

SZÉCHENYI ISTVÁN UNIVERSITY
APÁCZAI CSERE JÁNOS FACULTY OF
HUMANITIES, EDUCATION AND
SOCIAL SCIENCES

PROCEEDINGS OF THE INTERNATIONAL
CONFERENCE ON TECHNOLOGICAL,
EDUCATIONAL, SOCIAL, AND INTERNATIONAL
CHALLENGES IN THE CHANGING WORLD 2025

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Foreword

The International Conference on Technological, Educational, Social, and International Challenges in the Changing World 2025 covered a broad array of topics related to technological, educational, social, and international challenges.

The rapidly evolving global landscape poses a set of complex challenges in areas such as technology, education, society, and international relations. Advances in fields like artificial intelligence, automation, and digitalization are reshaping not only industries but also everyday life, demanding continuous adaptation. To remain relevant, educational systems must evolve to equip individuals with critical thinking, digital literacy, and the necessary skills in line with the changing labor market and corporate expectations. Socially, increasing digital connectivity brings both opportunities for greater inclusion and risks of deepening inequality, alienation, and misinformation. Internationally, globalization has intensified interconnectedness, but has also increased miscommunication and reinforced geopolitical tensions and cyber security.

Addressing these interconnected challenges calls for an approach that combines innovation with strong ethical standards and inclusive strategies. Education must become more adaptive and accessible, integrating technology to personalize learning and foster globally-required competencies. At the same time, societies must focus on promoting equity, strengthening community cohesion, and promoting resilience against emerging risks. At the international level, collaboration and collective action will be key to solving pressing issues like climate change, economic disruptions, and digital security. Addressing these challenges also requires insights from regional science and management science, as they offer valuable perspectives on local development, resource allocation, and organisational strategies. By adopting a coordinated and inclusive strategy, societies can turn these global shifts into opportunities for a more equitable and sustainable future.

The proceedings contain eleven scientific studies addressing a diverse range of topics closely aligned with the central theme of the conference. The chapters offer valuable insights into the complex relationships between technology, education, society, and international relations, while also examining the pressing challenges that emerge at their intersections.

We trust that this collection of studies will serve as a meaningful resource for researchers, practitioners, and policy-makers alike, fostering reflection and inspiring continued exploration in these vital fields.

The Editors

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EDUCATIONAL INNOVATIONS AND PEDAGOGICAL STRATEGIES

COLLABORATION, PROFESSIONAL CAPITAL, AND CAREER CHOICE: EXPLORING HIGHER EDUCATION STUDENTS' RELATIONSHIP NETWORKS IN TEACHER TRAINING

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Abstract: The timeliness of this research lies in the fact that, in terms of the teaching community in our country, there are significant vacancies, and the number of elderly, near-retirement, and retired teachers who continue to be employed is also significant. All of this can be offset by the increase in the number of young people choosing teacher training. Although some movement can be observed in this area, the popularity of the teaching career among young people choosing the career is still low. The functioning of the profession has been further complicated by the fluctuation experienced in recent years. However, the teaching career increasingly requires complex knowledge and skills from employees. Preparing for this is primarily the task of higher education. Taking labour market needs into account is inevitable, which emphasizes the strengthening of teachers' collaborative culture, which is also highlighted by the teacher qualification system. Based on Hargreaves and Fullan's (2012) theory of professional capital, emphasis should be placed on the relevance of professional capital in teacher education. The examination of teachers' life paths in the dimensions of human and social capital accumulation (Hornyák & Pusztai, 2022) shows that higher education extracurricular commitments, an open, diverse (inter-institutional and cross-border) professional network, and a rich role interpretation enhanced by professional self-realization have a motivating force in terms of teachers' performance, strengthening their retention in the profession. The results obtained during the study of teachers' motivational disposition (Hornyák, 2023) show that the background of unfavorable teacher motivation is the lack of external motivational factors related to work, which were already identified in their earlier years of life in terms of the narrow professional network of contacts and the lack of professional self-realization. My research conducted with students participating in higher education and teacher training, using focus group interviews conducted in the spring of 2024, showed that the relationship capital present in secondary school and higher education (teacher training), the series of future plans and individual life events, and parental background patterns are of particular importance for choosing a teaching career. The gap-filling significance of this work is given by the fact that no surveys have been conducted in our country to learn about the professional relationship capital of students present in higher education. A pilot questionnaire was prepared to investigate this, the dimensions, indicators, and questions and variables that form the basis of the analyses will be presented at the conference.

Keywords: professional capital, collaboration, teacher training, pilot questionnaire

INTRODUCTION

Regarding the teaching society of our country, there are significant vacancies, and the number of elderly, near-retirement, and retired teachers is also significant. All of this can be offset by the increase in the number of young people choosing teacher training. Signs of the shift are already noticeable, but the popularity of the teaching profession among young people choosing the career is still important. The fluctuation experienced in recent years has further complicated the professional operation of the profession. The strengthening labour market trends of recent years have not left the teaching profession untouched. In addition to professional knowledge, the

acquisition of skills and abilities has come to the fore, which, beyond academic knowledge, enable the employee to cooperate within and outside the school, even across national borders (Mrázik, 2021). The teaching career requires increasingly complex knowledge and skills from the employee. Furthermore, developing and utilizing collaborative skills is associated with teacher retention. Collaboration can help teachers become committed to their school and their teaching career, which strengthens their retention (Kraft et al., 2016; Vangrieken et al., 2015).

THEORETICAL BACKGROUND

Research on the willingness of international teachers to collaborate has also focused on whether collaboration improves teachers' job satisfaction and teaching practice. Vangrieken and his colleagues (2015) found that teachers who are willing to work collaboratively are able to anticipate the effectiveness of their work. Because they strive not to work in isolation, they are much more effective than their isolated peers. PISA results show that Shanghai, Hong Kong, Singapore, Taiwan and South Korea represent high-quality education (Jensen, 2012; OECD, 2013). Communities of practice have been increasingly practiced in the West since the 1990s, but the highly centralized Asian education policy based on traditional knowledge transfer views the new phenomenon critically, as the world of Professional Learning Communities (PLCs) in a globalizing world needs to be examined in depth in a different cultural context (Pang & Wang, 2016). PLCs, already known in European and U.S. education, are also present in six education systems in the Asia Pacific region. The aim is that collaboration with colleagues, which is a manifestation of a strong professional community, has an impact on students' responsibility for learning, which leads to an increase in academic achievement. Professional networks offer teachers venues in which they can apply their own practical knowledge to solve their common problems. The number of empirical studies on learning communities is still very small, but a noticeable shift can be observed in the education systems of the Asia Pacific region (China, Hong Kong, Taiwan, South Korea, and Singapore). Since these education systems have different historical, political, cultural, demographic backgrounds, and face different challenges in their everyday teaching practices, the same educational practice cannot be applied to professional communities all over the world. China has been increasing the professional competence of teachers through collaboration in the school environment since the 1950s (Paine & Fang, 2006). In order to support teachers' professional learning, an organizational structure has been created in which scheduled discussions play a decisive role. Even before the introduction of the concept of PLC, all teachers participated in school professional learning communities. School leaders have an important role to play in the interests of continuous improvement, in creating a culture of shared vision and trust, in supporting and monitoring collegial learning. Research on PLC practices has been conducted in both rich and less developed regions of China (Zhang & Pang, 2016). Wang (2015) conducted research in Hong Kong schools and found that PLC practices have some unique characteristics that can be explained by organizational, social, and cultural factors. In the Taiwanese context, Chen and Wang (2015) pointed out that the following factors

are essential for the development and maintenance of PLCs: mutual trust among teachers, strong leadership, organizational structure, and continuous monitoring. In the past decade, school-based professional learning communities have emerged as a key element of the South Korean education system (Park & Kim, 2014). In the case of PLCs, educators have shown three defining features: vision, practice, and shared teaching. Communities of practice have become officially accepted in Singaporean education. PLCs play an increasingly important role in driving school curriculum development and innovation, providing diverse learning experiences.

Collaboration is also associated with teacher retention. Collaboration can help teachers become committed to their schools and their teaching careers (Kraft et al., 2016; Johnson et al., 2012). When teachers leave their schools, they lose professional knowledge and collegial relationships, which can take a long time for teachers to replace. In-depth interviews with teachers during the first four years of their careers found that attrition rates were high among beginning teachers. Beginning teachers performed better in schools where they received more support from their colleagues (Smith et al., 2004). It is therefore clear that collaboration between teachers plays a significant role in reducing early attrition.

Based on Hargreaves and Fullan's (2012) theory of professional capital – which includes professional professional capital, collaborative/cooperative capital and decisional capital – emphasis should be placed on the relevance of professional capital in teacher education. Our previous research examining the life course of teachers in the dimension of social capital accumulation (Hornyák & Pusztai, 2022) drew attention to the fact that extracurricular commitments in higher education, an open, diverse (intra-institutional and extra-institutional, cross-border) professional network and a rich role interpretation enhanced by professional self-realization have a motivating force in terms of teachers' performance, thus strengthening their retention in the profession. The significance of this research is also confirmed by the study of teachers' motivational disposition (Hornyák, 2023), which revealed that the background of unfavorable teacher motivation is the lack of external motivational factors related to work, which were already identified in earlier years of life in terms of a narrow professional network of contacts and lack of professional self-realization. In the context of all this, a key task of higher education is to produce beginning teacher students who, with their strong professional initiative, are able to work in close cooperation with colleagues (Czető, 2020; Lénárd et al., 2020), thereby increasing student success and ensuring their retention in the teaching profession. In order for higher education to respond effectively to the development of collaborative skills, it is necessary to map out patterns belonging to the defining stages of the life course that can develop or strengthen collaborative skills among teacher education students.

METHODOLOGY

The gap-filling significance of this work is that no surveys have been conducted in our country so far among teaching students in higher education to learn about their professional relationships. A questionnaire was developed to measure this. The basis for this was the focus group interview

conducted with teaching students at the University of Nyíregyháza in the spring of 2024. This method provided an opportunity for the students to freely express their thoughts along guided questions. Using the Atlas ti.7 text analysis software, the system of codes and subcodes belonging to the code families outlined the thematic structure of the pilot questionnaire.

RESULTS

Thanks to the interview research, the features of four main dimensions emerged in the formation of the students' professional network: the influence of the parental home, the initiative characteristic of the years spent in high school and higher education, and the ideas related to future employment. The analysis of the focus group interview material converted into a text document with the Atlas ti.7 text analysis software identified the following indicators within each dimension. In the context of the influence of the parental home, the organization of the codes into groups identified the following indicators of the examined issue: place of living, need for expanding contacts, the supporting effect of the network of contacts established by the parental home at each school level, and the significance of the network of contacts established by the parental home in connection with future employment. In relation to the initiative characteristic of the years spent in high school, the following additional indicators were identified: the degree of initiative, the forms of cooperation with school libraries, the efficiency of cooperation, and the durability of the network of contacts. The third dimension explores the initiative characteristic of university years along the following indicators: the degree of initiative, the fertilizing effect of the secondary school network, the importance of expanding professional networks, ways to expand network capital, cooperation with students from domestic and foreign universities, difficulties in establishing professional networks, opportunities for expanding knowledge and the formulation of future plans. The fourth dimension identifies indicators related to ideas about future employment: taking up a teaching career after completing the training, the importance of establishing cooperation between teachers, the role of expanding the professional network and continuing further studies. After these dimensions and indicators were identified, the questionnaire was prepared (Appendix). Table 1 summarizes the dimensions and indicators that make up the body of the questionnaire, and the third column shows the number of questions in the questionnaire explaining them.

Table 1 Dimensions, indicators of the research and the questions and variables that form the basis of the results

<i>Dimension</i>	<i>Indicators</i>	<i>Question/Variables/Values</i>
1. The influence of the parental home	place of living	3
	need for connection expansion	24
	supporting effect of the network at each school level	25
	importance of the relationship system developed by the parental home in connection with future employment	26
2. Initiative typical of the years spent in high school	<i>degree of initiative</i>	4a, b
	<i>forms of cooperation with peers</i>	5
	<i>efficiency of cooperation</i>	6
	<i>durability of the relationship system</i>	8
3. The initiative characteristic of university years	degree of initiative	9
	fertilizing effect of the high school network	10
	importance of expanding professional connections	11
	ways to build relationship capital	12
	cooperation with students from Hungarian universities	13, 14
	cooperation with students from foreign universities	15, 16
	difficulties in establishing professional relationships	17
	ways to expand knowledge	18a, b, c, d, e
	future plans	19, 20, 21
4. Future employment plans	<i>commitment to the teaching profession</i>	27
	<i>importance of developing cooperation between teachers</i>	28
	<i>role of expanding professional networks</i>	29
	<i>continuing further studies</i>	30

Source: own compilation, 2025.

DISCUSSION

In the spring of 2024, a pilot survey was conducted among graduating teacher education students (N=45), the experiences of which will serve the further development of the questionnaire. The designation of additional dimensions will become justified in the future: mapping of academic success and student habitus. In the case of academic success, the indicators examined focus on the following: academic self-assessment, studies abroad, commitment to learning, and extracurricular work. In terms of student habitus, further examination is justified in terms of leisure activities, individual education, and cultural consumption.

CONCLUSION

A broad study of the collaborative skills of teacher education students seems to be justified. Furthermore, it draws attention to the need to create a training structure that effectively develops students' collaboration skills. Trainings and the practice-oriented course called School Career Socialization Practice, introduced at the University of Nyíregyháza in cooperation with the

university's partner institutions, can contribute to this. Today's labour market expectations require employees to become an effective member of a community, in addition to their subject and professional knowledge, and to be able to establish effective professional relationships.

All this greatly increases the effectiveness of work, and for the teacher, a strong professional network provides a retaining force in the career. Reducing turnover is highly justified, since a strong professional community means stability for the various agents of the school, increasing student efficiency.

