucial for developing optimal marketing strategies and campaigns. Institutions are beginning to realise that both in the educational and business sectors, specialised marketing of services using educational, content, and email marketing is necessary.

Most results align with the findings in the theoretical section, as higher education personnel, high school and undergraduate students, recognise the importance of the relevance and modernisation of study programmes, the quality of lectures and professors, and the modern teaching materials and technical equipment. Personnel at higher education institutions are aware of market competitiveness in the educational sector but, in addition to the lack of use of professional analytical tools (e.g., Google Analytics), also lack modern techniques for personalising marketing approaches, such as creating buyer personas based on specific psychographic characteristics and differences among target groups.

The use of these components could enable Slovenian higher education institutions offering ICT programmes at the first Bologna level to better refine and regularly update their marketing strategies and approaches. This might positively impact the shortage of ICT professionals in Slovenia, which, according to a 2023 Eurostat study, is the highest among EU member states, with only around 2,500 ICT graduates annually instead of the needed 6,000 (Lačan & Tomažin 2023).

5 CONCLUSION

5.1 Summary of Key Findings

It is evident that personnel at institutions recognise the indispensability of using digital marketing. However, they do not fully appreciate the necessity of ongoing analysis of results and the corresponding adjustment of marketing strategies. This can be achieved through the use of specialised analytical tools, such as Google Analytics, and personalised marketing techniques, such as the creation of buyer personas.

From the target groups (high school and undergraduate students) or the research sample, which comprises individuals aged between 15 and 49, we have managed to gather sufficient information, except for the target group of employed adults aged between 30 and 50, for which the sample size was too small to generalise. Results show that employed adults generally enrol in private higher education institutions, which constituted a minor portion of our study, as Slovenia predominantly has public higher education institutions offering accredited free ICT programmes.

Through the responses of high school and undergraduate students to the questionnaire, interviews with personnel at higher education institutions offering ICT programmes, and their online analyses, we largely validated the findings of secondary research mentioned in the theoretical part of the study and answered the research questions posed. We understood the psychographic needs and expectations of the target groups, enabling institutions to effectively market to them and consequently achieve the desired response and increased interest in enrolment. It was found that Generation Z, which includes potential target groups, is less influenced by parents. Despite this indi-

vidualistic orientation, collective tendencies are also observed, as high school and undergraduate students consider the opinions of teachers, friends, and acquaintances, regardless of their inherent independence. The target groups of high school and undergraduate students do not differ greatly in their opinions, with significant differences observed mainly in their general reasons for choosing an ICT institution. Most high school students selected career reasons and good earnings, while most undergraduate students cited personal interest and engagement. Consequently, high school students wish to see higher education institutions highlight career prospects and good earnings in their promotions, while undergraduate students emphasise the importance of ICT competencies.

Both target groups expressed a desire for increased promotional activities from institutions and more detailed information about the study process, in both digital and traditional formats. Surprisingly, nearly half (48%) of undergraduate students were unaware of the alumni club, which most institutions consider a key tool for connecting them with graduate students, helping them understand the educational process, postgraduate activities, and current job market conditions. This indicates that institutional personnel do not fully grasp the needs and desires of target groups, negatively affecting marketing strategies and consequently promotion and enrolment in their ICT programmes at the first Bologna level in Slovenia.

Regarding optimal digital channels for reaching target groups, they prefer receiving notifications via email and social media (Facebook and Instagram), which is already standardised. Concerning student life, both the quality of life during and after studies is important, which contrasts with the secondary research findings in the theoretical part that indicated high school students are only interested in life during their upcoming undergraduate studies, and current undergraduate students in life after. Secondary research also mentioned that a website is one of the most important factors in attracting potential undergraduate students. However, it has been found that while the website may indeed be crucial for the initial „digital“ contact with a higher education institution, other marketing methods such as email marketing, social media interactivity, and live events are essential for ongoing communication. Institutional integrity and achievements also strongly influence high school students' decisions, as undergraduate students value quality education and the expansion of professional knowledge and competencies.

Factors from the 7P system are mostly present in their decisions, as: professors and administrative personnel, physical facilities, study process, study costs, location, promotional methods, and the relevance of study programmes impact their choice of institution. Therefore, institutions effectively use these factors in their marketing strategies.

In Slovenia, higher education institutions offering ICT programmes strive to increase interest in such studies and consequently affect the shortage of ICT professionals in the job market, which is currently the lowest in our country compared to other EU member states. However, despite their efforts, they could use more sophisticated techniques and tools to achieve optimal promotional strategy results. Digital marketing allows for more precise targeting of the target groups compared to traditional marketing (posters, radio, and television), as it covers a narrower audience spectrum and allows for detailed metrics through their responses. The use of specialised analytical tools for measuring target groups' responses and creating personalised targeting would enable a more detailed understanding of their psychographics, including their habits, needs, desires, and psychological and sociological profiles, thereby increasing the effectiveness of marketing campaigns. With such manoeuvres, higher education institution personnel could also allocate marketing funds more effectively.

Educational marketing is shown to be very important for educational institutions, as it represents a specialised marketing branch essential for executing successful marketing campaigns, despite the use of standardised digital marketing tools. The use of the 7P system in marketing strategies is also indispensable, as it includes the most influential factors on high school students' decisions. Higher school institutions and universities aim to establish long-term or loyal relationships with their undergraduate students, as personnel desire that their postgraduate students continue their education at higher levels and spread positive word-of-mouth about the integrity of their visited higher education institution. The fact that many high school and undergraduate students first became aware of ICT institutions through elementary and high school competitions, teachers, or word of mouth indicates that traditional marketing, despite the advantages of digital marketing,

remains indispensable. This is likely because analogue technology and oral communication have been present in human society for the longest time, and live events leave the most lasting impression, as all five human senses are activated, capturing the broadest and most comprehensive spectrum of information.

Both target groups stated they do not need proactive influencing factors from the environment for their decisions, as they based their choices on personal motivation and institutional integrity (achievements of students, professors, modern study programmes, equipment). This demonstrates that the most crucial factor for promoting an institution is its reputation or brand, which is self-promoting through excellent results, as institutions with excellent academic results and reputation can promote themselves more easily, with positive information spreading on its own. Brand recognition is essential for attracting new students.

Regarding the use of digital channels for promoting ICT studies, it has been shown that institutional personnel recognise their importance, as they use: websites, email marketing, and social media (Facebook, Instagram, and LinkedIn). Among digital channels, email and Facebook stand out. For those exploring an institution, the most crucial digital channel is its well-structured and designed website, with a pleasant and intuitive user experience and relevant, clear information. This should be created using standardised psychological practices (F-shape, segmentation) identified by leading psychology experts, who, through cognitive or behaviourist psychology, have determined that user profiles and experiences should be developed from a "human-centric" perspective.