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APPENDIX

Questionnaire

1. Gender: Male / Female (Please underline!)
2. What field of study do you study? (Please underline!)
 - a, humanities
 - b, real
 - c, mixed
 - d, arts
 - e, sports
3. Permanent residence (Please underline!)
 - a, county seat
 - b, city
 - c, village
 - d, bush farm
4. How much did you consider yourself to be an initiator in high school? (Rate on a five-point scale: 1-Not true at all...5-Totally true)
 - a, in the class community 1 2 3 4 5
 - b, in the case of the subject(s) related to your current field of study 1 2 3 4 5
5. Where did you collaborate with your peers the most? (You can mark one answer!)
 1. in classes
 2. outside of school
 3. in professional circles/talent care sessions
 4. in online forums

-
6. How effective did you find this cooperation indicated above?
(Rate on a five-point scale: 1-Not at all true...5-Totally true) 1 2 3 4 5
7. Who, apart from the teachers and fellow students of your institution, were involved in the cooperation? Write your answer here: _____
8. Did you manage to cultivate these relationships during your university years? Yes / No
9. How proactive do you consider yourself during your university studies?
(Rate on a five-point scale: 1-Not at all true...5-Totally true) 1 2 3 4 5
10. Did the network of relationships you acquired in high school influence your ability to take Yes / No (Please underline!)
11. Do you consider it important to expand your professional connections during your university years? Yes / No
12. In what way are you currently building your network capital? (Multiple answers can be marked!)
- a, university classes
 - b, extracurricular programs related to higher education
 - c, entertainment venues
 - d, involvement in programs related to your place of residence
 - e, cooperation with students from other domestic universities
 - f, cooperation with foreign students
- Other: _____
13. Do you cooperate with students from other domestic universities in developing and implementing projects? Yes/No
14. How regularly? (If you answered Yes to the previous question.)
- a, 1 time during my university years
 - b, 2 times
 - c, 3 or more times
15. Do you cooperate with students from other foreign universities in developing and implementing projects? Yes/No
16. How often? (If you answered Yes to the previous question.)
- a, 1 time during my university years
 - b, 2 times
 - c, 3 or more times
17. What factors make it difficult to establish professional relationships? (You can mark more than one answer!)
- a, excessive class load
 - b, lack of information
 - c, lack of motivation
 - d, working while training
 - e, private reasons
- Other: _____
18. What sources and opportunities do you use to expand your knowledge?
Rate on a five-point scale:
(1-Not at all true...5-Completely true)
- a, personal contacts 1 2 3 4 5
 - b, online professional forums 1 2 3 4 5
 - c, social media platforms 1 2 3 4 5

d, online databases 1 2 3 4 5

e, institutions collecting original sources (see libraries, archives, museums...) 1 2 3 4 5

Other: _____

19. Do you consider it important to study abroad or receive scholarships in the future?
Yes / No
20. Are you looking for this opportunity? Yes / No
21. To what extent do you have sufficient information about study abroad or scholarship programs? (Rate on a five-point scale: 1-Not true at all...5-Completely true) 1 2 3 4 5
22. Where do you find out about these opportunities?
-
23. Do you know of any organizations that support student collaboration at the national and international levels? Yes / No
If Yes, name of the organization: _____
24. Is expanding knowledge/knowledge-related relationships important in your family?
Yes / No
25. To what extent did the relationship system established by your parents' home help you at each school level?
(Rate on a five-point scale: 1-Not at all true...5-Totally true)
Primary school 1 2 3 4 5
Secondary school 1 2 3 4 5
University 1 2 3 4 5
26. How important do you consider the relationship system established by your parents' home to be for your future employment?
(Rate on a five-point scale: 1-Not at all true...5-Totally true)
1 2 3 4 5
27. Do you plan to work as a teacher in the future? Yes / No
28. Do you consider it important to establish cooperation between teachers/educators? Yes / No
29. How important do you consider expanding your network of contacts for your future employment? (Rate on a five-point scale: 1-Not at all true...5-Completely true) 1 2 3 4 5
30. Do you plan to complete further studies or training in the future? Yes / No

LABOR MARKET DYNAMICS AND WORKFORCE DEVELOPMENT

LABOUR MARKET 4.0: CHALLENGES AND SOLUTIONS FOR INCENTIVE MANAGEMENT IN THE DIGITAL AGE

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Abstract: The term Fourth Industrial Revolution is used to describe the current phase of technological and industrial development, referring to the era of digital technologies. This process also means that, through the more efficient use of resources, not only our pace of life has accelerated, but also our communication and consumption habits have changed. Change is also affecting the world of work. Modern workplaces are increasingly multi-generational teams. These diverse groups bring many benefits, but most companies are faced with the challenge of coordinating the work of employees who may have radically different views and perceptions of work, not only in terms of age, but also in terms of values, interests and perceptions of work itself. Generational management plays a role in motivation and incentive management at work. In the era of Labour Market 4.0, identifying employee needs, and collaborating and aligning different generations is essential for competitive and sustainable operations, organisational effectiveness and employee engagement. The aim of this paper is to identify the motivational needs of the different generations and thus provide alternatives for the development of effective incentive strategies that contribute to organisational success in the era of Labour Market 4.0.

Keywords: fourth industrial revolution, digitalisation, generations, motivation

INTRODUCTION

Labour Market 4.0 describes the changing world of work as a result of the Fourth Industrial Revolution, and reflects the changes associated with the rise of digitalisation, automation, artificial intelligence (AI), robotisation and data-driven decision-making. All of these are leading to the emergence of smart solutions, products, services and new business models based on them (e.g. platform companies) (Demeter, 2020; Hortoványi et al., 2020). Modern workplaces are increasingly composed of multi-generational teams. The resulting diversity can bring benefits but also challenges for companies, as the different competences, values, motivations and attitudes to work of the generations need to be reconciled.

METHODOLOGY

The aim of the study is to present the main characteristics of each generation through secondary source analysis (Bereczki, 2022; Karácsony, 2019; Nógárdi-Szabó & Neulinger, 2017), to explore their motivational needs (Bińczycki et al., 2023; Pálffy, 2021; Tracy, 2014), and thereby shed light on the importance of generational management for human resource management (Malatyinszki, 2020; Visontai-Szabó, 2020). The research also aims to offer alternatives for

incentive management professionals based on the findings (Török-Kmoskó & Dajnoki, 2023; Czeily & Dajnoki, 2024).

In the secondary source analysis, I applied a three-dimensional theoretical model based on the interrelationships between generational differences, motivational theories and workplace changes in the context of Industry 4.0 (Demeter, 2020; Rikala et al., 2024; Szalai, 2022). The model aims to make a systemic sense of the challenges and opportunities that emerge in the functioning of multigenerational workplaces in the era of digital transformation (Hortoványi et al., 2020; Budai, 2022; Szűcs et al., 2021).

The analysis included only academic journal articles, professional studies and official research reports published between 2016 and 2024, directly related to the three key areas of research: generations, motivation and Industry 4.0 (Asztalos, 2022; Dajnoki & Héder-Rima, 2020; Deloitte, 2024).

LITERATURE REVIEW

Generational characteristics

Knowing the characteristics of each generation is of paramount importance, as it enables companies to develop strategies that foster collaboration, increase organisational effectiveness and strengthen employee engagement (Szabó-Szentgróti et al., 2019).

Baby Boomer generation (1946–1964)

The name refers to the fact that members of this generation were born during the post-World War II population explosion (Buda, 2019). Unlike their veteran parents, they are more open to change and recognise the need for progress, and are more optimistic about the future. For them, the workplace is exclusively a workplace, sharply separated from the family. They value stability, loyalty and loyalty to the employer. They prefer long-term employment, predictability and financial security. It is natural for them to move up the career ladder in a job. They are characterised by a deep desire for professional knowledge, coupled with a need to follow rules and do tasks correctly, but they are challenged to adapt to technological advances (Steigervald, 2020).

Generation X (1965–1979)

They are often referred to as digital immigrants, because they were the first to be exposed to the new technological advances of their time, such as mobile phones and computers, and the first to go online (Buda, 2019).

These tools forced them to adapt, to train, as this was the only way to meet demands of the labour market. Lifelong learning became an integral part of their lives. They are more success-oriented and ambitious, and their motivation is more material. They are less likely to spend their working years with a single employer. They are independent and self-centred. They believe that only strong personalities can effectively assert themselves and move up the career ladder more quickly. They develop their relationship systems around interests and question the role of

hierarchy in the organisation. They are maximalists, flexible, creative and solution-oriented. They are able to carry out several parallel tasks simultaneously, but are less able to delegate individual tasks because they feel they are the only ones who can do them well. They value work-life balance, friendships and building networks of acquaintances (Bereczki, 2022).

Generation Y (1980–1994)

They are often called the "internet generation" or the "digital generation", referring to the fact that members of this generation are the last ones born into "an offline world", but they are already connected to the internet and digital communication, so they have experienced that with the help of the internet they can get information about world events much faster and keep in touch with their friends more easily (Nógárdi-Szabó & Neulinger, 2017).

They are also known as the "reverse socialised" generation because they teach their parents and grandparents how to use electronic devices (Malatyinszki, 2022). They are determined, energetic and have new insights. They are mobile and value flexibility. They prioritise a work environment that supports teamwork, collaboration and innovation. While Baby Boomers and Generation X were task-oriented, Generation Y now sees the world differently. They've realised that life is not just something to be lived, but something to be lived. Work-life balance is even more important for them, and they prefer flexible working hours. Although career and salary are important to them, they take a measured approach and do not sacrifice everything. They prioritise leisure, relaxation and regeneration (Steigervald, 2020).

Generation Z (1995–2010)

They are often referred to as the iGeneration, Gen Tech, Net generation, IT generation, bit generation (Pálffy, 2021). They have the potential for both the virtual and the modern world, and the accumulation of activities, i.e. multitasking, which results in a continuous choice at the centre of their experience (Steigervald, 2020).

They were born into a more economically, socially and politically volatile time than their ancestors. External events (economic crisis, COVID-19 pandemic, terrorism, climate change, wars) have influenced their values and way of life, and have led to an unpredictable and uncertain world (Malatyinszki, 2022).

They are the latest to leave the world of formal education, but only part of their knowledge comes from outside the traditional education system. For them, Lifewide learning (LWL) plays a much more prominent role (Asztalos, 2022). Like their predecessors, they value individual ideas and self-expression, but are less tolerant of formalities (Karácsony, 2019).

RESULTS

Generational management has a key role to play in multi-generational workplaces, as the generational strengths of diversity need not only to be exploited, but also combined to ensure that different age groups can work together optimally to increase organisational effectiveness.

Table 1 Impact of generational management on organisational effectiveness

Key area	Mechanism	Expected outcome
Knowledge sharing	Combining experience and technology	Innovation and development
Motivation	Personalised incentives	Dedicated workers
Teamwork	Reducing conflicts	A better working environment
Power	Aligning skills	Higher productivity
Organisational culture	Promoting diversity	A more open, flexible company

Source: own edited, 2025.

In Table 1, I have identified key areas for generational management based on the literature reviewed, such as knowledge sharing, motivation, teamwork, performance and organisational culture. I then linked each area to the mechanism through which the outcome in that area can be achieved. In terms of expected outcomes, I identified the following areas: innovation and development, engaged employees, better working environment, higher productivity, more resilient company.

Knowledge sharing

However, Labour Market 4.0 has a number of characteristics that are closely related to the concept of VUCA (Volatile, Uncertain, Complex, Ambiguous), suggesting that the pace of technological development is increasing exponentially (Szűcs et al., 2021).

By competence we mean the set of individual characteristics that contribute to the achievement of the organisational goal through the performance of work tasks (Szűcs et al., 2021). Competitive advantages that were previously thought to be stable can suddenly become devalued, and this is also true for knowledge acquired in formal education (Szujó, 2019).

Today's employers are not only looking for knowledge acquired through formal education, but also for competences that are of high value in our changing world (Rikala et al., 2024).

More and more companies are recognising the importance of mentoring as a form of knowledge sharing between generations, as it is not only about transferring professional knowledge, but also about transferring a range of other skills and abilities (Malatyinszki, 2020).

More experienced generations can help younger generations to understand problems and develop possible solutions through their practical experience. At the same time, younger generations can bring new approaches and innovative solutions to the organisation through their digital literacy (Meret et al., 2017). Consider, for example, the transfer of digital competences, which were already seen to play an important role in learning, working and socialising during the Covid-19 pandemic. Workers who do not have the right digital skills may be excluded from the

economy of modern societies, and on the other hand, this competence is one of the bases of resilience (Szűcs et al., 2021).

It is also worth mentioning that Baby Boomers can learn loyalty, dedication to work, loyalty, Generation X members can learn a strategic perspective and task-orientation, Generation Y members can learn to solve complex tasks in a team, while Generation Z members can learn to find and solve creative and flexible ways of working (Malatyinszki, 2022).

Motivation

The concept of motivation comes from the Latin verb "movere", which means movement, but in many cases it can also be associated with the meaning of stimulation, inspiration, urge. Theories of motivation seek to answer the why of behaviour and, depending on the way in which they see it, the theories that fall into this category include those based on needs (Taylor, McClelland (1955), Maslow (1954, 1970), Alderfer (1969, 1972), Herzberg (1966)), instrumental theories (Georgopoulos et al. (1957), Vroom (1964), Porter and Lawler (1968)) and equity theories (Festinger (1957), Adams (1965)). (Klein, 2007) Pink's (2010) Motivation 3.0 theory draws attention to the existence of a third motivating factor in addition to biological and extrinsic motivations (Pálffy, 2021). Tracy (2014) states that a combination of seven elements is necessary for an employee to perform his/her tasks effectively. These are challenge, freedom, control, respect, friendliness, a sense of achievement and trust (Tracy, 2014).

Psychological approaches emphasise the importance of intrinsic motivation and define it as an inner drive, a desire. According to this view, employees perform a work process because they find it interesting, so it is not the end result but the pleasure in the action that motivates them. Intrinsic motivating factors include interesting and challenging work, responsibility, freedom of action, opportunities to develop skills and abilities, promotion, etc. The impact of intrinsic incentives is usually deeper and more lasting, as they are intrinsic to the individual. Theories of management use the concept of motivation as a synonym for incentive, thus focusing on extrinsic motivation. In this case, management uses incentives such as pay increases, rewards and bonuses, which are performance-based incentives (Matiscsák, 2016).

Generation management must take into account that different generations are motivated by different factors. The organisation must therefore offer tailored incentives and working environments for different generations to ensure employee satisfaction and engagement.

Teamwork

For many people, working in a group enhances both intrinsic and extrinsic motivation and allows for greater flexibility in organising and sharing work, especially when the group includes people with multiple skills (Chikán, 2021).

Communication is the key to collaboration in the management of multi-generational teams. Understanding and respecting generational differences, using the right communication channels and methods contribute to harmonious and productive work and a better working environment (Kőműves et al., 2023). Baby Boomers still prefer traditional working methods, face-to-face meetings, telephone communication, paper-based information recording, formal style, while

Generation X members are more comfortable with electronic tools, using different platforms in this field. Generation Y prefers to use chat applications and video calls. Generation Z prefers fast, visual communication (GIFs, emojis, short videos). The use of modern, user-friendly digital tools and platforms (e.g. collaboration software, teleworking tools) is now essential in today's workplace, but different working methods, attitudes and communication styles can lead to conflicts. With the right communication training, education and sensitisation, relational capital can be strengthened and generation gaps can be bridged (Malatyinszki, 2022).

Performance

In the complex digital systems and networks that characterise Labour Market 4.0, technical or operational problems can arise constantly. Team members need to work together to troubleshoot and ensure optimal functioning of the systems, taking advantage of the systems experience of older team members and the technological skills of younger ones

One feature of project-based working is that project communities are not permanent. Different projects require different methods and tools, which requires continuous learning, development and change from all participants (Malatyinszki, 2022). Projects require members of different generations to work together to achieve the goals set, which often requires creative and effective problem solving. Combining different experiences and perspectives can lead to a more complex approach to problems and more innovative solutions

Because of the ambiguity of the VUCA world, critical thinking helps multi-generational teams to make logical and rational decisions in ambiguous situations. It helps to question old ways of doing things and to weigh up the pros and cons of new technologies, and to improve performance by reconciling views. For example, older generations can critically examine the need for and effectiveness of introducing new digital solutions versus existing processes, while younger generations can better assess the opportunities offered by technology (Szűcs et al., 2021).

Organisational culture

As a result of globalisation, organisations are increasingly operating across borders, which increases diversity. This means that workers from different cultures, genders, identities, ages and backgrounds work together. This brings to the fore an inclusive organisational culture that values diversity (Csástyu, 2023).

The coordination needed to carry out these tasks requires people with specific expertise to work together regardless of time and place, even if they are not geographically located. This puts flexibility and adaptability at the forefront (Chikán, 2021; Szujó, 2019).

Resilience in this respect also means that different generations are able to accept and respect each other's views and ways of working. And adaptability is the ability of different generations to learn from each other. Younger generations can learn new technologies more quickly, while older generations have valuable experience and systems thinking that can help them adapt flexibly to changing circumstances. The perspectives of different workers can bring new ideas and solutions. The opportunities for development and learning provided by the workplace are of particular importance for Generation Z and, more generally, contribute to increasing the adaptability of

workers by enabling them to acquire new skills and knowledge. Learning through projects and practical activities are particularly effective in this respect (Malatyinsky, 2022).

CONCLUSION

Based on the literature review, it can be concluded that in the era of Labour Market 4.0, generational management is essential for organisations to remain competitive. In this context, incentive management should be seen as a comprehensive approach and set of activities that contribute to motivating employees, increasing their engagement and achieving desired organizational goals. It involves attracting and retaining employees and optimising their performance at work through a variety of financial and non-financial incentives and the creation of a supportive work environment.

In this context, employee engagement is a central concept. In the case of continued engagement, the employee stays with the organisation as long as it is financially rewarding. It is a calculative attitude where the individual weighs the pros and cons of the options. Normative commitment is when the employee feels a moral obligation to stay with the organisation, based on a deep conviction. In the case of organisational commitment, the individual identifies with the organisation, its goals and values, and is motivated to participate in organisational life. This includes a strong belief in the organization, identification with its goals, a willingness to make efforts for the organization, and a strong desire to maintain membership. The lack of engagement in real life is well illustrated by the phenomenon of job hopping (Török-Kmoskó & Dajnoki, 2023), where employees change jobs in a relatively short period of time, on average every 1-1.5 years. This phenomenon is a characteristic of Generation Y and Z. If they do not feel comfortable in one job, they look for another one, as they are flexible and expect the same from their employer. They need feedback, recognition, to be seen as a member of the team (Malatyinszki, 2022). A negative consequence is the loss of knowledge capital, as the employee takes their accumulated knowledge with them when they leave the organisation (Kőműves et al., 2023).

Traditional, material-based incentive schemes do not always deliver the expected results. More attention should be paid to alternative strategies that build not only on material incentives but also on the individual needs and values of employees. Successful incentive management is based on taking into account the needs of employees, which requires knowledge of the motivational factors of each generation (Bińczycki et al., 2023).

Table 2 Generation-specific motivational factors and incentives

Generation	Motivational factors	Incentive management strategies
baby boomer	Security, stability	Fringe benefits, loyalty programmes
Generation X	Career development, financial recognition	Performance-based bonus, training
Generation Y	Work-life balance, development	Flexible working arrangements, coaching
Generation Z	Technological innovation, experiential employment, development	Digital working environment and tools, social responsibility, gamification, empowerment

Source: own edited, 2025.

In Table 2, I summarised the generation-specific motivational factors and incentive management strategies, indicating that in a multi-generational workplace, in addition to financial incentives (fringe benefits such as bonuses, cafeteria and loyalty schemes), other elements such as performance recognition, the role of training, development and learning opportunities, flexible working arrangements, digital work environment, social responsibility should be included.

For the older generations (Baby Boomers, Generation X), stability, long-term financial rewards (fringe benefits, loyalty schemes, performance-based bonuses) and career opportunities to progress in a hierarchical organisation are the biggest motivators. In contrast, for Generations Y and Z, the focus should be more on flexibility, self-fulfilment and the opportunity to work experientially.

In the era of Labour Market 4.0, flexible working arrangements are essential for employee satisfaction and work-life balance. It also contributes to attracting and retaining staff and increasing efficiency. It also plays a role in addressing labour shortages, as companies need to attract potential employees in a competitive labour market. The experience during the virus crisis has also confirmed that systems supporting teleworking and hybrid working allow for value-added remote working. Flexibility is also an aspect of job choice, as it allows to reduce barriers due to geographical distances and time zones. It is also worth mentioning that efficiency gains can be achieved by using atypical forms of work other than the traditional work schedule (Kóbor & Mayer, 2021). From a cost-effectiveness perspective, it is increasingly common to work in person rather than in a permanent location, in a flexible way, on a rotational basis or by using the services of community offices (Kolonics & Pónusz, 2020).

Flexibility also has a role to play in retaining workers, as it enhances individual responsibility and autonomy, and helps workers to participate in decisions and processes related to their work. This process is known as empowerment, which means broader empowerment. Consequently, organisations have become flatter and leaner in many places by eliminating certain levels of management. The development of information technology has greatly facilitated this process (Chikán, 2021).

According to Ken Blanchard, there are three elements of empowerment: sharing information, setting boundaries and replacing hierarchical leadership with self-managing individuals and teams. Empowerment is therefore not just an organisational transformation; it is an increased expectation for younger generations, especially Generation Z. Involving employees in decision-

making can not only lead to better decisions, but also increase the chances of them being implemented properly. Giving employees the opportunity to take responsibility is of paramount importance to enable them to feel that they are able to fulfil their potential. It is also important to provide opportunities for initiative and cooperation, to encourage creativity and to give the opportunity to make mistakes (Visontai-Szabó, 2020).

In this process, the role of the leader is key: he or she must be people-oriented, honest and supportive. A trust-based leadership approach, open communication and good relations with colleagues are important for all employees, regardless of generation. Managers should provide opportunities for employee voice, which includes two-way communication, means of expressing individual opinions, satisfaction surveys and various forms of collective employee representation (Kőműves et al., 2023).

The human resources model for employee well-being also highlights that positive employee attitudes mean commitment to the organisation and work, and motivation is manifested in cooperation, organisational citizenship and higher energy levels. Thus, empowerment, involvement and empowerment tools can strengthen employees' entrepreneurial and agency roles (Kőműves et al., 2023).

The creation, use, preservation and development of in-house knowledge is key for businesses. The younger generations entering the labour market also have increased demands for learning on the job. Although Generation Z members do not plan for the long term in a particular job, it is the learning and development opportunities provided by the workplace, the relationships with colleagues and the work environment, as well as fringe benefits, that are most prominent in their preferences, while for professional challenges, they prefer the ongoing fulfilment of smaller challenges and a project approach (Varga & Héder-Rima, 2021).

Even for many of the older generation, mandatory statutory training is seen as a necessity, but workplace learning is no longer only a formal framework. It can be brought about by developing the conditions for informal learning, i.e. a combination of activities, situations and tools in on-the-job situations, with the primary aim of knowledge sharing. In addition to the mandatory training elements, companies' training plans should also reflect the idea that learning in projects, learning and development of practical activities should often take place in virtual space rather than in reality, or on e-learning platforms, thus emphasising experiential learning. Community-building programmes, training, joint projects and opportunities to exchange experiences can also promote this and help understanding and cooperation between different generations.

In the field of human resource management, it is worth considering the issue of gamification, allows the use of elements and mechanisms that are also found in games, such as points, leaderboards, rewards, challenges, competitions. These, when applied in a workplace setting, can contribute to improving the effectiveness of performance management, career management and training development, but can also be effective in the area of health promotion, as they can reduce workplace stress and thus increase well-being (Czeily & Dajnoki, 2024).

The role of employer branding is essential for success, emphasising the company's values. This is particularly so when employers are competing to attract and retain talented staff (Dajnoki

& Héder-Rima, 2020). An employer brand is “nothing more than the sum of functional, economic and psychological benefits derived from employment and identified with the employee (...) whose main role is to provide a coherent framework for management, simplify processes and focus on priorities, increase productivity, improve and develop recruitment, retention and engagement” (Ambler-Barrow, 1996 cited in Dajnoki & Héder-Rima, 2020). One of the most important elements of an employer brand is honesty and credibility, i.e. the consistency of the company's promises and actions. Social responsibility (CSR) programmes, an environmentally conscious corporate approach, and support for diversity, inclusion and equal opportunities should be mentioned as an integral part of this.

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TECHNOLOGICAL ADVANCEMENTS IN EDUCATION

ARTIFICIAL INTELLIGENCE IN SECONDARY EDUCATION: CAN WE TEACH THE NEXT GENERATION?

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Abstract: Artificial intelligence is almost everywhere. Education is no different. But can we use it in secondary education? Does it really have the potential to teach the next generation? In my opinion, it is important that young people learn the correct and appropriate use of AI applications. They know what we use and how we use it. After all, it is not just a tool for talking; it can be used to develop skills, for personalised learning/teaching, and, moreover, for critical thinking. There are many potentials in these tools for teachers to facilitate their daily preparations or even to reduce the time spent on revision. In my research, I received responses to the questions of the respondents that are a good starting point for teachers in secondary schools in Győr. The key points where there are major differences of opinion are presented, as well as those where there is agreement in the answers. However, in general, it can be said that, fortunately, many open-minded teachers work in Győr and see both sides of the "gun" of AI. Everyone knows that AIED tools are the future of teaching – the amount of them is one of the main questions and how to transplant them into the Hungarian Education System. This is not only our issue to solve; however, European Union, United Kingdom, and the United States have many good examples not only in secondary education but also in primary and academic level, too. We need to follow these new waves and use the new features if we do not want to be left behind other countries.

Keywords: AIED tools, education, Győr, pedagogy, secondary schools

INTRODUCTION

Artificial intelligence (AI) is a keyword in our ever-changing world. We want to solve problems and find answers to our questions in the fastest and quickest way possible. We have no time to waste and no energy to spend with problems. This is the 21st century.

AI has been one of the greatest inventions in the last 50 years, with the help and support of the World Wide Web. These two fancifuls are the best-known and most used tools in the new century – after a big pandemia, the COVID-19 virus. There are no examples where these IT-tools are not represented. From car development to economy, across travel and tourism, everywhere we can use them online and off-line as well. Why would education be the exception? Learning technologies, including artificially intelligent learning applications such as adaptive learning systems, automated grading systems, and virtual tutors, are progressively incorporated into higher learning institutions around the world (Holmes et al., 2019).

Artificial intelligence is rapidly transforming various aspects of society, including education. Understanding teachers' perspectives on this disruptive technology is essential, given its potential to revolutionize the teaching and learning process. Integrating AI into classrooms is changing the roles and attitudes of teachers towards technology (Uygund, 2024).

First, I will show you some pros about these tools. AI is not only a tool in education but also a subject of study itself. Students learn to use artificial intelligence in their creative projects and

critically think about the ethical and social implications of AI. Theoretical and practical knowledge of current and future generations of schoolchildren is not the same. It matters whether they turn to AI as a friend or foe, useful or useless (or even downright harmful). Informing, shaping attitudes, and preparing for the cooperation between humans and AI is a necessary and essential task of our time (not only for AI researchers) (Mező & Mező, 2023).

AI-based learning platforms provide a personalised learning experience, adapting to each student's individual needs and learning style. This is particularly important in the development of creative skills, where an individual approach is key. Mustafa Saritepeci and Hatice Yildiz Durak conducted a 5-week experiment to see how the use of two AI-based programmes helped the participants. In this research, they concluded that working with AI contributed to the development of the creative self-awareness, critical reflection, and reflection of the participants. (Saritepeci & Yildiz Durak, 2024).

Now let's introduce some negative points. The integration of AI into higher education poses many challenges, including lack of transparency, safety concerns and some ethical dilemmas. These barriers have severely hindered the incorporation of AI into the higher education sector, unlike sectors such as business or health care (Singh & Miah, 2019). To make AI an integral part of education process, it is crucial to understand concerns of both teachers and students, as they pose a barrier for the integration (Huszárová et al., 2024).

AIED – ARTIFICIAL INTELLIGENCE IN EDUCATION

Due to the Covid pandemic, schools were closed all over the world and education was carried out online. It was the greatest challenge for the world how to solve these problems for months. This was the period when online teaching, online working and so on got developed and show how effective could be as a new form of learning/working. There were so many problems, such as if students do not receive support for the complexity and area of the course module, they may be demotivated and withdraw from the module itself. It is imperative to design a solution that helps students retain information in the e-learning environment as well. We observed e-learning processes could be so useful, fast and it also take less time to check them. Both teachers and students need the opportunities that AI provides for teaching and learning.

“The real power of artificial intelligence for education is in the way that we can use it to process vast amounts of data about learners, about teachers, about teaching and learning interactions,” said Rose Luckin, a professor of learning-centered design at University College London in 2017. “[It can] help teachers understand their students more accurately, more effectively. You still get the high-quality human-to-human, tutor-to-student interaction, but the evaluation of that interaction will be, in the future, done by an AI. And in addition, the evaluation that’s done automatically will be used to tailor the continuing professional development of that tutor,” Luckin added (Avary, 2017).

Examples from the world

Let's see some good practices from Europe. How countries will support and guarantee AI learning in education. The Department of Education in Ireland published the Digital Strategy for Schools in 2022. Using the Digital Strategy document as a basis, some curriculum work has been done in the past year to develop pupils' understanding of AI. A specific module called 'AI in my Life' has been developed by Dublin City University (DCU) and offered to all upper secondary schools in 2023. This module follows a pilot program involving approximately 8,000 secondary school pupils from 100 schools in 2022. The module, which covers about 20 teaching hours, focuses on topics such as learning about AI and how it works, exploring ethical and privacy implications, and evaluating the role of AI in their lives and society. It also explores future career paths in AI (European Commission, 2023).

In Italy, Civic education was introduced for all school grades in 2020/2021, and the lesson time could be used to teach transdisciplinary topics like in this case AI skills, focusing on ethical, societal and political aspects of AI. Students can learn AI ethics, by discussing topics like privacy, data security, and bias. They can understand the influence of AI on politics and democracy, such as its potential role in misinformation campaigns. The social impact of AI, such as employment and inequality, and the intersection of AI and law could be discussion points to foster students' understanding of how AI impacts daily life (European Commission, 2023).

A recent survey of more than 5,000 primary school teachers in England, conducted by the British Computer Society found that 67% of teachers encountered generative AI for the first time on a platform called ChatGPT, but many still consider this tool to be more of a challenge than help. The study found that nearly two-thirds of teachers do not use AI in their daily work. The survey also found that 84% of teachers have not changed their assessment methods since the introduction of AI, and that many teachers lack appropriate guidance and training in how to use the system. A high school in London will let students around the age of 15 use AI tools before taking standardized exams in this year, despite experts warning that they make for a poor replacement for human teachers. „Students will benefit enormously from AI-powered adaptive learning, which allows every student to learn at their own pace rather than having to keep pace with a class,” coprincipal John Dalton told Business Insider, „which often progresses too quickly for some students and too slowly for others.” David Game College is far from the first to dabble with AI in the classroom. Harvard introduced an AI instructor to teach a popular intro-level coding course. Private school kids in Silicon Valley are also being taught by an AI-powered tutor (Tangermann, 2024).

Examples from Hungary

In September 2020, the Hungarian Government published its National AI strategy, outlining the strategic vision and actions regarding the development of AI for the period of 2020–2030 (Hungary, 2020). The strategy is published by the Ministry of Innovation and Technology and developed by the Artificial Intelligence Alliance. In October 2018, the AI Coalition was formed

on the initiative of the Ministry of Information, as a partnership between government institutions, prominent scholars and practitioners of leading IT companies.

However, the usage of educational tools is still in its early stages, there is a growing demand among teachers for comprehensive knowledge of these platforms and their effective implementation. The Teachers' Union is now warning: if the effective and ethical use of artificial intelligence in public education is not launched, Hungary's competitiveness will suffer. According to the Union's president, Tamás Totik, the government still has much to do, including organizing appropriate training, integrating artificial intelligence into basic education programs, providing the tools needed for its use, and resolving the issues of data protection and ethics (R. Kiss, 2025).

Thus, Yettel's ProSuli program has launched a practical online training of artificial intelligence for teachers, enabling them not only to grasp the basics of the technology but also use artificial intelligence in lesson planning and administrative tasks. During training, they will learn how to ask appropriate questions (called prompts) to AI systems to provide the most effective help in their work (Trademark, 2025). The first meeting was on 4th April 2025.

One of the best-known concrete examples is the Hungarian Language School, Budapest. They use Speakifyr, an innovative learning app that uses AI technology to boost the students' Hungarian speaking skills. Learners choose from two teachers: Noémi or Tamás. With fun exercises, real-time feedback, and personalized lessons, students gain confidence in speaking Hungarian. The AI mentors guide at every level – beginner to advanced – helping improve listening, pronunciation, and conversation skills. Whether they are learning basic phrases or aiming for fluency, the app adjusts to their needs (Magyar Iskola).

RESEARCH AIM AND QUESTIONS

The purpose of the paper is to determine the opinions of Hungarian secondary school teachers – especially in Győr – on AI-based technology use in education. As such, I have proposed the following research questions:

- What is the opinion of Hungarian secondary school teachers on the implementation of AI in education?
- What are the perceived advantages and disadvantages of AI-based technology implementation into education based on the opinions of Hungarian secondary school teachers?