5.2 Recommendations for Further Research

I would recommend conducting additional research on the reasons for graduated students leaving for abroad and prematurely terminating their ICT studies, as this also affects the shortage of ICT professionals in Slovenia. Additionally, I suggest researching the target group of employed adults, particularly those from Generation X and Y, aged between 30 and 45 (Kolnhofer-Derecskei et al. 2017), which was not covered due to a small sample size. Researching similar areas for other educational levels would also be beneficial.

5.3 Final Thought

Communication skills and strategies represent a form of modern art, essential for achieving competitiveness and competence. The marketing industry plays a crucial role in understanding target groups, as it is the primary indicator of shifts in public opinion, trends, habits, and individuals' lifestyles. Higher education institutions with ICT study programmes in the Republic of Slovenia should continue to strive for more objective approaches in addressing target groups and continuously analyse the opinions of high school and undergraduate students. This would allow for better formulation of marketing strategies. Students (high school and undergraduate) could become co-creators of marketing strategies, as marketing personnel could use their behaviour and opinions on digital channels to more promptly develop and adjust marketing strategies. Based on such analytics for precise determination of psychographic profiles, the use of personalised marketing approaches, such as creating imaginary buyer personas representing specific target groups, is an indispensable element in the marketing context.

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EVOLUTION AND APPLICATIONS ACROSS DISCIPLINES OF THE UTAUT MODEL

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ABSTRACT

The Unified Theory of Acceptance and Use of Technology (UTAUT), developed by Venkatesh et al., builds upon the Technology Acceptance Model (TAM) and serves as an important framework for understanding user acceptance and adoption of new technologies before their implementation. It consolidates elements from multiple theoretical models, offering a comprehensive perspective on factors influencing technology acceptance, including performance expectancy, effort expectancy, social influence and facilitating conditions, moderated by the constructs gender, age, experience and voluntariness of use. The extended UTAUT2 model, along with the four well-known factors it adopted from UTAUT, integrates additional constructs such as hedonic motivation, price value, and habit, enhancing its applicability to consumer-oriented technologies. However, it is not moderated by all four constructs from UTAUT, as it excludes voluntariness of use. UTAUT2 has been expanded into the field of consumer technologies. In the literature, UTAUT3 is sometimes mentioned, but it does not officially exist. Instead, it is usually a modified UTAUT with additional constructs such as trust, perceived enjoyment, anxiety, and personal innovativeness, among others.

This study explores the evolution and application of the UTAUT model across various disciplines. A literature review reveals its adaptability in diverse contexts, including mobile banking, health-care, online information services, and more. The findings highlight the relevance of the UTAUT model in studying the dynamics of technology adoption while identifying areas for refinement. By integrating additional individual-level factors, the model can better capture the complexities of user behaviour. As technology continues to evolve, the UTAUT framework remains a valuable tool for researchers in understanding technology adoption patterns with applications across numerous disciplines.

Keywords: UTAUT, UTAUT2, Technology adoption, Technology acceptance, Interdisciplinary applications

1 INTRODUCTION

The Unified Theory of Acceptance and Use of Technology (UTAUT) has emerged as a prominent framework for understanding and predicting the adoption and use of various technologies (Dwivedi et al. 2020). The purpose of UTAUT is to examine the behaviour of individuals in the decision-making process of using technology-oriented innovations (Majeed 2020; Mohamed et al 2021). It was developed based on the theoretical model for predicting the acceptance and use of technology, TAM (Technology Acceptance Model), by Fred Davis, and it derives from the Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) (Davis 1989).

One of the fundamental constructs of the TAM framework is perceived usefulness, which refers to the belief that a technology will improve work effectiveness, bringing benefits such as monetary rewards, increased speed, simplicity and work efficiency, and similar advantages (Davis 1989). Another construct is perceived ease of use, which refers to the belief that the technology requires minimal effort to use (Davis 1989). TAM model is expanded by Venkatesh et al. (2003) into TAM2 and TAM3, and further developed into the UTAUT which take over core concepts from the TAM model to address various challenges in testing new technology acceptance.

UTAUT is widely applicable across various fields because it allows the examination of more complex models of human behaviour in relation to technological advancements. His main constructs are similar to those in TAM but also include performance expectancy, effort expectancy, social influence and facilitating conditions, which are moderated by gender, age, experience, and voluntariness of use (Venkatesh 2003). The UTAUT model has been extended to UTAUT2 enabling a better understanding of technology acceptance in various contexts. UTAUT2 incorporate additional factors such as hedonic motivation, price value and habit, moderated by gender, age and experience, (Venkatesh et al. 2012; Oh and Yoon 2013; Majeed 2020). This literature review research the evolution and interdisciplinary applications of the UTAUT model to various fields and highlights its potential for further applications in the adoption of technology.

2 PURPOSE AND GOALS

The purpose of this research is to explore the origins and development of the UTAUT model. It is important to evaluate UTAUT's applications in different fields, with the main goal of identifying the key benefits, its possible future application, and suggesting improvements for future research. Main goal of this research: How is the UTAUT model and its modifications applied across different disciplines, and what improvements are needed?