Research methodology and sample

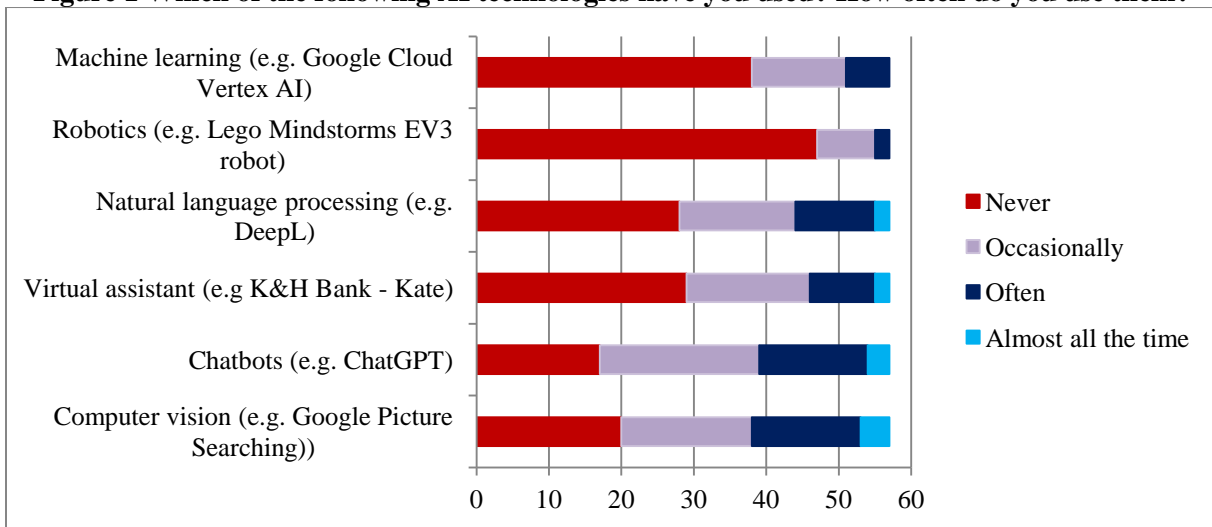
The research sample consisted of 69 Hungarian Győr-located secondary school teachers (39 female; 30 male). The respondents were of different age categories, with the largest number of respondents falling into the 50-age category. Most of the teachers live in cities (45 people). The questionnaire contains 26 questions which are divided into three main topics: general information and data, the opinion of AI and the future usage of AI in education. The survey was anonymous and filled out online.

RESULTS

I have selected the most significant questions and present the results in this study.

Most of the respondents have already met and used AI technology. It shows that two-thirds of respondents are familiar with such systems. Machine vision is the most used of the listed AI types. Following by the chatbots, and the various virtual assistants are in third place. In everyday life, AI can help to find pictures on the world wide web or chatbots get more relevant information than the searching webpages. Virtual assistants are also common – especially on large webpages where they help if we have some troubles to find something. Not only online markets but bank sector also use virtual assistants. In my example, I mentioned Kate, the Hungarian K&H Bank virtual assistant, too.

Figure 1 Which of the following AI technologies have you used? How often do you use them?

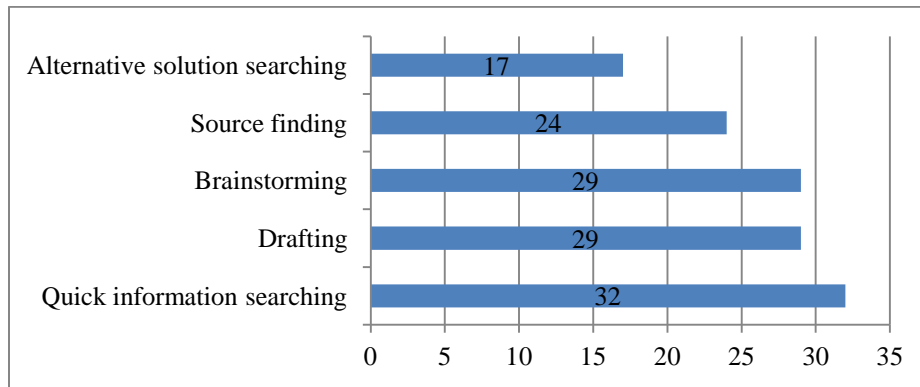


Source: own edited, 2025.

When asked concretely if artificial intelligence was used in teaching, 22 teachers answered yes. This is also positive because almost one-third of respondents used the opportunity to introduce new technologies into their teaching - whether in home preparation or in other ways of education.

In the following question, I asked them how to use text generation tools creatively in classrooms. Teachers can choose multiple options from the list. Firstly, the rapid search for information (32 votes) came out. The next ones on the list: draft (29 votes), brainstorming (29 votes), source search (24 votes), alternative solution search (17 votes) were launched. All these creative ways of learning with AI support them to understand how they use them: you must have some background information about the topic. You need to think about it first, get some questions in your mind and focus on the topic.

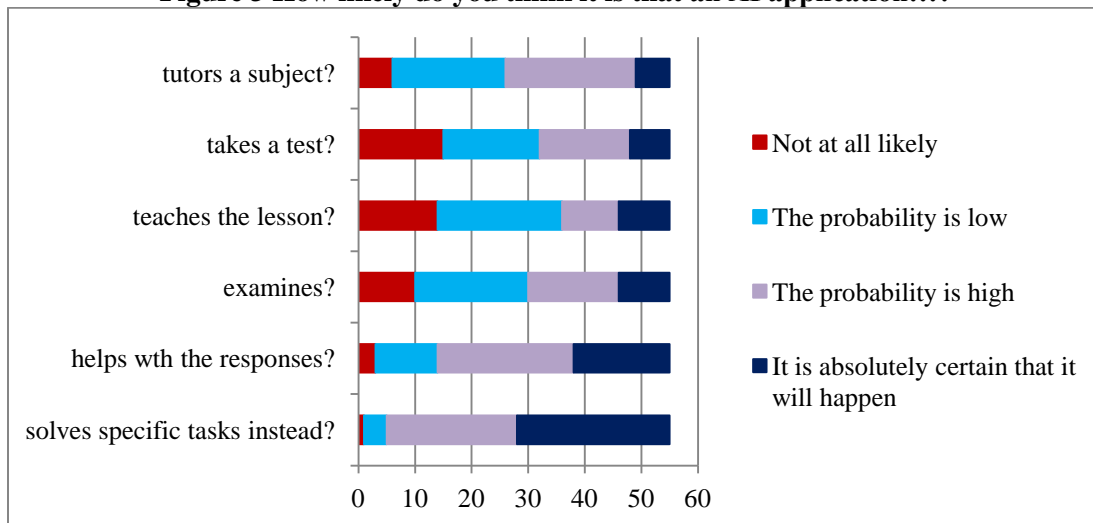
Figure 2 How creatively do teachers use text generation tools such as Chat GPT in the classroom?



Source: own edited, 2025.

As for the question „How likely are you to use AI?“, most teachers think AI solves specific tasks rather than performing them on their own. AI can help students respond but is probably unable to mentor subjects. For me, these are very important opinions because AI is well known for its potential use in the differentiation of educational tools. It can help to develop weaknesses and create a suitable learning platform for individual learning. It is also a good way to give exercises at different level of difficulty to students. As another example it's also useful if we design tests and use AI to monitor or assist in completing them. The paper-based accounting process will likely disappear.

Figure 3 How likely do you think it is that an AI application...?



Source: own edited, 2025.

I also asked about certain “superpowers”: skills that help the process of education and learning. More than 15 responses were given, and the following received the highest number of teachers' votes. At the top of the list was time-saving, cited by 38 out of 64 voters as the most powerful effect of AI. The second most frequently mentioned advantage was support with additional tasks. If we think about schools with mixed classes, this can be a good way not to avoid disengagement

among students. Or just teach diverse lessons with these kinds of exercises – going beyond the textbook or the student’s book. Thirdly, individual learning pathways also received remarkable votes. These methods enable learning and personal development based on individual strategies for achieving long-term personal goals. And in a head-to-head race, personalized learning and automatic check-ins ranked fourth. Both are useful in everyday learning and teaching techniques.

Table 1 In your opinion, what "superpowers" do you think AI can give teachers/students?

	Percentage	Number
Saving time	69%	38
Additional task expenditure	60%	33
Individual learning pathways	56%	31
Personalized learning	53%	29
Automatic checking	53%	29

Source: own edited table from the survey (Qualtrics)

Finally, when asked to evaluate the current stage of AI implementation in their schools are, respondents gave rather modest assessments. They were asked to rate the extent of implementation on a scale from 1 to 5, and the average score was only 2.28, suggesting that most schools are still in the early stages of adopting AI in education. Sadly, they do not see how and when AI could be part of education in Hungary. They wrote some examples and negative sights about it. Here are some examples:

- Not enough is known about it, a presentation would be necessary.
- Our fleet is not suitable for any serious task.
- Opinions are divided on AI among the teaching staff.
- A large part of the teaching staff and I belong to the 50s and 60s age bracket. They are used to different ways of doing things, working to old reflexes.

Although, there are some positive examples as well and I hope, they have an increasing number in Hungary at all, not just only in Győr:

- Our school is currently at an intermediate level in the use of AI in education. This means that there are some initial steps and applications, but it is not yet fully integrated or widespread. There are areas where we are already using AI, but there is still much room for further development and expansion.
- I try to use it well in my daily teaching, I would like to improve, learn more about it, gain practical knowledge and help my students.
- Colleagues often use AI to support their lessons, especially the younger generation.

I collected some secondary school teachers’ opinions from all over the world. These ones are positive and negative sides as well – as is the case everywhere because the coin has two sides, too (OUP online, 2024) – and these are very similar to the Hungarian ones.

- Ms Betty Cheng (Vice Principal, Chan Sui Ki (La Salle) College, Hong Kong): “On a scale of 1 to 10, I would give ChatGPT a score of 6: AI has provided a good start for us, but we need to rely on ourselves to reach full marks.”

- Massimo Soranzio (Teacher, I.S.I.S. Michelangelo Buonarroti, Monfalcone, Italy): “As a teacher, AI can rapidly give me new material to work on, but as an educator proper, I am more interested in making my students understand how not to turn it into the ‘new frontier’ of cheating.”

Sonjie Kennington (Language Coach, Spain): “I think AI is going to revolutionize education (and almost every other aspect of the way we live) in ways we cannot yet imagine.

DISCUSSION

One of the biggest challenges for AIED is the lack of technology necessary for implementing the transformative power that artificial intelligence can bring to education. The problems of lack of modern electrical equipment, the inadequacy of information technology hardware, the inadequacy of the consistent Internet, the high cost of data and the lack of skills are the key challenges that limit the realization of the power of artificial intelligence in secondary education in the questioned schools.

Although teachers may have high teacher potential, the integration of AI technologies is a new trend. The lack of trained teachers with skills and tech expertise in these technologies prevents the process of exploring the potential of AI-based technologies. To eliminate the major challenges of this AI in education, teachers must engage in learning digital AI skills and incorporate them into their teaching curriculum.

CONCLUSIONS

Due to the unprecedented Corona virus crisis, schools and universities around the world are forced to close to promote health and safety, resulting in major changes in education. Online learning was adopted almost overnight by alternative methods, allowing for a comprehensive discussion about the use of artificial intelligence in the field of education, much faster than expected (Wijayawardena et al., 2022). However, as is always the case, the successful application of new technologies is closely linked to teachers' attitudes to the teaching and the educational system as well.

Despite the great potentials of AI-enabled learning supports, the pervasive use of technology in education does not guarantee teachers' ability to deploy technology in classrooms, nor does it ensure the quality of teaching (Mercader & Gairín, 2020).

In view of this, teachers need to learn not only how to use technology but also how to successfully integrate it into their curricula. Also, to be open to integrating advanced technology into their lessons, teachers need to understand the importance of educational technology and the affordances that it can bring to instruction. Furthermore, when it comes to AI, a great number of teachers and school officials have not yet experienced AI-based learning support and might simply recognize it as slightly more advanced educational technology (Kim & Kim, 2022).

Thus, the integration of AI into educational delivery has the potential to change learning landscapes, although the achievement of these changes depends on teacher training, support and

resources. For the areas of professional development that are currently not sufficient to support the effective use of AI-based applications in education, we can emphasize as follows: In this regard, the recommendations of institutions will help educators strengthen the capabilities of the AI tools to improve students' participation and increase learning results (Roshan et al., 2024).

It is hoped that AI will ultimately help educators to continue to address the wide range of physical, cognitive, academic, social and emotional factors affecting students' learning and to ensure that all students, regardless of their social class, race, gender, sexuality, ethnic origin, or disability, have equal opportunities for education.

Although there is still a widespread debate about the advantages and disadvantages of the use of AI technologies in education, including concerns about depersonalization and ethical considerations mentioned above, it is clear that extraordinary benefits in current and future will continue to carry out their roles.

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INNOVATION, ENTREPRENEURSHIP, AND DIGITALIZATION

A GENERIC BALANCED SCORECARD-BASED METHOD TO EVALUATE THE EFFECT OF ERP IMPLEMENTATION IN A MID-SIZE COMPANY IN KSA

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Abstract: The evaluation of the effects and impacts of implementing an Enterprise Resource Planning (ERP) system is very difficult because this system affects all aspects of the organization, and some of these aspects may be hard to quantify. There is no single agreed-upon analytical structure for analyzing the organizational benefits and effects of ERP systems. Nonetheless, several academics have proposed that the balanced scorecard technique could be a useful tool for reviewing ERP system performance and its effects on the company. In this study, we decided to follow this method because it assesses the effects of the ERP system not only on the informational infrastructure of the organization but also on all aspects of the organization, including financial, business processes, customer service, and innovative learning perspectives. We studied a mid-sized medical company in Saudi Arabia using real data that were collected before and after the implementation. The results of the study were surprising and indicated a complete failure of the system implementation.

Keywords: Enterprise Resource Planning system, Balanced Scorecard method, Oracle ERP system, mid-sized company.

INTRODUCTION

ERP is an acronym that stands for Enterprise Resource Planning, and it refers to any software system that is meant to assist and automate the business activities of medium and big enterprises. Examples of essential features of enterprise resource planning systems are listed as follows: The modular functionality prevalent in ERP systems comprises expanded capabilities of all MRP-II system modules, as well as “Electronic Data Interchange” (EDI), engineering change control, project management and control, and service control. A typical ERP system is referred to as an umbrella system (Mahmoud, 2014).

“Enterprise resource planning systems are off-the-shelf pre-written software” (Chand et al., 2005).

Enterprise resource planning ties resource planning concepts to consumers' and suppliers' expanded supply chains (Alwabel et al., 2006).

The enterprise resource planning systems are very expensive and complicated; as a result, 90% of ERP installations are either late or above budget (Alwabel et al., 2006).

According to Chand et al. (2005) deploying an ERP system is an expensive and risky endeavour, and the technical and management hurdles of doing so have been extensively examined and evaluated. However, even though the problems encountered in evaluating the business impacts of ERP systems are not like any other IT projects, the subject of analyzing the effects of ERP systems is less widely studied and understood. The subject of how to quantify the advantages of ERP in use has been raised but not fully addressed. There is, in particular, a dearth of an analytic framework that may serve as a guide for establishing indicators for evaluating the advantages and effectiveness of ERP systems.

Several writers have proposed building an ERP balanced scorecard, but only Rosemann & Wiese (1999) have attempted to apply the balanced scorecard method to evaluate the impact of enterprise resource planning systems. The balanced scorecard (BSC) is an excellent approach for assessing the strategic impact of enterprise resource planning on a firm since it allows for the connection of the rationale for adoption with the predicted benefits (Chand et al., 2005).

The purpose of this paper is to evaluate the success and the impacts of implementing an enterprise resource planning system (ERP) in a mid-size organization in the kingdom Saudi Arabia through a generic Balanced Scorecard based method. The main hypothesis that this article started from is that the implementation of ERP instead of the older legacy systems or company's own developed systems does not always positively impact the overall performance of the firms.

Methods for Evaluating the Impacts of Implementing a New ERP System. Because they make it possible to combine different company processes and information into a single system, enterprise resource planning (ERP) systems have become a crucial component of contemporary enterprises. However, because it requires considerable time, money, and resource expenditures, implementing a new ERP system can be challenging for businesses; to ensure that the investment is worthwhile, it is crucial to assess the effects of the new ERP system. The impact of deploying a new ERP system is discussed in this article along with several evaluation techniques.

The Return on Investment (ROI) method is one of the most popular techniques for assessing the effects of an ERP system (Kumar et al., 2003). The ROI technique evaluates the ERP system's benefits and costs in order to determine which is more advantageous. Increased productivity, lower operating expenses, and higher customer satisfaction are just a few advantages that may result. The ROI approach can offer a quantitative evaluation of the new ERP system's effects and aid enterprises in decision-making.

The Balanced Scorecard (BSC) method is another approach for assessing the effects of an ERP system (Chang et al., 2010). The BSC technique analyzes the effects of the new ERP system on many performance facets of an organization, including financial, customer, internal, learning and growth processes. This approach offers a thorough evaluation of the new ERP system's effects on overall organizational performance.

Delphi approach is another technique for assessing the effects of an ERP system (Huang et al., 2004). In the Delphi process, a group of specialists are asked for their assessments on how the new ERP system would affect business operations. Employees, supervisors, clients, and other stakeholders can all be considered experts. The Delphi technique can offer a shared

understanding of the new ERP system's effects and assist in pinpointing areas that need improvement.

A thorough literature search and a systematic literature review is another approach for assessing the effects of an ERP system (Mahmood et al., 2019). An exhaustive search and analysis of research publications that have been published on the effects of ERP systems constitute a systematic literature review. Based on the current research information, this method can offer an unbiased assessment of the new ERP system's impact.

In addition to the methods mentioned above, there are other methods that can be used to assess the effects of an ERP system, including the Cost-Benefit Analysis (CBA) method (Al-Mashari & Al-Mudimigh, 2003), the Business Process Reengineering (BPR) method (Mabert et al., 2003), and the Six Sigma method (Bocij et al., 2014).

METHODOLOGY

Balanced Scorecard Overview

Kaplan and Norton first presented the balanced scorecard (BSC) as a method for measuring strategic performance in 1992. By monitoring performance from four critical perspectives (financial, customer, internal processes, and learning and growth) the BSC assists firms in coordinating their business activities with their vision and strategy (Kaplan & Norton, 1992).

Measuring the financial results of an organization's actions, such as revenue growth and profitability, is important from a financial standpoint, the ability of a business to meet customer demands is vital to measure from the standpoint of the customer, and these metrics include customer satisfaction, loyalty, and retention (Kaplan & Norton, 1992).

The efficiency and efficacy of internal processes that influence customer satisfaction and financial performance are measured from the point of view of internal processes. The ability of the organization to learn, innovate, and develop is measured by the learning and growth viewpoint (Kaplan & Norton, 1996). This is done through initiatives to train employees, deploy new technologies, and enhance processes.

Improved performance assessment, business activity alignment with vision and strategy, identification of improvement opportunities, and higher responsibility are just a few advantages that the BSC offers to organizations (Ittner & Larcker, 2003). But the BSC has also some limitations, for example, it may not be suitable for all organizations: organizations that are not profit-oriented may not find the financial perspective of the Balanced Scorecard to be relevant (Chang et al., 2010). Despite these criticisms, the flexibility of this method is a huge advantage because it allows organizations to customize the performance assessment indicators to meet their specific needs (Shen et al., 2016). Determining the organization's vision and strategy, choosing appropriate measures, establishing roles and responsibilities, communicating the BSC throughout the organization, and monitoring and modifying the BSC as necessary are all steps in the BSC implementation process (Huang & Palvia, 2001). Careful planning, solid leadership, and efficient

communication throughout the organization are necessary for the BSC implementation to be successful (Kaplan & Norton, 1992).

In conclusion, the balanced scorecard is an effective instrument for measuring strategic performance that can assist firms in coordinating their operational activities with their long-term goals and strategies. The BSC offers a thorough view of business performance from four main angles and can be used to find possibilities for improvement and raise accountability. Despite the BSC's detractors, it is still a well-liked and widely-used tool for measuring strategic performance in organizations all over the world.

The case company and the installation of Oracle ERP

The case company is considered one of the largest medicine and medical equipment distributors in the Kingdom of Saudi Arabia. In addition to the main headquarters in the city of Riyadh, it has four other branches in the kingdom. The main customers for this company are governmental and private hospitals, pharmacies, drug stores, and direct to end customers. The information system before implementing the ERP system was a bundle of multiple disconnected legacy systems that were hard to maintain and faced a lot of issues in integration with partner's IS. These legacy systems were hard to maintain, with each system used for one function solely. For example, one system to check the stock level, another system to process the purchase orders, and a third system to enter the customer orders with no ability to share data between these disconnected systems. The IT personnel were distributed in two teams, one team for supporting business applications and the other one for maintaining the IT infrastructure with a total headcount of approximately 20 personnel. In 2017, the decision was made to replace all of these legacy systems with off-the-shelf Oracle ERP systems.

One of the main reasons to implement the ERP system was to align with the company's biggest and most profitable supplier (in 2016, the net sales value of this supplier was 1,392,784,936 SAR, which equals 371,409,316 USD) and also to keep up with the new developments in the information system and preserve its competitive advantage. The company decided to implement Oracle Enterprise Resource Planning System (ERP) along with the Advanced Planning and Scheduling module (APS).

The other reasons for the ERP implementation are summarized in the table below.

Table 1 Reasons for ERP implementation

Business reasons	Technical reasons
Increase corporate expansion and enhance market share	Aligning with the main supplier's information systems
Enhance business processes efficiency	Lower company software maintenance expenses.
Reduce the company's operational and administrative costs.	Reduce data mistakes by eliminating data entry redundancy
Cut down on inventory-carrying expenses and stockouts.	Integrate cross-functional apps
Enhance the customer service ratios	
Provide unified IT support	
Streamline the internal processes	

Source: own edited, 2025.

Oracle ERP was installed in a single step, with all legacy systems replaced at the same time. A regional consulting company led the implementation process. This company was chosen solely based on cost; it was the lowest cost compared to its competitors. The role of this company was to lead the implementation process and train employees to use the new system. Despite the fact that the company demonstrated a successful history of implementing ERP systems, this was the first time they had attempted it in a company of this size and complexity. At the end of the installation process, the aim was to have one ERP system on one platform with no legacy systems.

The Oracle ERP deployment was assigned to the head of IT and the business supporting application manager, with little input from other business department leaders. There was no clear description of the metrics that would be used to assess the completion and success of this system implementation. The goals and objectives of replacing the legacy systems with one company-wide ERP system were not clearly communicated to employees and other stakeholders. The transformation to ERP was not accompanied by a change or restructuring of internal processes.

The higher management considered this project as an information system only, and because of the relatively short time period to complete this project, the data transfer process from the old legacy systems to the new ERP system was carried out hastily, and the uploaded data was not reviewed properly. The implementation process was mainly carried out by the implementer from the advisory company, with little involvement from the company's IT personnel. Due to the high cost of implementing the ERP system, management searched for ways to cut costs, so they shortened the training period. As a result, users did not receive enough training on this new platform. The implementation process started at the beginning of 2017 and went live in January 2018.

In the next part, we will discuss the effects of the ERP implementation in each group and align them with the strategic goals to understand if the ERP system achieved the desired goals, starting with the first group Business internal processes perspective.

RESULTS

The primary purpose of an ERP system from the standpoint of internal processes is to unify diverse activities across the company. The result should be more efficient business processes and a seamless, transparent flow of information (Chand et al., 2005). In the studied organization, the stock coverage KPI (key performance indicator) suddenly climbed from a good 2 months of stock coverage in 2016 to a very poor 9 months of coverage in 2018. Similarly, the inventory turnover rate worsened; it decreased from 6 rounds per year to 2 rounds per year. The same trend can also be noticed in the last KPI in this category, Inventory Days Outstanding. Against expectations, the number of days required to sell the stock increased from 63 to 192.

In summary, although the ERP system's ability to streamline the firm's internal processes in theory should enhance all the business process KPIs that were recorded in 2016, it failed to do so. In fact, all the KPIs that were recorded after the ERP implementation worsened in 2018.

Table 2 Business internal processes perspective

Business internal processes perspective			
KPI	Target	2016 Result	2018 Result
Inventory (stock) coverage	Maintain an average stock coverage between 2-4 months	2 Months Stk Coverage	9 Months Stk Coverage
Inventory turnover rate	Maintain and enhance the turnover rate	6 Rounds / Year	1.9 Rounds / Year
Inventory days outstanding	Decrease the inventory days outstanding as low as possible	63 Days	191.5 Days

Source: own edited, 2025.

The impact on customer service metrics

Visibility of available stock from ordered products is a typical necessity for the customer service and sales support team. This is required whenever a customer places an order. Prior to the implementation of the ERP system, there were no direct means to track, identify, and determine which warehouse the items were available in. As a result, salespeople had to contact and check each warehouse individually until the required item was located. This process was time-consuming, and the cost of delays was high.

Today, however, the ERP system displays the location of each SKU (stock-keeping unit) in each warehouse, allowing the salesperson to pick up and arrange delivery of the item from the nearest warehouse. As a result, all customer service KPIs improved. Even though they did not match the goals of this category, the visibility, Available-to-Promise (ATP), and Capable-to-Promise (CTP) functions provided by the ERP system helped enhance the percentage of orders delivered on the requested date, the percentage of orders delivered on the promised date, and the overall order fill rate.

Table 3 The customer perspective

Customer Perspective			
KPI	Target	2016 Result	2018 Result
% orders delivered on the requested delivery date	Enhance this percentage to at least 90%	21%	33%
% orders delivered on promised delivery date	Enhance this percentage to at least 95%	32%	51%
Order fill rate	Enhance this percentage to at least 99%	47%	88%

Source: own edited, 2025.

The impact on financial metrics

Reducing the cost of doing business has always been one of the most important goals for implementing the ERP system, as increasing the efficiency of internal processes, the timeliness of data availability, and better controls of firm activities, all of which are intended to improve the company's overall financial performance. However, on a similar trend to what we experienced from the internal processes perspective, all the financial key performance indicators worsened. For instance, the company's goal of reducing the holding inventory cost was not achieved; the inventory cost increased in 2018 by over 34% compared to the value in 2016. The total revenue decreased from \$371,409,316 in 2016 to merely \$90,000,000 in 2018, representing a decline of over 75% in revenues in 2018. Tallying those two important indicators, the company achieved a total loss at the end of 2018 of about 2,000,000 USD. In summary, the company failed drastically and miserably in achieving any of its strategic financial goals from implementing the Oracle ERP system.

Table 4 Financial perspective

Financial Perspective			
KPI	Target	2016 Result	2018 Result
Inventory Value	Reduce the holding inventory cost	\$54,859,298	\$83,784,276
Total Revenue	Increase total revenue	\$371,409,316	\$89,384,431
Net Profit / Lose	Increase net profit	\$34,460,592	-\$2,184,663

Source: own edited, 2025.

The impact on innovative and learning perspectives

The Oracle ERP business process consultants' end-user training method was based on conventional Oracle business processes. The training materials were narrative, and they were documented in big, bulky PDF files. The training procedure was ineffective since it needed several interventions to get users to be moderately adept at utilizing the new system. To reduce costs, the organization developed a new training process that included training each department solely on a very specific ERP function in two sessions per month.

In summary, the training methods and duration were insufficient, and the system went live in early 2018 with employees still unsure how to use it. Moreover, the process of transferring both

the implementation knowledge and the how-to-use in show-to-use were poorly executed. The external services of ERP consultants are still required whenever a glitch or problem occurs in the system, and the number of end-users help tickets is still relatively high even after years of the system implementation. On the other hand, after implementing the ERP system, a new innovative service was created that helped in enhancing the customer service metrics. The ATP capability allowed the customer service team to serve the customers better.

In conclusion, all the above-mentioned indicators mean that the company did not fully manage to achieve its targets in the innovative and learning perspective.

Table 5 Innovative and learning perspective

Innovative and learning perspective		
KPI	Target	2018 Result
Formal training of the staff	Adequate training for the employees to use the ERP system effectively	The training process of the employees was insufficient; a continuous intervention from the ERP team was required to support the end-users
Innovation in products or services	Create new and innovative products and services	New innovative services were created after the implementation of the ERP like direct access to the sales and inventory status of the strategic partners
Knowledge transfer	Transfer the knowledge from the implementer to the company employee during the ERP installation process	The Oracle ERP implementations were carried out mainly by an external advisory organization with limited intervention from the company's own IT specialist.

Source: own edited, 2025.

DISCUSSION

In this research, we evaluated the impacts of Oracle ERP implementation on the case organization and linked these impacts to the goals set by the organization. We used an adjusted form of the well-known balanced scorecard to examine the effect of the ERP system on the four main perspectives: Business internal processes, Customers, Financial, and Innovative and learning perspectives. The results and findings will be listed by groups.

The impact on business internal processes

In this category, we quantitatively studied the impact of the ERP system on the firm's internal processes by using three performance indicators that measure the efficiency of the business internal process. We started with the inventory (stock) coverage ratio, which was 9 months of stock coverage after implementing the ERP, compared to 2 months of stock coverage before the implementation. The target was to maintain an average stock coverage between 2-4 months. The second measured key performance indicator in this category was the inventory turnover rate. The result in 2018 after the implementation was 1.9 rounds per year, compared to 6 rounds per year in 2016. The target was to maintain and enhance the turnover rate. The third indicator used in this category was the inventory days outstanding. The achieved result after the implementation was 192 days, while the result before the implementation was 63 days, and the target was to decrease

the inventory days outstanding to as low as possible. When looking at the results achieved in 2018 after the implementation of the ERP system, we conclude that the organization failed to enhance any of these measures, and the efficiency of its internal operation worsened as compared to 2016 (before implementation) and the assigned goals.

The impact on customer service metrics

The quantitative results for the ERP implementation are as follows: First, the percentage of orders delivered on the requested delivery date improved to 33% after implementation, compared to 21% in 2016. However, the target of achieving at least 90% was not met. Second, the percentage of orders delivered on the promised delivery date improved to 51% in 2018, an improvement from 32% before implementation. Despite this, the target of achieving at least 95% was not met. The last measure is the order fill rate, which witnessed the biggest improvement in this category, improving from 47% in 2016 to 88% in 2018. However, the target was still not met. Overall, while the company witnessed improvements in all KPIs, it fell short of achieving the set targets for each metric.

The impact on financial metrics

Arguably the most important perspective to be taken into account before deciding on implementing the ERP system is the financial perspective. Starting with the inventory value indicator, the target for this metric was to reduce the holding inventory cost, but the result after the implementation shows an increase in the stock value (\$83,784,276) compared to \$54,859,298 in 2016. The second indicator is the total revenue: the total revenue of the case organization decreased after the implementation of the ERP by more than 75% (\$89,384,431) in comparison to 2016 (\$371,409,316), while the target was to increase the total revenue. The net profit/loss: the organization realized a net profit in 2016 of \$34,460,592, but after implementing the ERP, the company suffered a net loss of (\$2,184,663) in 2018. The numbers speak for themselves in the most important category. All the measured key metrics decreased, and as a result, the company suffered a net loss of over 2,000,000 USD.

The impacts on innovative and learning perspective

We evaluated the impact of ERP implementation on the organization's Innovative and learning perspective using an adjusted Balanced Scorecard framework. We measured the impact through three metrics. First, the Formal training of the staff metric aimed to provide sufficient training to employees to use the ERP effectively. However, the results indicate that the training process was insufficient, and continuous intervention from the ERP team was required to support the end-users. Second, the Innovation in products or services metric aimed to create new and innovative products and services. The implementation resulted in a new innovative service created after the implementation of the ERP, allowing strategic partners to coordinate their activities without intervention from the case company. The last metric is Knowledge transfer, which aimed to transfer knowledge from the implementer to the company employee during the ERP installation process. However, the ERP implementation was mainly carried out by an external advisory

organization with limited intervention from the company's own IT specialist. In summary, the organization failed to achieve its goals except for the innovation part in which new services were created that added some value for the organization's partners.