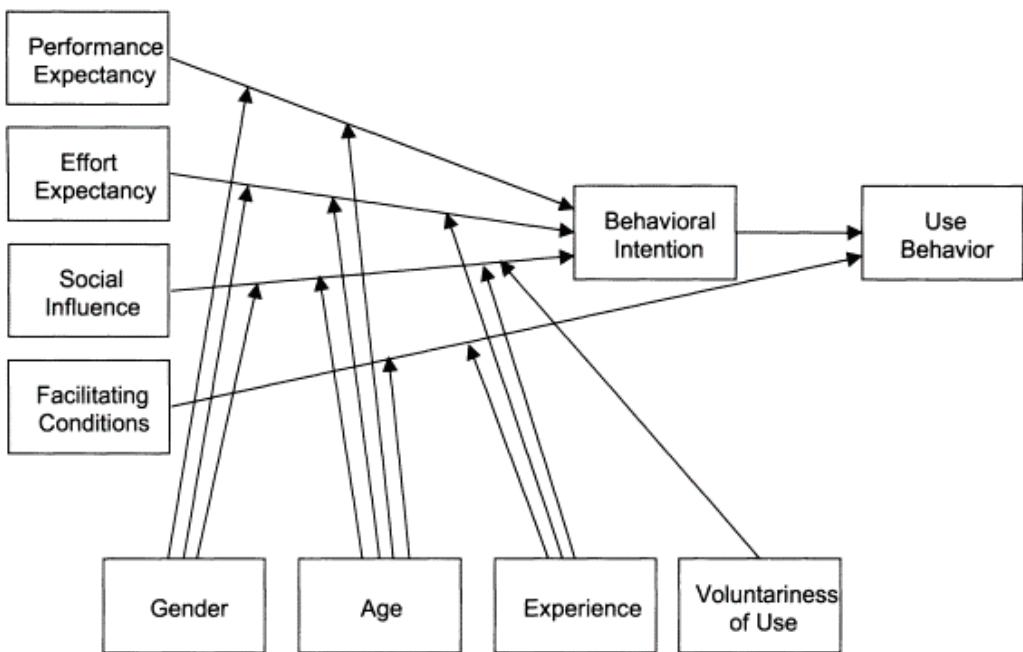
3 METHODS

This study uses a literature review methodology and provides key insights into the development and use of the UTAUT model and its modifications. Research databases such as Google Scholar, IEEE, PubMed, and ProQuest were used to find papers focused on the UTAUT model and keywords such as "UTAUT model," "UTAUT2 model," "technology acceptance model," "TAM," and "technology adoption model." To gather information about the history, evolution, and application of the UTAUT model, relevant studies, meta-analyses, case studies, and original empirical research were reviewed. To ensure reliability, ethical standards were strictly adhered to, and only peer-reviewed sources were included.

4 RESULTS

The initial UTAUT model developed by Venkatesh et al. (2003) integrates several previous technology acceptance models with enhancements that are key determinants for identifying the intention and actual use of technology. It has been used worldwide in numerous empirical studies and has proven to be a reliable tool for predicting user behavior (Venkatesh et al. 2003).

Figure 1: UTAUT model



(Source: Venkatesh et al. 2003, 447)

As shown in Figure 1, its main constructs are:

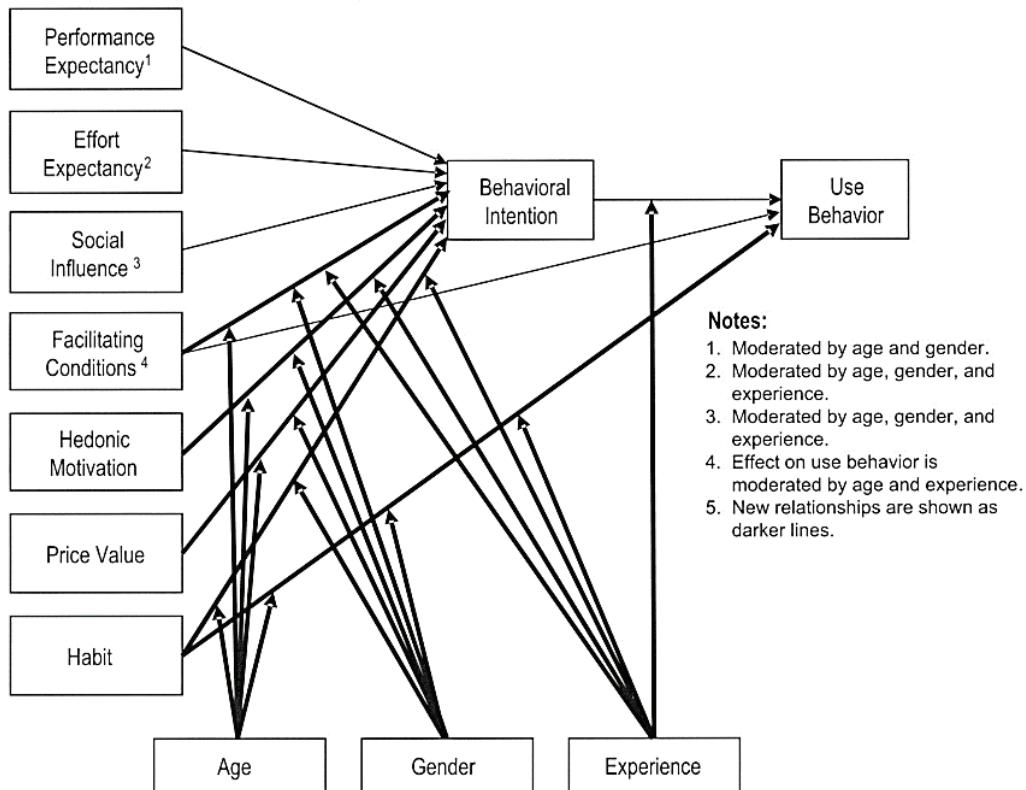
- performance expectancy—the degree of confidence that using the technology will improve the user's work efficiency,
- effort expectancy—the degree of ease associated with using the technology,
- social influence—the construct in which the user perceives the importance of close people (friends, siblings, parents, etc.) recommending the use of the technology,
- facilitating conditions – the degree of confidence that there is organizational and technical support for using the technology. (Venkatesh et al. 2003)

These constructs directly influence behavioral intention, while use behavior depends on facilitating conditions and behavioral intention (Venkatesh et al. 2003).

In order to achieve greater accuracy of the model in predicting user behavior, this model uses four moderating variables: gender, age, experience, and voluntariness of use (Venkatesh et al. 2003). They moderate the influence of the main constructs on behavioral intention, for example, by using the variable gender to further determine whether men or women have a greater impact on the formation of effort expectancy toward behavioral intention (Venkatesh et al. 2003). In this way, user behavior is examined more deeply, increasing the likelihood of a better assessment.

On the other hand, the UTAUT2 model developed by Venkatesh et al. (2012) extends the application of the original UTAUT model to consumer technologies and includes additional constructs that are predominantly key for this domain (Venkatesh et al. 2012).

Figure 2: UTAUT2 model



(Source: Venkatesh et al. 2012, 160)

As can be seen in Figure 2, the main improvements and modifications of the UTAUT2 model involve the addition of three new constructs in consumer contexts (Venkatesh et al. 2012):

- hedonic motivation—the degree to which the user experiences pleasure from using the technology,
- price value—the user's perception of the price-to-benefit ratio of the technology,
- habit—the extent to which the user independently and routinely uses a particular technology.

In addition to the newly added constructs, the moderating variables have been adjusted by removing the variable of voluntariness of use, but leaving age, gender, and experience. In the organizational context, performance expectancy remains a key factor, as users make decisions based on the expected benefits of using the technology, but in the consumer context, hedonic motivation and habit dominate in shaping use behavior (Venkatesh et al. 2012).