The reasons for the failure

After examining the impacts of the ERP implementation on the case organization from four different perspectives, we can conclude that it failed to achieve its set goals and even worsened all the previous measurements, except for the customer perspective where the results in 2018 were slightly better, although still falling short of the set objective. We consider this implementation process a total failure, as defined by Gargeya and Brady (2005), where the firm incurs considerable long-term financial harm due to the failure.

The reasons for the failure can be summarized as follows: first, lack of top management commitment. In our case organization, the decision to implement the ERP system was viewed as an IT project, and the head of IT was assigned as the project leader with little input from other departments. Additionally, in an attempt to reduce costs, the new system was implemented using a one-phase approach. Secondly, poor training. Cutting back on training expenses can substantially jeopardize the long-term success of an ERP implementation, as employees may not be fully prepared to use the new system. In our case firm, the new system was rolled out while the end-users still lacked sufficient training. Thirdly, worker resistance. Employees may resist new ERP software if they are not comfortable using it, which can be traced back to poor training. Fourthly, the degree of detail in ERP systems is often too complicated for making sound decisions, leading to confusion and uncertainty among users. Fifthly, external product market changes can have a significant impact on the success of an ERP implementation. In our case, there was a drop in the firm's product market during the deployment, which can be seen in the financial perspective KPIs, where the total revenue and net profit dramatically worsened. Lastly, the software itself played a role in the failure. The company purchased an off-the-shelf Oracle ERP system without considering the organization's specific needs, resulting in considerable delays and additional financial costs due to extensive customization requirements.

Overall, addressing these issues could have led to a more successful implementation of the ERP system in the case organization.

CONCLUSION

The enterprise resource planning system (ERP), particularly its predecessors from the MRP-Type system family, has had a significant impact on manufacturing and supply chain management. Today, businesses and organizations worldwide are becoming more connected, and rising customer demand has driven the supply chain and manufacturing industries toward greater customization and niche markets. This has resulted in unprecedented complexity in manufacturing processes and demands, making it nearly impossible to execute them without MRP-Type systems.

In conclusion, all key performance indicators (KPIs) related to the first category, Business Internal Processes, which examine the ERP impact on business internal efficiency, worsened compared to pre-implementation ratios. The same is true for the impact on the company's financial perspective, as the net loss after implementation was USD 2,000,000. The targets set for the innovation and learning perspective were not achieved either, except for the implementation of new services. The last category taken into consideration was the customer perspective, in which all KPIs improved compared to the pre-implementation era, but the organization still failed to meet the set percentages for this group. Overall, the implementation of ERP in the case organization can be considered a total failure.

The recommendations drawn from this study can be applied to any future projects that involve implementing an enterprise resource planning system. In our research we studied the impact of ERP on virtually every aspect of the organization, which means that the installation of an ERP transforms how firms conduct business and how employees fulfill their tasks. Therefore, a number of recommendations are listed below against each reason for the failure that occurred in our case organization:

A. Lack of top management commitment: In our case organization, when the decision was taken to implement the ERP system, the top management saw it as only an IT project and assigned the head of IT in the company as a leader for the project with little to no feedback from other departments, and in an attempt to reduce the cost, they implemented the new system in one phase.

a) A recommendation here is that the company should not think of the ERP system as just a technical task. The implementation of an ERP system is a business-wide project, in which businesses should try to align the technological capabilities of the ERP software with the company's business needs.

B. Poor training: When firms try to cut back on the training expense in a try to reduce the total cost of deploying an ERP system, this will substantially jeopardize long-term success, and this is exactly what happened in our case firm, the new system went live while its end-users were not fully sure of how to use it.

b) The recommendation here is that proper training is one of the cornerstones on which the successful implementation of the ERP system depends. The company should invest generously in employee training to realize the full benefits of the ERP system.

C. Workers' resistance: The employees resisted the implementation of the new ERP software because they were not comfortable using it.

c) Recommendation: The higher management should convince all the stakeholders of the strategic advantages of the ERP system and take measures to ensure that the employees are adequately trained and engaged in the implementation process.

D. The degree of detail in ERP systems is too complicated for making sound decisions.

d) Recommendation: Although ERP systems contain a lot of complicated details, they also possess a lot of possibilities. This problem can be mitigated by choosing an appropriate type of ERP system and investing well in training.

E. 'External Product Market Change': An important factor is a drop in the firm's product market during deployment, which can be seen in the financial perspective KPIs, where total revenue and net profit dramatically worsened.

e) Recommendation: Choose a suitable time to invest in a new system that normally costs millions. The internal and external factors must be thoroughly examined before proceeding with the implementation project.

F. 'Software': The company purchased an 'off-the-shelf' Oracle ERP system without any consideration of the company's special needs. As a result, there was a considerable delay in the implementation process and huge extra financial cost incurred due to the extensive customization required to make the system work for the organization.

f) Recommendation: The company-specific needs and projected plan must be taken into consideration during the selection phase of the new ERP system to avoid incompatibility and excessive customization.

Conflict of interest:

The authors declare no conflict of interest.

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TRANSFORMING RECRUITMENT: THE ROLE OF E-MARKETING IN A POST-COVID WORLD

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Abstract: The COVID-19 pandemic has profoundly reshaped business practices, particularly in marketing and recruitment. This study aims to explore the integration of e-marketing strategies into recruitment processes in the post-pandemic era, emphasizing their significance and impact. The research objectives include identifying key trends, innovations, and challenges associated with digital marketing's role in human resource management, providing a rationale for understanding its transformative potential. Methodologically, the study employs a bibliometric approach, analysing 1,391 publications using tools such as Bibliometrix, VOSviewer, and CitNetExplorer. These tools facilitate a systematic examination of research trends, intellectual advancements, and conceptual frameworks. The dataset was curated from the Web of Science database, focusing on publications from 2020 to 2024, ensuring relevance to post-pandemic dynamics. The findings highlight the critical role of technologies like artificial intelligence, machine learning, and big data analytics in optimizing recruitment and enhancing marketing efficiency. Social media platforms, including LinkedIn, Facebook, and Instagram, have proven invaluable for real-time communication and brand engagement. However, challenges such as data privacy concerns and algorithmic biases underscore the need for ethical practices. Furthermore, the study's cluster analysis reveals significant themes, including post-pandemic recovery in recruitment, digital transformation in marketing, and the psychosocial impact of social media. This research contributes to the broader discourse on digital transformation, emphasizing the strategic alignment of technological innovation and ethical considerations. It provides a comprehensive framework for understanding how e-marketing can enhance recruitment efficiency, foster organizational competitiveness, and address emerging challenges in a digitally driven landscape.

Keywords: bibliometrics, hiring, pandemic, social media

INTRODUCTION

The COVID-19 pandemic has fundamentally reshaped organizational processes, including recruitment, leading to an accelerated adoption of e-marketing techniques. With the global shift towards remote work and digital platforms, the integration of e-marketing in human resource management has emerged as a critical area of study. This research examines the intersection of digital marketing and recruitment, focusing on how organizations have leveraged e-marketing strategies to address challenges posed by the pandemic.

Bibliometric analysis offers a powerful tool to map the intellectual landscape of this evolving field. By analyzing a vast dataset of 1,391 publications, this study uncovers key trends,

innovations, and strategic directions in e-marketing and recruitment research. Previous studies have highlighted the transformative potential of digital technologies, yet a comprehensive understanding of their application in recruitment processes remains limited. This study aims to bridge that gap, providing a detailed exploration of the field's development, key themes, and emerging trends.

The methodology combines advanced bibliometric tools, including Bibliometrix for statistical analysis, VOSviewer for visualization, and CitNetExplorer for network mapping. Together, these tools enable a systematic examination of literature, offering insights into the conceptual and strategic frameworks shaping the field. The study's findings contribute to the broader discourse on digital transformation, emphasizing the role of e-marketing in enhancing recruitment efficiency, competitiveness, and strategic alignment in a post-pandemic world.

LITERATURE REVIEW

The COVID-19 pandemic has dramatically reshaped global business practices, particularly in marketing and recruitment strategies. Organizations swiftly embraced digital platforms to ensure continuity and competitiveness during lockdowns and remote work environments (Chen & Wang, 2021). The increased adoption of e-marketing techniques has played a crucial role in helping businesses attract talent, engage customers, and manage operations effectively (Liu et al., 2023).

Digital transformation emerged as a necessity rather than a choice for companies seeking to stay competitive. Artificial intelligence (AI), machine learning, and big data analytics became integral tools for personalized marketing campaigns and efficient candidate sourcing (Silva & Fernandes, 2023). Social media platforms such as LinkedIn, Facebook, and Instagram proved invaluable for real-time communication and brand management (Singh & Kumar, 2023). However, the surge in digital activities highlighted challenges like data privacy concerns and algorithmic biases (Patel & Johnson, 2022).

Zhang et al. (2024) demonstrates how marketing strategies and social media reviews positively influence online purchasing intentions, with customer satisfaction serving as an internal mediator that amplifies the effects of both. Organisational commitment further strengthens this relationship by acting as a moderator between satisfaction and purchase intention, enhancing trust and loyalty.

Online businesses need logistics to reach customers. Shopping satisfaction affects client buy intent. The findings indicate that there are five key factors that can have a positive impact on consumers' intentions to purchase online: price, quality, logistics, comments, and the environment. It is worth noting that price plays a significant role in moderating the effects of environment and quality. The findings align closely with prior studies in the field (Zhang & Rudnák, 2023).

Several studies emphasize the role of bibliometric analyses in mapping these emerging trends, revealing a growing interest in themes like influencer marketing, international marketing

strategies, and the digital transformation of recruitment practices (Van Eck & Waltman, 2014). Rovira et al. (2022) highlight the significance of search engine optimization in improving visibility and reach during the pandemic. Similarly, Hota et al. (2023) explore social media's influence on consumer engagement and brand loyalty post-pandemic.

In periods of transition and transformation, the positive effects of change, such as innovation and development, tend to be emphasized (Bujdosó et al., 2024). The need for an immediate and effective response to change is reflected in the change management activity, which has become an essential factor in a dynamic business environment. The role of managers is also unquestionable in successful transformation, in managing the process of change in the company. Leaders are also responsible for initiating and managing change, so they must not only lead change but also inspire teams. Managing employees' reactions and involving them in the process can play a major role in keeping the transformation moving in a positive direction (Bujdosó & Rudnák, 2024).

Organizations must now strike a balance between technological innovation and ethical practices in marketing and recruitment strategies. Studies continue to explore these dynamics, highlighting the evolving landscape of digital marketing in the post-pandemic era (Cobo et al., 2022). This paper employs bibliometric methods to analyse 1,391 publications on e-marketing strategies and their adaptation to the post-pandemic challenges.

The application of bibliometrics is increasingly being adopted across various fields. It is especially effective in charting scientific domains during a period when the focus on empirical studies generates extensive, fragmented, and sometimes contradictory research paths. Science mapping is a multifaceted and labour-intensive process, involving numerous stages and frequently requiring a range of software tools, many of which are not freely accessible. The bibliometrix package in R facilitates the recommended procedures for conducting bibliometric analysis (Aria & Cuccurullo, 2017).

VOSviewer is a free software tool designed for constructing and visualizing bibliometric maps. In contrast to most other software utilized for bibliometric mapping, VOSviewer places significant emphasis on the graphical depiction of bibliometric maps. Its features are particularly advantageous for presenting extensive bibliometric maps in a clear and comprehensible format (Van Eck & Waltman, 2009).

Search engine optimization encompasses a series of techniques aimed at improving a website's visibility and increasing web traffic by enhancing its ranking on search engine results pages. Ranking is a crucial element in any information retrieval system, as it determines how results are presented to users (Rovira et al., 2022).

CitNetExplorer is an innovative software tool designed for the analysis and visualization of citation networks within scientific publications. It can be employed to explore the progression of a research domain, outline the literature related to a specific topic, and assist with systematic literature reviews. CitNetExplorer is frequently applied in the analysis of scientometric studies and in examining the representation of communities within networks (Van Eck & Waltman, 2014).

METHODOLOGY

The research utilized the Web of Science database, considering publications dated from 2020 up to November 26, 2024.

To refine the search strategy, multiple keyword combinations were tested. The outcomes were evaluated, and the most reliable and meaningful results were obtained using the following keyword combinations:

TS= (((("impact") OR ("effect") OR ("consequenc*") OR ("result*") OR ("influenc*") OR ("affect*")) AND (("marketing" OR "emarketing" OR ("online marketing"))) AND ("employ*" OR "recruit*" OR "select*" OR "hiring") AND "process"))), Timespan: from 2020 up to 26 November 2024.

Complete records and cited references were collected, with missing citations supplemented and duplicates removed. This process resulted in a total of 1,391 bibliometric units compiled.

The analysis of these units employed established methodologies in modern bibliometrics, integrating natural language processing, big data techniques, and algorithms to uncover generalizable patterns through word co-occurrence and co-citation analysis. A comprehensive bibliometric evaluation was conducted using the Bibliometrix R package. Methodological triangulation was employed throughout the study, utilizing various cluster analysis techniques to investigate the foundational aspects, internal structure, and strategic trends of research in e-marketing and recruitment processes.

In the initial phase, we focused on the temporal development of the research field. The CitNetExplorer visualization tool proved invaluable in identifying pivotal publications and tracing the intellectual lineage of key studies. The next phase utilized the VOSviewer application, offering an efficient approach to grouping publications based on keyword similarities. Finally, the third phase implemented the Bibliometrix science mapping algorithm to further analyse the field.

RESULTS

The research utilized the Web of Science database, considering publications dated from 2020 up to November 26, 2024.

Overview of dataset

The dataset consisted of 1,391 documents, with the average citation rate per document being notably high, exceeding 7.01.

Many of the articles were authored in China (17%), the USA (11%), India (5%), the UK (4%), Iran (3%), and Australia (3%).

When examining the sources based on the publishing journals, most relevant papers have been published in a relatively small group of journals. The journal Sustainability published three times as many articles as the second most active journal. The ranking of the leading journals is presented in Table 1.

Table 1 Ranking of the top journals by the number of published marketing / COVID articles

Journal	Rank	Published Articles
SUSTAINABILITY	1	47
COGENT BUSINESS & MANAGEMENT	2	11
IEEE ACCESS	3	11
MARKETING AND MANAGEMENT OF INNOVATIONS	4	11
HELIYON	5	10
JOURNAL OF BUSINESS-TO-BUSINESS MARKETING	6	10
ASIA PACIFIC JOURNAL OF MARKETING AND LOGISTICS	7	9
INTERNATIONAL JOURNAL OF CONTEMPORARY HOSPITALITY MANAGEMENT	8	9
JOURNAL OF BUSINESS & INDUSTRIAL MARKETING	9	9
EUROPEAN JOURNAL OF MARKETING	10	8
INDUSTRIAL MARKETING MANAGEMENT	11	8
INFORMATION PROCESSING & MANAGEMENT	12	8
INTERNATIONAL JOURNAL OF BANK MARKETING	13	8
JOURNAL OF BUSINESS RESEARCH	14	8
APPLIED SOFT COMPUTING	15	7
INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH	16	7
JOURNAL OF CLEANER PRODUCTION	17	7
JOURNAL OF DISTRIBUTION SCIENCE	18	7
JOURNAL OF PRODUCT AND BRAND MANAGEMENT	19	7
MARKETING INTELLIGENCE & PLANNING	20	7
ENVIRONMENT DEVELOPMENT AND SUSTAINABILITY	21	6
EXPERT SYSTEMS WITH APPLICATIONS	22	6
INFORMATION	23	6
INTERNATIONAL JOURNAL OF SPORTS MARKETING & SPONSORSHIP	24	6
JOURNAL OF ASIAN FINANCE ECONOMICS AND BUSINESS	25	6

Source: RStudio, n = 1,391.

Results of the cluster analysis

The Intellectual Roots of Research

The publications were grouped using three different approaches. The first categorization is based on their intellectual foundations. The CitNetExplorer software algorithms identified five distinct clusters. The distribution of articles across these five clusters is shown in Figure 1.

Figure 1 Number of articles in the different clusters by the intellectual bases of the research



Source: CitNetExplorer, n = 1,391.

The largest group of publications focuses on post-pandemic recovery on recruitment processes (468 publications, Cluster No. I/1). The COVID-19 pandemic resulted in temporary holds placed on new trial startups, patient recruitment and follow up visits for trials which contributed to major disruptions in cancer centre trial unit operations. To assess the impact, the Canadian Cancer Clinical Trials Network (3CTN) members participated in regional meetings and a survey to understand the impact of the pandemic to academic cancer clinical trials (ACCT) activity, cancer trial unit operations and supports needed for post-pandemic recovery. Trial performance and recruitment data collected from 1 April 2020–31 March 2021 was compared to the same period in previous years. From 1 April–30 June 2020, patient recruitment decreased by 67.5% and trial site activations decreased by 81% compared to the same period in 2019. Recovery to reopen and recruitment of ACCTs began after three months, which was faster than initially projected. However, ongoing COVID-19 impacts on trial unit staffing and operations continue to contribute to delayed trial activations, lower patient recruitment and may further strain centres' capacity for participation in academic-sponsored trials (Sundquist et al., 2022).

The second cluster analyses the digital transformation of marketing (409 publications, Cluster No. I/2). Digital transformation has a substantial impact on the activities of public organizations. The way public organizations conduct marketing has also changed due to digital transformation. This paper evaluates how digital transformation influences public organizations' marketing activities in their employees' perception and examines the changes triggered by digital technology in public marketing. The research results are based on the literature review empirical studies based on a survey conducted among 425 employees of public organizations in Romania in the marketing field. Using technology acceptance model and structural equation modelling to analyse and interpret the data, the paper demonstrates that digital technologies have a substantial impact on marketing, in the perception of technology users, in helping to build relationships with the public, and in increasing citizens' trust in public organizations. Digital technologies, by their significant characteristics (innovativeness, social influence, accessibility, and rapidity), have a significant impact on all public marketing activities. However, they are substantially transforming quantitative marketing research activities due to the digitization of financial accounting and managerial information systems, as well as interactive and transparent communication and public relations activities. Public organization managers must explain the

benefits of digital marketing to employees from the internal branding perspective as well as the effectiveness of public marketing activities (Varzaru, 2023).

Papers assigned to the third cluster analyse the social media influence on marketing (270 publications, Cluster No. I/3). It is becoming more and more promising that marketers hire influencers to launch campaigns for spreading items (e.g. articles or videos about products) over social media platforms. Such social media influencer marketing may generate tremendous utility if the influencers persuade their followers to adopt the recommended items. This could further spur extensive spontaneous item propagation on social media. Although prior studies mainly focus on influencer-selection strategies by the influencers' traits, marketers with several items are often requested to determine both influencers and marketing items. The appropriateness between influencers and items is critical but rarely considered in prior influence-identification methods. We thus formulate and solve a novel cost-effective social media influencer marketing problem to maximize marketers' utility by selecting appropriate pairwise combinations of influencers and items (i.e., item-influencer pairs). We first model utility functions and propose a simulation-based method to estimate the appropriateness of arbitrarily given item-influencer pairs by their potential utility. With the estimated utility, we devise an algorithm to iteratively select appropriate item-influencer pairs under various realistic conditions, including marketers' budget, influencers' payments, item-user fitness, social propagation, and influencers' marketing slots. We theoretically prove that the marketing utility achieved by our method is near-optimal. We also conduct extensive empirical experiments with three real-world data sets to verify the superiority of our method in terms of cost-effectiveness and computational efficiency. Lastly, we discuss insightful theoretical and practical implications (Han et al., 2023).

The fourth cluster is focusing on the international marketing strategy (182 publications, Cluster No. I/4). This paper aims to identify the revised international marketing strategies in communication during the COVID-19 pandemic by utilizing the firm's resources and capabilities. We conducted in-depth interviews and a questionnaire survey with key stakeholders of retail organizations that changed their digital marketing strategies during COVID-19. The data was collected from 587 respondents from different parts of the world through resource orchestration theory. The qualitative findings support a high degree of association among the firm's resources and capabilities, leveraging processes based on the revised international marketing strategies during the COVID-19 pandemic. We have developed a conceptual model based on these findings with six variables: leveraging process of the firm's capabilities, information technology-related resources, information technology-related capabilities, dynamic capabilities, environmental uncertainty, and leveraging process of the firm's resources. However, environmental uncertainty and leveraging of the firm's resources were not influential in forming digital marketing strategies during COVID-19. This study proposes a new process for international marketing managers in business organizations to restructure the resources within their organizations by creating new capabilities and leveraging them (Paul & Rosado-Serrano, 2023).

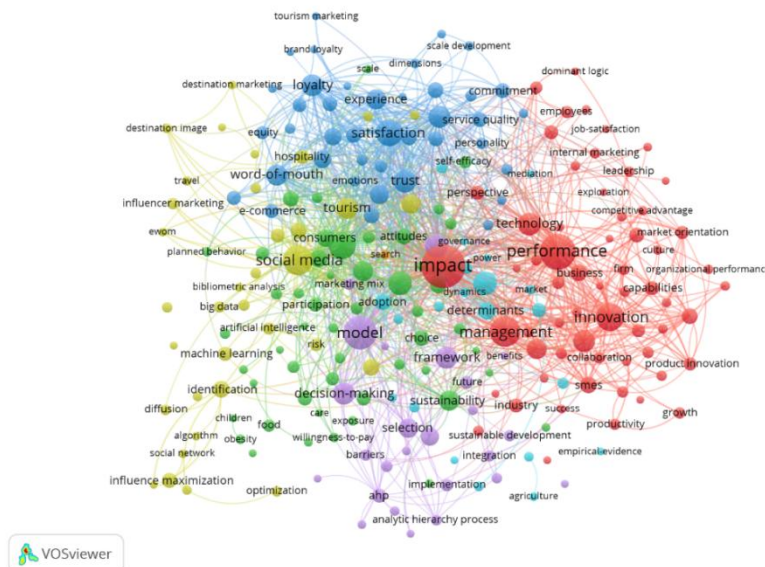
The fifth cluster considers the fuzzy clustering (61 publications, Cluster No. I/5). Fuzzy clustering algorithms have been widely used to reveal the possible hidden structure of data.

However, with the increasing amount of data, large-scale datasets have brought genuine challenges for fuzzy clustering. Most fuzzy clustering algorithms suffer from the long time-consumption problem since a large amount of distance calculations are involved in updating the solution per iteration. To address this problem, we introduce the popular anchor graph technique for fuzzy clustering and propose a scalable fuzzy clustering algorithm referred to as Scalable Fuzzy Clustering with Anchor Graph (SFCAG). The main characteristic of SFCAG is that it addresses the scalability issue plaguing fuzzy clustering from two perspectives: anchor graph construction and membership matrix learning. Specifically, we select a small number of anchors and construct a sparse anchor graph, which is beneficial in reducing the computational complexity. We then formulate a trace ratio model, which is parameter-free, to learn the membership matrix of anchors to speed up the clustering procedure. In addition, the proposed method enjoys linear complexity with respect to the data size. Extensive experiments performed on both synthetic and real-world datasets demonstrate the superiority (both effectiveness and scalability) of the proposed method over some representative large-scale clustering methods (Zhang & Chen, 2023).

The conceptual structure of research directions based on co-citation analysis

Our second approach involves analysing the articles based on the co-occurrence of various keywords found in the abstracts, titles, and keywords of the publications. The findings of this analysis are summarized in Figure 2. This approach allows for the visualization of a very broad range of explored topics.

Figure 2 Co-occurrence of words analysis



Source: VOSViewer, n = 1,391.

Publications were grouped by references. A detailed explanation of the algorithm can be found in Hota et al. (2019), where they use bibliometric analysis to empirically analyse research published

between 1996 and 2017 on social entrepreneurship, using citation analysis, document co-citation analysis and social network analysis methods.

Through the examination of e-marketing research outcomes, seven separate clusters can be distinguished based on the frequent co-occurrence of terms. The distribution and content of these clusters are visually summarized in Table 2.

In the Post-COVID Challenges in E-Marketing cluster (II/1., red), the emphasis lies on the strategic adaptations businesses have made in the wake of the pandemic. This cluster (57 items) explores themes like innovation, dynamic capabilities, and competitiveness. The focus is on how firms build resilience and leveraging their capabilities to achieve long-term growth and success in the post-pandemic market.

The Sustainability and Social Marketing cluster (II/2., green) includes 55 publications, emphasizing the integration of sustainable practices into marketing strategies, with a particular focus on social behavior and attitudes. Topics such as consumer preferences, motivations, and the promotion of environmentally friendly products dominate this cluster, reflecting a shift toward value-driven marketing in both higher education and general consumer contexts.

In the Digital Age Marketing and Recruitment cluster (II/3., blue, 36 items), publications focus on the interplay between advanced technologies and modern marketing strategies. Central topics include artificial intelligence, big data, and machine learning, emphasizing their application in areas like optimization, selection process, and social networks. It highlights the role of digital tools and information technology in driving business performance and value creation and how frameworks and systems are evolving to adapt to the digital age, with a particular emphasis on B2B strategies, hiring processes and media transformation.

The Social Media and the Psycho-Social Impact cluster (II/4., yellow, 32 items) explores the influence of social media on consumer behaviour and emotional engagement. Core topics include influencer marketing, word-of-mouth strategies, and brand image. This cluster focuses on the psychosocial dimensions of marketing, examining how emotions, personality, and community-building efforts shape consumer interactions within digital platforms.

The Impact of COVID-19 on Hospitality and Tourism Marketing cluster (II/5., purple, 32 items) examines the profound effects of the pandemic on sectors like travel and hospitality. Publications address topics such as recovery strategies, customer satisfaction, and trust-building. Key themes include e-commerce, health, and the relationship between marketing and tourism destinations. This cluster sheds light on how industries are rebuilding relationships with customers while adapting to new health and safety expectations.

The Navigating Industry Dynamics cluster (II/6., light-blue, 23 items) focuses on industry-specific challenges and opportunities. Topics such as governance, reputation, and strategic management are central. China plays a pivotal role in this cluster, often tied to discussions of uncertainty, environmental dynamics, and industry-level determinants of success.

Leadership and Communication cluster (II/7., orange, 19 items) emphasizes the human and organizational aspects of marketing. Topics such as transformational leadership, internal marketing, and collaboration dominate the discussion. This cluster highlights the importance of

effective communication and leadership in fostering value co-creation, organizational commitment, and development during challenging times.

Table 2 The cluster structure based on of word co-occurrence

<p>Post-COVID Challenges in E-Marketing (Cluster No. II/1) (total: 57 items)</p>
<p>adoption, benefits, business performance, capabilities, challenges, competitiveness, cooperation, corporate social responsibility, creation, culture, decision, dynamic capabilities, evolution, exploration, financial performance, firm, future, growth, information technology, innovation, performance, strategy, success, value creation</p>
<p>Sustainability and Social Marketing (Cluster No. II/2) (total: 55 items)</p>
<p>attitudes, behaviour, care, children, choice, competition, green marketing, higher education, implementation, internet, meta-analysis, interventions, motivations, participation, perception, physical-activity, price, preferences, products, promotion, quality, recruitment, scale, social marketing, students, sustainability, user acceptance, values, willingness-to-pay</p>
<p>Digital Age Marketing and Recruitment (Cluster No. II/3) (total: 36 items)</p>
<p>artificial intelligence, b2b, big data, classification, demand, Facebook, framework, hiring, identification, machine learning, media, model, optimization, recruitment, selection, social network, supplier selection, supply chain, system</p>
<p>Social media and the Psycho-Social Impact (Cluster No. II/4) (total: 32 items)</p>
<p>advertising, brand, community, consumer, context, emotions, engagement, image, influencer marketing, personality, search, social media, word-of-mouth</p>
<p>The Impact of COVID-19 on Hospitality and Tourism Marketing (Cluster No. II/5) (total: 32 items)</p>
<p>bibliometric analysis, co-creation, Covid-19, customer, destination, dimensions, e-commerce, energy, health, hospitality, impact, recovery, relationship-management, satisfaction, tourism marketing, travel, trust</p>
<p>Navigating Industry Dynamics (Cluster No. II/6) (total: 23 items)</p>
<p>agriculture, China, cluster analysis, determinants, environment, governance, industry, reputation, power, sales, strategic management, uncertainty</p>
<p>Leadership and communication (Cluster No. II/7) (total: 19 items)</p>
<p>collaboration, commitment, communication, development, dominant logic, employees, internal marketing, leadership, outcomes, support, transformational leaders, value co-creation</p>

Source: VOSViewer, n = 1,391.

The strategic map of publications

The strategic map for this study draws on the work of Cobo et al. (2012), who introduced SciMAT, an innovative open-source software tool for conducting scientific map analyses within a longitudinal framework. SciMAT includes several modules to guide analysts through every stage of the scientific mapping workflow. Notable features of SciMAT, distinguishing it from other science mapping tools, include: (a) a robust pre-processing module for cleaning raw bibliographic data, (b) the application of bibliometric metrics to assess the impact of analysed items, and (c) a user-friendly wizard for configuring analyses.

On the strategic map, density (Y-axis) reflects the internal coherence, strength, and interconnectedness of clusters. Higher density signifies those elements within a cluster, such as keywords or articles, are closely related and form a cohesive group. Centrality (X-axis) indicates a cluster's significance within the overall research landscape, with higher centrality suggesting strong connections to other clusters and an influential role in the broader research network.

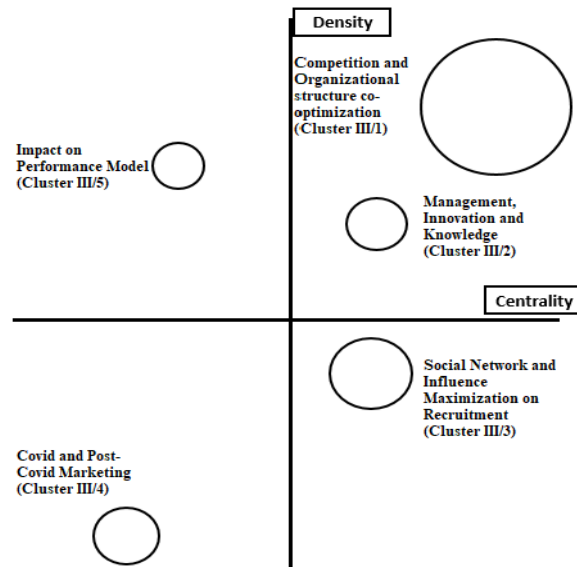
As depicted in Figure 3, cluster III/1 exhibits both high density and high centrality. This cluster is internally cohesive and exerts substantial influence on the broader research field. Its focus on competition dynamics and optimizing organizational structures underscores its strategic importance, serving as a pivotal link between various research themes.

Cluster III/3. has moderate density and high centrality. This cluster has strong external connections, but relatively lower internal coherence compared to Cluster III/1. It highlights the role of social networks in enhancing recruitment strategies and influence maximization. External connectivity indicates its importance in linking recruitment-related research to other domains.

The direction of Cluster III/2 is moderate density and low centrality, relatively isolated, with weak internal connections and external links and explores the marketing strategies adopted during and after the COVID-19 pandemic. The lower density and centrality suggest that this topic may be emerging or less integrated with the broader research landscape.

The impact on performance model's (Cluster III/5.) direction is moderate density and low centrality, has moderate internal coherence but low external connectivity and focuses on evaluating the impact of various factors on performance models. Its limited external connections indicate that it operates as a niche topic without strong links to broader research themes.