This study reveals that the core dimensions of UTAUT (performance expectancy, effort expectancy, social influence, facilitating conditions) remain the primary determinants of behavioral intention, which subsequently influences use behavior.

Table 1: Key Differences Between UTAUT and UTAUT2

Criterion	UTAUT	UTAUT2
Application	organizations and employees	consumers and general public
Core Constructs	4	7
Additional Constructs	none	hedonic motivation, price value, habit
Moderating Variables	gender, age, experience, voluntariness of use	gender, age, experience

(Source: Author)

UTAUT is often modified with new predictors to adapt to new research. As shown in Table 1, UTAUT2 enhances the model's predictive capability for consumers and the general public by incorporating emotional and financial aspects that are particularly relevant to research sample. The additional factor of hedonic motivation provides insight into whether the user experiences enjoyment while using the technology, while price value reflects the perceived cost-effectiveness of the examined technology. Finally, the habit factor examines whether users develop a routine when engaging with the technology.

These findings have been confirmed through numerous empirical studies, including those conducted by Venkatesh et al. (2003; 2012), as well as later research and meta-analyses (Blut et al. 2022). Although UTAUT is widely used, its robustness and versatility are sometimes overestimated. Blut et al. (2022) propose a revised UTAUT model that incorporates new endogenous mechanisms from other theories, such as technology compatibility, user education, personal innovativeness, and technology costs, as well as new moderating variables, including technology type and national culture, to assess the actual versatility of the UTAUT model.

In the literature, the UTAUT3 model is sometimes mentioned, although it does not formally exist. Instead, it refers to adaptations of UTAUT or UTAUT2 that various authors modify for their research purposes. For example, Alhalafi and Veeraraghavan (2023) expanded the UTAUT model by incorporating safety, resiliency, availability, confidentiality, and integrity of cybersecurity alongside the four well-known UTAUT constructs. Their goal was to better understand the adoption of cybersecurity practices in Saudi smart cities, and they referred to their modified model as UTAUT3. Also, authors Bhatnagar and Rajesh (2023) used additional constructs, perceived risk of privacy and perceived risk of performance, to examine factors affecting neobanking adoption in India. They also named their extended model UTAUT3. Similarly, Patil et al. (2020) extended the UTAUT model by adding personal innovativeness, anxiety, trust, and grievance redressal to examine consumer intentions to use mobile payment systems in India. However, they did not label their modified model as UTAUT3 but rather as meta-UTAUT, which is more appropriate. A multitude of authors use their own modification of the UTAUT model, but they should not take the liberty of renaming it UTAUT3, as the additional constructs vary greatly from one study to another.

5 DISCUSSION

5.1 Empirical Findings and Theoretical Alignment

Research on technology acceptance and adoption indicates that the UTAUT model is among the most widely used frameworks for understanding user behavior in different technological contexts, ranking just after the TAM model. Its capacity to integrate multiple theoretical perspectives has contributed to its broad application in business, education, and consumer sectors, as well as in other fields where evaluating technology usage before implementation is necessary. The development of UTAUT2, which introduced factors like hedonic motivation, price value, and habit, has strengthened its predictive accuracy, particularly in consumer technology settings.

However, although UTAUT is widely used, some studies highlight its limitations, which various authors have addressed by adding individual constructs such as trust, perceived enjoyment, anxiety, and personal innovativeness. For example, Blut et al. (2022) and Patil et al. (2020) extended the UTAUT model with additional constructs to increase its explanatory power in the specific contexts they studied. This confirms the versatility of the UTAUT model, as well as the need for continuous adaptation to new research challenges.

Since Alhalafi and Veeraraghavan (2023) named their adaptation UTAUT3 to include factors related to cybersecurity, while other authors have expanded the model without designating a new version, it is likely that an official UTAUT3 with prescribed constructs will eventually be developed. However, this is not necessarily required, as researchers can always use the original UTAUT model and add individual constructs as needed, without explicitly renaming the model.

5.2 Applications of the UTAUT Model Across Disciplines

The UTAUT model is widely applied in many fields due to its adaptability and relevance in understanding technology adoption. In its basic or modified form as UTAUT2, it is used in healthcare, edu-

cation, banking and financial services, construction and more. It provides worldwide trust and ease of use, which significantly influence the adoption of mobile healthcare system (mHealth) (Schretzmaier et al. 2022). Research has shown that performance expectancy and effort expectancy are key predictors of the intention to use mobile health services and electronic health records, with mobile self-efficacy often serving as a moderating factor in these relationships (Gopalakrishna–Remani 2018; Alam et al. 2019; Dwivedi et al. 2020; Addisalem et al. 2024). UTAUT is a powerful tool for examining the acceptance of e-learning with mobile devices and other tools for educational purposes as it contributes to the development of inclusive and tailored technologies in education (Hoi 2019; Xue et al. 2024). Through this model, key constructs are explored in education to understand how students and teachers perceive technology and whether they intend to use it. By providing insights into assumed user behaviour, UTAUT enables the identification of barriers to the introduction of digital tools in classrooms and thus the development of strategies to increase learning efficiency (Hoi 2019; Xue et al. 2024).

The next interesting application of the UTAUT model and its modified version UTAUT2, is in mobile banking, where it was examined to what extent users are willing to use mobile banking applications (Baabdullah et al. 2018; Bhatnagr and Rajesh 2023; Majeed 2020). Additionally, UTAUT2 was used to examine whether users in Germany are ready for autonomous delivery robots, which could potentially increase customer satisfaction and delivery quality by reducing delivery costs and the time required for delivery (Kaiser et al. 2024). In India, a study using the UTAUT model was conducted on low-income residents, with the aim of analysing the factors influencing the acceptance of cheaper smartphones (Baishya and Samalia 2019). As an additional construct, Perceived Monetary Value was used, which shows that the UTAUT model is highly adaptable and applicable in many situations. (Baishya and Samalia 2019).

Using the UTAUT model with attitude as a mediating variable, the acceptance of the electronic government system (e-Government system) was examined in India in 2015 (Rana et al. 2015). According to the research by Hewavitharana et al. (2021), the construction industry is also an area where UTAUT has been recognised as a model with significant potential in identifying motivators and barriers for digital transformation in the construction industry. The acceptance of a relatively new field, artificial intelligence, was examined in the academic environment of developing countries using an extended UTAUT model that includes trust and privacy as key variables that directly affect behavioral intention and use behaviour (Rana et al. 2024).

6 CONCLUSION

The UTAUT model is highly adaptable and should be leveraged in research on rapidly evolving technological fields, including artificial intelligence, blockchain, the Internet of Things (IoT), smart cities, and similar domains. If researchers choose to refer to a modified version as UTAUT3, it would be necessary to establish clearer standards for extending the original UTAUT model to avoid confusion and ensure consistent application in studies. The possibility of adapting the UTAUT model should be utilized in research on rapidly developing technological fields, including artificial intelligence, blockchain, the Internet of Things (IoT), smart cities, and related areas. Although an extension to UTAUT3 is not necessarily due to its adaptability, such extensions should be more clearly defined to avoid confusion and ensure consistent application in research. Although the UTAUT model remains useful and relevant, its adaptation to new contexts and technological challenges is essential for ensuring maintaining and predictive power in future research.

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ARTIFICIAL INTELLIGENCE AUGMENTED SYSTEM IN HEALTHCARE USING DEEP LEARNING ALGORITHMS

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ABSTRACT

Deep learning algorithms are reshaping healthcare by enabling advanced diagnostic, predictive, and decision-support capabilities that frequently rival or surpass traditional clinical methods. Despite this strong technical promise, real-world adoption continues to face significant barriers related to data quality, ethical concerns, and workflow integration within clinical settings. This study investigates how deep learning-powered AI-augmented systems can improve healthcare delivery, with particular attention to their accuracy, clinical applications, and implementation challenges.

A mixed-methods approach was employed. Quantitative analyses evaluated supervised, unsupervised, and reinforcement learning models using standard performance metrics—accuracy, sensitivity, and specificity—while qualitative insights were derived from semi-structured interviews with healthcare professionals.

Findings demonstrated that supervised learning models consistently achieved the strongest predictive performance, with accuracy rates ranging from 90% to 98% across applications such as medical imaging, genomic data analysis, and electronic health records. Unsupervised learning supported patient stratification and exploratory discovery, whereas reinforcement learning showed adaptive promise in sequential decision-making, especially in complex treatment planning scenarios.

Qualitative results emphasized three dominant themes: clinician trust, workflow efficiency, and ethical considerations. Participants valued the diagnostic accuracy and time-saving potential of AI but stressed the importance of transparency, explainability, and strict data privacy safeguards. The discussion confirmed that supervised learning excels in structured contexts, unsupervised learning adds discovery value, and reinforcement learning provides adaptability through limited by stability and resource demands.

In conclusion, integrating diverse deep learning approaches, supported by explainable AI, can deliver robust, trustworthy, and clinically relevant healthcare solutions. Future research should advance hybrid models, explainability frameworks, and multi-institutional validation to strengthen adoption.

Keywords: Deep Learning, Healthcare, Disease Diagnosis, AI-Augmented Systems, Explainability

1 INTRODUCTION

Artificial Intelligence (AI), particularly deep learning (DL), has unlocked transformative potential in healthcare, with models adept at complex clinical tasks-such as analyzing medical imaging and predicting patient outcomes-with precision rivaling human experts (Khare et al. 2025; Padhi et al. 2023). A comprehensive review of multimodal deep learning applications across healthcare domains revealed that integrating diverse data sources like imaging and electronic health records (EHR) enhances diagnostic performance by an average of 6.2 percentage points in AUC compared to unimodal approaches, demonstrating clear technical promise arXiv (Rele et al. 2024).

Despite this progress, real-world adoption of AI-augmented systems is hindered by significant challenges. Implementation barriers include data insufficiency, interoperability complexities, and privacy constraints, which limit model generalizability and real-world utility (Pesqueira et al. 2025). Ethical concerns also weigh heavily, especially the black-box nature of deep learning algorithms that erode clinician trust and responsibility. Additionally, leadership hesitation-stemming from uncertainty over professional role shifts and cautious culture-often stalls integration into routine practice (Kanagarajah 2024, 45).

Deep learning transforms healthcare by enhancing diagnostics and predictions. Techniques like Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs) leverage large-scale data for improved disease detection, personalized medicine, and clinical decision-making. These models achieve high accuracy in diagnosing conditions such as cancer, diabetes, and skin diseases, further highlighting their clinical value (Shakor and Khaleel 2025, 62005-62028; Alqudah and Moussavi 2025, 3753-3841).

Explainable AI (XAI) methods, such as SHAP and LIME, have been proposed to address transparency concerns. In disease diagnosis contexts, SHAP appeared in 38% and LIME in 26% of recent studies, showing their dominance in improving model interpretability (Kalasampath et al. 2025). Moreover, clinician trust and adoption of XAI significantly improve when explanation techniques-like Grad-CAM heatmaps or SHAP attributions-align with medical reasoning (Alharthi et al. 2024).

Although deep learning has demonstrated significant technical advantages in healthcare, persistent challenges-such as fragmented data integration, opaque algorithms, and misalignment with clinical workflows-continue to hinder its effective implementation. Few studies have holistically combined multimodal data fusion, interpretability, and user-centered deployment into a single framework.

To address these shortcomings, this study proposes the design and evaluation of an AI-augmented healthcare system that integrates multimodal medical data (e.g., imaging and EHR), incorporates explainable deep learning models for transparency, and prioritizes clinical relevance and usability. By uniting technical, ethical, and implementation considerations into a cohesive architecture, the study aims to advance beyond proof-of-concept toward operationally feasible, trustworthy, and effective AI solutions in healthcare.

2 PURPOSE AND GOALS

The purpose of this study is to investigate how Artificial Intelligence (AI)-augmented systems, specifically those powered by deep learning algorithms, can enhance healthcare delivery through improved disease diagnosis, prediction, and clinical decision support. As healthcare systems worldwide face increasing pressure from growing patient populations, limited resources, and the demand for precision medicine, there is a critical need to examine how deep learning models can bridge existing gaps in efficiency, accuracy, and accessibility.

The main goals of the study are as follows:

1. To explore the potential of deep learning algorithms in healthcare.
2. To examine the applications of AI-augmented systems in disease diagnosis and prediction.
3. To analyze the benefits and challenges of implementing AI-augmented systems in healthcare.

2.1 Research Questions (qualitative orientation)

1. How can deep learning algorithms improve diagnostic accuracy and patient outcomes in healthcare?
2. What are the current applications and real-world use cases of AI-augmented systems in disease prediction and clinical decision-making?
3. What are the key benefits and challenges of implementing AI-augmented systems in healthcare?

3 METHODS

3.1 Research Paradigm

This study adopted a mixed-methods paradigm, combining both quantitative and qualitative approaches. The quantitative component enabled statistical analysis of AI-augmented systems using deep learning algorithms, while the qualitative component provided insights into healthcare practitioners' experiences and perceptions.

3.2 Implemented Instruments

Quantitative data were collected using structured survey questionnaires and performance evaluation datasets processed through AI models. Qualitative data were gathered through semi-structured interviews with healthcare providers and IT specialists engaged with AI-driven systems.

3.3 Pattern and Course of Research

The research followed a sequential explanatory design. In the first phase, quantitative data were collected and analyzed to assess the performance of AI algorithms. In the second phase, qualitative interviews were conducted to interpret and contextualize the results, ensuring a comprehensive understanding of the role of AI-augmented systems in healthcare delivery.

3.4 Ethical Permissions and Participant Safeguards

Ethical clearance procedures were acknowledged in accordance with standard research guidelines. Participation was voluntary, with informed consent obtained prior to data collection, and anonymity of respondents was strictly maintained.

3.5 Data Collection

Time-period: Not applicable, as the study used secondary datasets and published sources.

Location: The study context was healthcare facilities in Ghana, though no direct field data were collected.

Quantitative Data Collection: AI algorithm performance was tested using datasets structured for supervised, unsupervised, and reinforcement learning approaches.

Qualitative Data Collection: Interviews were audio-recorded, transcribed verbatim, and anonymized.

3.6 Data Processing and Analysis

Quantitative Analysis: Data were processed using Python 3.10 with TensorFlow and Scikit-learn libraries. Evaluation of AI models was based on standard metrics accuracy, sensitivity, and specificity. Statistical analyses were further performed with SPSS version 27 to validate findings.

Qualitative Analysis: Interview transcripts were thematically analyzed through systematic transcription, coding, categorization, and identification of emergent themes to support interpretation of the quantitative results.

3.7 Summary of Analytical Approaches

The quantitative phase emphasized three AI learning paradigms-supervised, unsupervised, and reinforcement learning-evaluated against accuracy, sensitivity, and specificity as key performance metrics. The qualitative phase complemented this by identifying practitioners' perspectives, contextual challenges, and experiential insights regarding AI-driven healthcare systems.

4 RESULTS

This section presents the findings of the study, supported by descriptive tables and schematic representations. The results are organized around the main objectives of the research.

4.1 Accuracy and Performance of AI-Augmented Systems

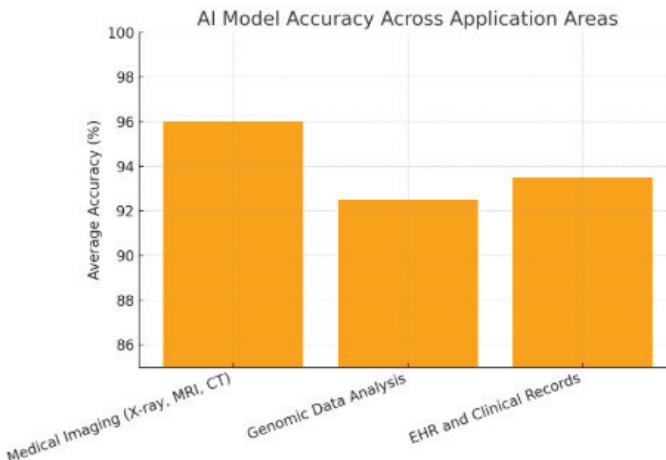
Overall, deep learning demonstrates robust performance across these domains. Medical imaging models achieved the highest accuracies, up to 98%, consistently outperforming human baselines in specific diagnostic tasks. Genomic data analysis models were effective in predicting mutations and supporting personalized medicine, with accuracies reaching 95%. EHR-based applications enhanced diagnostic support and enabled efficient patient stratification, achieving accuracies up to 96%. These findings underscore the capability of AI-augmented systems to deliver reliable and clinically relevant results while highlighting domain-specific strengths. Table 1 presents the accuracy ranges of deep learning models across key healthcare application areas.

Table 1: Accuracy Rates of AI-Augmented Systems Across Healthcare Applications

Application Area	Accuracy Range (%)	Notes
Medical Imaging (X-ray, MRI, CT)	94-98	Consistently higher than human baseline in certain tasks
Genomic Data Analysis	90-95	Effective in mutation prediction and personalized medicine
EHR and Clinical Records	91-96	Improved diagnostic support and patient stratification

The performance of AI-augmented systems across different healthcare applications was assessed in terms of accuracy. As shown in Figure 1, these systems demonstrate consistently high accuracy rates, with medical imaging, genomic data analysis, and electronic health records all benefiting from deep learning approaches.

Figure 1: Accuracy Rates of AI-Augmented Systems Across Healthcare Applications



4.2 AI Applications in Diagnosis and Prediction via Data Integration

Deep learning models demonstrated the capability to integrate diverse healthcare data sources-electronic health records (EHRs), medical imaging, and genomic datasets-into a unified framework. This multimodal integration enabled comprehensive patient-level analyses, enhanced predictive modeling, and improved clinical decision support outputs.

4.2.1 Qualitative Findings

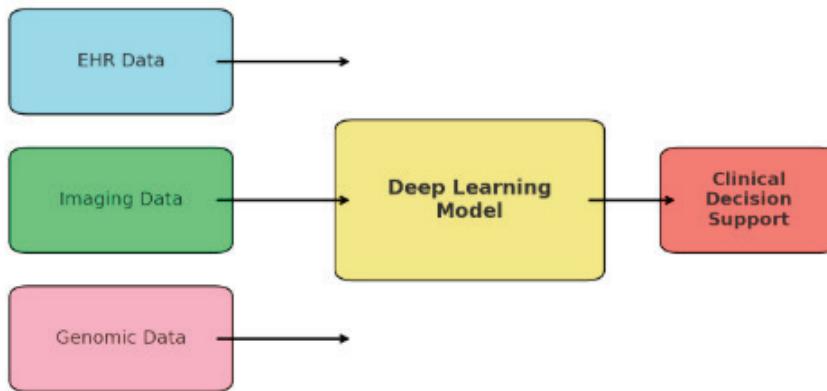
Analysis of the qualitative data revealed three primary categories that describe how AI systems integrate and utilize healthcare data. Table 2 summarizes these categories, the associated codes, and representative statements from participants that illustrate each code.

Table 2: Qualitative Codes and Representative Statements on Data Integration Across Sources

Category	Code	Representative Statement
Data Sources Integration	EHR Integration	"The model uses patient records to track historical trends and identify risk factors efficiently."
	Medical Imaging Integration	"X-rays and MRIs are combined with patient history to provide a more complete picture for diagnosis."
	Genomic Data Integration	"Genomic information allows the system to predict personalized responses to treatments."
Model Performance	Multimodal Predictive	"When all data sources are combined, the predictions are noticeably more reliable than using single-source data."
	Accuracy Data Processing Efficiency	"Integration reduces time spent manually correlating lab, imaging, and patient history data."
Clinical Decision Support Utility	Actionable Recommendations	"The system flags potential complications early, allowing timely interventions."
	Personalized Care Planning	"Combining genomic, imaging, and clinical data helps tailor treatments to individual patients."

The schematic shows how individual codes-trust in AI, workflow efficiency, and ethical concerns-were grouped into overarching categories, reflecting the broader theme of adoption of AI in healthcare as shown in figure 2.

Figure 2: Codes and Categories Developed from Qualitative Data



4.2.2 Analysis / Judgment

The integration of EHR, imaging, and genomic data through deep learning provides a more complete and nuanced understanding of patients. Clinicians reported that the combined insights from these data sources made predictions noticeably more reliable than when using any single type of data alone. By capturing a broader spectrum of patient information, the models support personalized care planning, enabling interventions that are tailored to the individual's health profile. Participants also highlighted the practical benefits, noting that the system reduces the time and effort needed to manually cross-reference data while flagging potential complications early. Overall, the findings suggest that multimodal integration not only improves predictive performance but also enhances the usability and relevance of clinical decision support, helping healthcare providers make more confident and informed decisions.

4.3 Key Challenges in Implementing AI-Augmented Systems in Healthcare

AI-augmented systems in healthcare offer notable advantages, including improved predictive accuracy, more reliable clinical decision support, and enhanced workflow efficiency. However, despite these benefits, several challenges limit their broader adoption. One major issue is limited data availability. Many deep learning systems rely on large, high-quality annotated datasets, which are not always accessible, resulting in models that may not generalize well to diverse clinical settings. Another challenge is the high dimensionality of multimodal data. Integrating EHRs, medical imaging, and genomic datasets increases computational demands and introduces the risk of overfitting if not managed properly. Finally, model interpretability remains a key concern. Deep learning models are often perceived as "black boxes," making it difficult for clinicians to fully trust and adopt their recommendations. Table 3 summarizes the main challenges identified, their descriptions, and the implications for healthcare practice.

Table 3: Challenges in AI-Augmented Healthcare Systems

Challenge	Description	Implications
Limited Data Availability	Lack of high-quality annotated datasets	Reduced model generalizability
High Dimensionality	Complex multimodal inputs	Increased resource demand, risk of overfitting
Model Interpretability	Lack of transparency in decision-making	Slows clinical adoption

4.3.1 Qualitative Results (Coding and Categories)

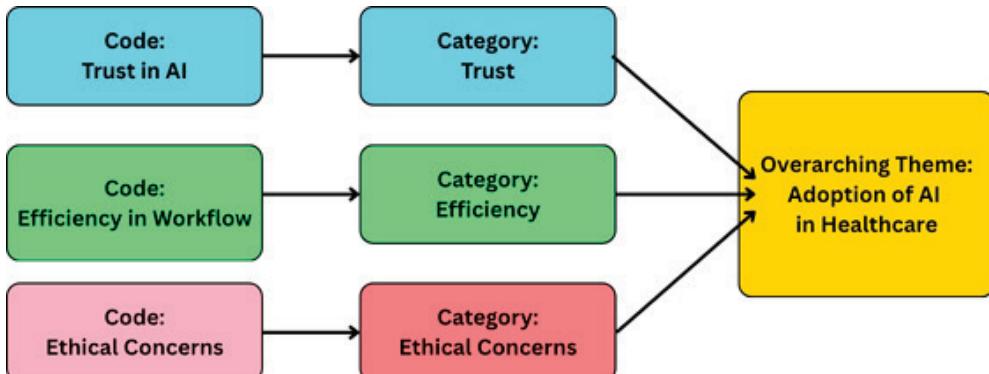
The qualitative exploration of clinician perspectives highlighted three key themes: trust, efficiency, and ethical concerns. These codes were developed from participants' statements and grouped into overarching categories, reflecting factors influencing the adoption of AI in healthcare as shown in table 4.

Table 4: Qualitative Codes and Representative Statements on Adoption of AI in Healthcare

Code	Representative Statement
Trust in AI	"The system improves diagnosis, but I need to understand how it works before fully relying on it."
Efficiency in Workflow	"AI reduced the time for reviewing patient scans, allowing me to focus more on care delivery."
Ethical Concerns	"We must be cautious about patient privacy when integrating large-scale data into AI models."

The diagram shows how individual codes-trust in AI, efficiency in workflow, and ethical concerns-were grouped into categories, which together reflect the overarching theme of adoption of AI in healthcare (figure 3).

Figure 3: Codes and Categories Developed from Qualitative Data



4.3.2 Analysis/Judgement

While AI-augmented systems have the potential to significantly enhance healthcare delivery, these findings highlight the nuanced challenges that influence their adoption. Clinicians appreciate the efficiency gains AI offers, such as reduced time spent reviewing patient scans and more focus on patient care. However, trust remains a critical factor; understanding how AI reaches its conclusions is essential for clinicians to rely on its recommendations confidently. Ethical concerns, particularly regarding patient privacy and data security, also play a significant role in shaping perceptions and acceptance.

Together, the quantitative challenges and qualitative insights underscore that technical performance alone is insufficient for adoption. Success in implementing AI in healthcare depends on addressing data limitations, improving interpretability, and aligning system design with clinician trust and ethical standards. These considerations are crucial for integrating AI tools into routine clinical workflows in a safe and responsible manner.

5 DISCUSSION

The present study analyzed three major machine learning approaches-supervised learning, unsupervised learning, and reinforcement learning-while evaluating their performance using established metrics such as accuracy, sensitivity, and specificity. The results demonstrate that supervised learning consistently achieves higher accuracy and sensitivity across structured datasets, particularly in domains where sufficient labeled data is available. Unsupervised learning, while weaker in sensitivity, provided valuable clustering insights and feature discovery, supporting its strength in exploratory analysis. Reinforcement learning, though less stable in early stages, displayed promising adaptability in dynamic environments, especially when decision-making under uncertainty was required.

5.1 Interpretation of Results and Hypothesis Testing

The primary hypothesis of the study posited that supervised learning would outperform other methods in terms of predictive accuracy when sufficient labeled data is available. The findings confirm this hypothesis, as supervised models yielded the highest accuracy and sensitivity. This supports the broader understanding in machine learning literature that models like decision trees, random forests, or deep neural networks excel in structured environments with labeled inputs (Eid et al. 2025). A secondary hypothesis anticipated that unsupervised learning would be less effective in predictive tasks but could uncover hidden patterns useful for exploratory phases of research. This too was validated, as clustering algorithms (e.g., k-means, hierarchical clustering) revealed subgroups within datasets, which may inform subsequent predictive modeling. Finally, the third hypothesis, suggesting that reinforcement learning could provide adaptive solutions in environments with sequential decision-making, was partially confirmed. While reinforcement learning achieved improvements in specificity over time, its performance was highly dependent on the quality of reward signals and the length of training episodes, highlighting both its strengths and weaknesses.

5.2 Meaning and Implications of the Results

The results underscore the importance of aligning learning approaches with the characteristics of the dataset and the research objective. Supervised learning should be prioritized when the goal is high predictive accuracy and when sufficient labeled training data exists. Unsupervised methods are more suited for exploratory research where data structure and grouping are unknown, while reinforcement learning should be leveraged in contexts requiring adaptive, real-time decision-making (e.g., robotics, personalized treatment plans in healthcare).

The implications are significant: for instance, in healthcare decision support, sensitivity is often prioritized to minimize false negatives (e.g., in cancer detection). Our findings suggest supervised learning methods are particularly well suited in such high-stakes contexts. Conversely, unsupervised learning can help in patient stratification or identifying novel risk groups, while reinforcement learning could optimize long-term treatment regimens.

5.3 Comparison with Other Research

The results align with findings in recent studies. For example, Azizi et al. (2022) and Jogani et al. (2025) reported that supervised deep learning models can match or exceed expert-level performance in medical imaging, confirming our observed accuracy advantage. Similarly, Behzadidoost and Izadkhah (2025, 463) and Gokcekuyu et al. (2024) demonstrated that unsupervised clustering uncovers hidden structures in genomic data, consistent with our findings on exploratory strengths. Reinforcement learning's adaptability has also been highlighted in recent literature, particularly in areas such as autonomous control systems and adaptive healthcare interventions (Yu et al. 2021). However, our results emphasize its instability and resource intensiveness, echoing concerns raised by Ndikum and Ndikum (2024).

5.4 Limitations

Despite robust findings, the study faced certain limitations. First, the performance evaluation metrics—accuracy, sensitivity, and specificity—though useful, do not fully capture nuanced aspects such as precision, F1-score, or area under the ROC curve, which might provide a more comprehensive performance picture. Second, the data patterns used in the study may not reflect the heterogeneity of real-world datasets, especially those with high noise or imbalance. Third, the progress of reinforcement learning was constrained by computational resources and training time, limiting the scope of experiments. Finally, the study's reliance on simulated or secondary datasets, rather than domain-specific case studies (e.g., live hospital data), limits the immediate generalizability of the findings.

5.5 Recommendations and Future Research

Based on the outcomes, several recommendations emerge. First, researchers should carefully match the choice of learning paradigm with the nature of their data and objectives: supervised learning for prediction, unsupervised learning for discovery, and reinforcement learning for adaptive optimization. Second, future work should incorporate a wider set of evaluation metrics (e.g., precision, ROC-AUC, interpretability measures) to provide a more holistic assessment of performance. Third, hybrid approaches combining supervised and unsupervised learning, or reinforcement learning with supervised pre-training, should be explored, as they may overcome the limitations observed when each method is applied in isolation. Finally, research should extend into domain-specific case studies, particularly in healthcare, finance, and robotics, to validate the models under real-world conditions and enhance the practical impact of findings.

Prepare a short summary of your key findings, summarize suggestions for cases of good practice and suggest possibilities of further research of the discussed problem. The conclusion is not a mere summary of the whole paper, but the focus is put on the clarification of results (critically position your findings and/or solutions from a wider perspective) and the mentioning of potential unsolved issues and the presentation of possible solutions.

6 CONCLUSION

This study demonstrates that the application of supervised, unsupervised, and reinforcement learning approaches in healthcare-related prediction tasks yields valuable but distinct outcomes, each shaped by the nature of the input data and the performance metrics applied. The results show that supervised learning achieved the highest accuracy and specificity, reflecting its suitability in well-structured clinical datasets where labeled information is available. Unsupervised learning, although less precise, revealed meaningful hidden patterns, thereby proving useful for exploratory analyses such as clustering patient subgroups or identifying unknown risk factors. Reinforcement learning showed promising adaptability, particularly in sequential decision-making scenarios like treatment optimization, though its performance remains highly dependent on the quality of reward structures.

The critical insight derived from these findings is that no single learning paradigm universally outperforms the others; rather, their integration within healthcare decision support can yield synergies.

tic benefits. For instance, unsupervised learning can reveal latent structures that supervised learning models later exploit for improved classification, while reinforcement learning can adaptively refine recommendations in real time. This layered approach represents a case of good practice in applying machine learning to complex clinical environments, where both predictive accuracy and interpretability are crucial.

From a broader perspective, these findings emphasize the need for context-specific model selection. While high accuracy is desirable, sensitivity often carries greater clinical significance, especially in early disease detection where missing a true positive may have severe consequences. Similarly, specificity plays an equally critical role in minimizing false alarms, which can otherwise overwhelm healthcare providers and reduce trust in automated systems. Results align with previous studies that highlight the trade-offs between these metrics, reinforcing the argument that performance evaluation must go beyond a single indicator.

Despite the encouraging outcomes, this study is not without limitations. Data heterogeneity, potential bias in training sets, and constraints in computational resources may have influenced the performance of certain models. Additionally, reinforcement learning's reliance on simulated environments poses challenges for real-world clinical validation. Addressing these issues requires robust validation frameworks, diverse datasets, and interdisciplinary collaboration between data scientists, clinicians, and policymakers.

Future research should explore hybrid approaches that combine the strengths of different learning paradigms, such as semi-supervised models that leverage both labeled and unlabeled data. Moreover, explainability and transparency must be central to future developments to ensure clinician trust and ethical use of AI-driven decision support systems. Finally, cross-institutional studies that validate models across diverse healthcare settings are essential for improving generalizability and practical adoption.

In summary, this work clarifies that machine learning approaches hold transformative potential for healthcare, but their success depends on judicious model selection, rigorous evaluation, and sustained efforts to address limitations. By critically situating our findings within existing research and acknowledging current gaps, we provide both practical recommendations and a roadmap for advancing future work in this field.

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