Figure 3 The strategic map of marketing related publications



Source: RStudio, n = 1,391.

DISCUSSION

This study sheds light on the transformative impact of e-marketing strategies in recruitment, particularly in addressing challenges posed by the COVID-19 pandemic. The bibliometric analysis reveals several key findings and highlights.

The pandemic accelerated the adoption of technologies such as AI, machine learning, and big data analytics, enabling organizations to personalize marketing campaigns and streamline recruitment processes. Tools like VOSviewer and CitNetExplorer demonstrated how these innovations facilitate the mapping of trends and intellectual advancements in digital marketing and recruitment.

Platforms like LinkedIn, Facebook, and Instagram emerged as vital channels for engaging potential candidates and building organizational brands. The ability to communicate in real-time significantly enhanced the recruitment process, enabling broader reach and deeper candidate engagement.

Despite the benefits of digital transformation, concerns about data privacy and algorithmic biases remain critical. Ethical e-marketing practices must balance technological innovation with respect for user rights and transparency.

Businesses have demonstrated resilience by reorienting their strategies to meet the demands of a digitally driven market. This includes leveraging dynamic capabilities and sustainability-focused practices to ensure long-term growth and competitiveness.

The study identified distinct research clusters such as post-pandemic recovery in recruitment, the digital transformation of marketing, and the psychosocial impact of social media on consumer behaviour. These clusters provide a comprehensive understanding of the field's development and highlight areas requiring further exploration.

The integration of e-marketing into recruitment has reshaped traditional practices, offering both opportunities and challenges. The findings emphasize the importance of strategic alignment between technological advancements and ethical considerations, ensuring that organizations remain competitive and socially responsible in a rapidly evolving digital landscape.

CONCLUSION

This study provides valuable insights into the evolving role of e-marketing in recruitment, demonstrating its profound impact on talent acquisition in a post-pandemic world. The integration of AI, machine learning, and big data analytics has revolutionized hiring processes, enabling companies to attract, assess, and engage candidates more effectively. However, as organizations increasingly rely on digital tools, they must also address ethical concerns, including data privacy and algorithmic fairness.

The findings highlight the critical role of social media platforms in modern recruitment, offering enhanced connectivity and branding opportunities for businesses. While digital transformation presents numerous benefits, it also necessitates a strategic balance between technological innovation and human-centric hiring practices. Companies must ensure that recruitment strategies remain inclusive, transparent, and adaptable to the changing labour market landscape.

Looking ahead, future research should delve deeper into the long-term implications of e-marketing-driven recruitment, particularly in areas such as workforce diversity and employee retention. As technology continues to reshape the hiring landscape, organizations that embrace a forward-thinking, ethical approach to digital recruitment will be better positioned to attract top talent and maintain a competitive edge in the global job market.

Conflict of interest:

The authors declare no conflict of interest.

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HIGHER EDUCATION – LOCAL AND GLOBAL DYNAMICS

THE UNIVERSITY AS A HUB OF ATTRACTION: EXAMINING THE INFLUENCE OF LOCALIZATION AND FAMILY ON UNIVERSITY CHOICE DECISIONS IN HUNGARY

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Abstract: This study seeks to examine the attractiveness of higher education institutions as community spaces for students and the significance of the services they provide. It aims to explore students' perspectives on planning their long-term futures, particularly in assessing whether the university environment serves as a stronger influence than their place of origin or family background. The role of the university is particularly significant if it is located outside the student's town of origin, so the student's decision to attend a particular institution is not necessarily based on the specific undergraduate program or the prestige of the university. The study combines a review of national and international literature with an empirical investigation, utilizing a questionnaire survey to analyze students' decision-making processes. Many students perceive the university as a transitional "island" offering a temporary space to inhabit before embarking on their future careers. The degree obtained serves as a "passport" to professional opportunities, while the university experience provides a unique community environment and represents a significant step toward independence and separation from familial influence. These findings hold particular relevance for universities, which are continually redefining their roles in response to changing student expectations. Many students view the university not merely as a site of learning but as a precursor to adulthood and a foundational space for personal growth. This study addresses a gap in the existing literature by focusing on the appeal of universities as local hubs and comparing their influence to the retaining power of family ties, offering insights for student development.

Keywords: family influence, hub of attraction, locality, university reputation, university ranking

INTRODUCTION

The development of universities as hubs of attraction in the process of higher education development now seems a natural development trend, as most higher education institutions are not only an integral part of a region, but also a major economic and socio-cultural factor. It is questionable, however, whether students also see this role as important; indeed, do they realize that their university of choice can be more than just a place of education? Universities have long been moving in a direction of development to promote student mobility, both at home and abroad. This strategy is also a premise of their sustainability. Internationalization is now one of the best-known manifestations of this gradual process, which has been going on for decades, but we are increasingly hearing about the Third Mission, which is not only a strategic catalyst for universities as hubs of attraction, but also an intellectual one. However, the question is still not clearly answered: if higher education development policy in general is moving in this direction and universities' own efforts are also increasingly effective in this area, are students also part of this process? Is it not possible that, while the institutions do, the students do not want to be part of the university community in the long term, but rather only for the duration of their bachelor's

or master's degree? Can we even talk about motivations that encourage students to stay (settle) in university towns and cities, so that they themselves become part of the regions shaped by the universities that are becoming hubs of attraction? In my current research, I have attempted to find some leads in order to establish the basis for a study mapping students' career preferences with the help of certain factors.

LITERATURE REVIEW – INSTITUTIONAL APPROACH

The internationalization of higher education institutions and the role of mobility in development

The internationalization of higher education has created new potential markets for students (alongside opportunities to participate in research collaborations) opened universities to market competition and made comparison with other countries a key factor. The growing importance of knowledge production and innovation in economic life has created new potential roles for universities and challenged the traditional social privileges and monopolies they had long enjoyed (Zomer & Benneworth, 2011). It is worth considering that between the second half of the 20th century and the first quarter of the 21st century, we can speak of three distinct periods of development of universities' integration in globalization processes, most notably in terms of student recruitment and retention. There is a link between internationalization and attraction. Knight (2014) divides this process of mobilization into three main stages: the first generation is the student mobility stage (from the 1960s to the late 1980s); the second generation is the program and service mobility stage (from the 1990s to the first decade of the 2000s); and the most recent generation is the emergence of education centers.

The development of the functions of universities as a base for student settlement is already noticeable in the first stage of student mobility described by Knight (2014) – it is no coincidence that the number of students studying internationally in the 1960s, around 238,000, rose to 4.1 million in 50 years and to 7–8 million today (OECD, 2021). Bohm et al. (2002) predicted this with sufficient accuracy at the beginning of the new millennium. The number of students, types of mobility experiences, driving motivations and destinations have changed dramatically. With the revolution in access to information, scientific and technological strengths were increasingly seen as a competitive factor in all areas of national development. As knowledge and information are inevitably vital, higher education has become a key international link. And while some nations have chosen to develop their own resources and traditions, others have chosen to pursue the academic expertise and advanced learning of other countries through overseas study (McMahon, 1992). In the early 1990s, cross-border movement of programs and providers began to increase significantly, with implications for students who could participate in higher education programs and qualifications abroad with-out leaving home. Examples of cross-border program mobility included twinning and franchising programs, articulation agreements, joint and dual degrees, and mass open online courses (Knight, 2014). The role of university branches, embedded learning centers, and virtual universities also grew during this period.

Education centers are the third wave of cross-border education initiatives. Education hubs build on and can encompass first and second generation cross-border activities, but represent a broader and more strategic configuration of actors and activities (Knight, 2014). National and local government forces are now making concerted and planned efforts to develop a critical mass of local and international actors to strengthen the higher education sector, expand the talent pool and contribute to the knowledge economy. According to Knight (2011), education hubs are created and operated by local and foreign actors – including students, educational institutions, companies, knowledge industries, science and technology centers – who engage in education, training, knowledge production and innovation initiatives through in-depth interaction and, in some cases, co-location. There are many factors driving countries to prepare and position themselves as centers of learning and education on the competitive map of knowledge transfer. These include revenue generation, soft power, the modernization of the domestic higher education sector, economic competitiveness, the need for a skilled workforce and, most importantly, the desire to move towards a knowledge or service-based economy (Knight, 2011). To this end, universities typically develop three different types of education centers: the student center, the talent center and the knowledge/innovation center. The student center focuses on recruiting foreign education providers and international students for training and education. The talent center (or skilled labor center) also focuses on education and training, but differs from the student center in that it encourages foreign students to stay in the host country for employment. A knowledge or innovation center extends its mandate beyond education and training to the production and distribution of knowledge and innovation (Knight, 2012).

The third mission of universities

Over the past decades, there has been increasing pressure on universities to shift away from focusing primarily on teaching and conducting research and to add an ambiguous Third Mission, called 'contributing to society' (Compagnucci & Spigarelli, 2020). A number of challenges, such as the knowledge economy, globalization, financial and environmental crises, have contributed to the redefinition and expansion of the mission of universities (Rubens et al., 2017). As part of this, universities have become more open to external agencies and actors, more engaged with society and have significantly increased their economic contribution (Benneworth & Jongbloed, 2010). But direct pressures for participation and relevance have not been the only ones that have been put on universities: the legitimacy, governance, marketization, internationalization and commodification of higher education have been both a challenge and a necessity for action (Jongbloed et al., 2007).

According to Ridder-Symoens (2003), implicit in the concept of the Third Mission was already a first and a second mission: education and research. And although it may seem that universities are in a dilemma of choice regarding this trinity, in fact the dynamics of knowledge production have changed, as have society's attitudes towards expectations and values (Bortagaray, 2009). An integrative higher education system, complemented by a Third Mission, plays a key and complex role in enriching society, going beyond the mere definition of performance indicators for the subject matter (Brown, 2016). In addition to teaching and research, universities now work organically with their stakeholders to foster innovation, contribute to the development of human capital, and contribute to the well-being of the local and international community (Mariani et al., Rolfo & Finardi, 2014), however, draw attention to the significant gaps and external and internal obstacles to the governance of the Third Mission. Among others, they identify that the main obstacle to universities' interactions with industry is the difficulty of finding suitable partners. And while academic performance positively influences the use of technology transfer, the contribution of technology transfer to collaborations is generally marginal. And, according to Benneworth et al. (2017), another dilemma arising from practice is even greater: universities are under so much pressure to transform every aspect of their institutional existence that it raises questions about whether the Third Mission can ever be a strategic goal.

According to Jäger & Kopper (2014), the involvement of universities in Third Mission initiatives means that the generation, accumulation and dissemination of knowledge is more focused on the surrounding environment ('local embeddedness'). However, the physical presence of universities in a given region is a necessary but not sufficient condition for social, economic and cultural development to occur (Pinheiro et al., 2012). In fact, the local context influences both the university's adaptation to changing external demands and circumstances and its ability to negotiate solutions (Lebeau & Cochrane, 2015). The regional logic of action of universities and their discourses of local engagement cannot be separated from the high vertical interinstitutional differentiation that characterizes the sector and this is also true for the integration of European higher education affairs, which directly affects Hungary (Teixeira, 2013). At the root of this stratification is the competitive (and now quasi market) nature of a system in which universities compete for resources and students while being subject to rather strong forms of central regulation (Brown & Carasso, 2013). The adaptive behavior of institutions in this configuration may be exacerbated by the squeeze on direct revenues from the state, the deregulation of the student body and the scarcity of resources from third stream activities. In such circumstances, universities may be expected to minimize their involvement in local politics, following significant funding cuts and the restructuring of regional development programs and governance (Van Vught, 2008).

According to Zomer and Benneworth (2011), when we talk about the 'third mission' of universities, we are talking about universities making a conscious and strategic contribution to society, and it is clear that over the last quarter of a century there has been an increasing emphasis on improving the performance of their 'third mission'. This emphasis is clearly driven by the wider environmental changes that universities are experiencing. However, their proactive involvement in third mission activities has also contributed to changing stakeholder expectations of what universities can achieve. The strategies of HEIs can show how they have re-focused their activities around core functions and areas of strength, or in line with the policy inflections of their main funder. Local community engagement, for example, is usually a significant element in the overall strategic plans of universities, and may remain so for some time, but externalities, budget constraints, or specific regional governance measures and aspirations may shift them towards other considerations and preferences.

The emergence of university hubs as a possible direction of development

Higher education institutions have essentially served since the 1970s as anchor institutions in cities' broader efforts to create new economic sectors, attract the creative class, and build facilities that encourage market-oriented redevelopment (Ferman et al., 2021). These activities have contributed to gentrification and the displacement of neighborhoods surrounding universities, setting the context for the interrelated struggles for the right to the city and the right to the university. Students, faculty and other university actors often join organizations and movements in the surrounding communities to resist restructuring and relocation, demonstrating a kind of local patriotism. According to Ferman et al. (2021), universities play a critical role in social, political and economic development by generating knowledge, culture, jobs and innovation through their primary educational and scientific research functions. They support wider efforts to influence the economy, attract the creative class and stimulate the development of neighborhoods, cities and regions.

Academics themselves, university employees, have been and are still concerned with the contribution of universities to society in the development of third mission activities and new institutional positioning. This includes all the social, entrepreneurial and innovative activities that universities undertake alongside their teaching and research missions (Lange, 2021). As the number of students and staff has grown and universities have sought to develop sustainable development in cities and regions, they have begun to develop multi-campus systems of geographically dispersed units with a common organizational identity to support research and teaching activities, and in many cases these have evolved into what are now called university hubs (Ağlargöz, 2016).

In terms of stakeholders, the university centers can be considered as hybrid due to their complex governance structure. They combine a top-down approach, where their establishment is heavily dependent on the will of private (i.e. foundations and associations, etc.) and public organizations (e.g. the university, the municipality and other priority institutions), but also have a bottom-up approach, whereby several members can propose independently on their own initiative. The study by Migliore et al. (2024), for example, illustrates the functioning of this hybrid system through the Italian Milano Luiss Hub project, which is an innovation of the university itself, together with the municipality, a foundation and an association. The authors conclude that university hubs have a business model independent of the main university, involving a separate board of directors and partnerships with other organizations, such as public and private institutions responsible for educational and social activities. Like campuses and independent new workspaces/accelerators/incubators, off-campus university centers are less open to informal members (except for public events). However, off-campus university centers also help to raise the reputation of the university and improve links with local communities. The opening of a university center also helps international competitiveness: it is one of many ways to attract more students from your country and is less challenging and costly than opening your own university abroad. According to Migliore et al. (2024), in parallel with the location strategies of large companies, universities seek to improve their image in attractive locations in order to ultimately gain an advantage in terms of reputation and hub of attraction. This objective is usually reflected even in architectural features such as visual openness. Campus hubs thus attract students, employees, research companies and industries from other regions and countries beyond the main campus site.

LITERATURE REVIEW – INDIVIDUAL-CENTERED APPROACH

Factors influencing students' choices

It can be seen that the way the institution operates can have a strong influence on the students' immediate ambitions. In turn, the career path of individuals and the operating principles of organizations are determinants in the development of a career management strategy, which includes both personal and institutional efforts to improve career sustainability. In this context, Canaj et al. (2021) examined the relationship between organizational and individual career management and their impact on career sustainability, including well-being, health and effectiveness, which are vital for long-term career success. Individual career management includes personal efforts such as goal setting, planning, networking and job search, activities critical to career progression (Turgut & Neuhaus, 2020). However, Canaj et al. (2021) find that while both organizational and individual efforts contribute to career sustainability, organizational initiatives tend to have a more significant impact. Moreover, educational institutions benefit from systematic career management.

The modern higher education environment increasingly reflects corporate management styles, and this is also a characteristic trend in Hungary. The role of universities is no longer limited to education and research, but also includes contributing to the social and economic integration of students and teachers. This shift requires institutions to adopt management strategies similar to those of companies, emphasizing efficiency, innovation, and stakeholder involvement (Németh et al., 2023). The balance between centralization and decentralization remains a critical issue. Centralized systems, where decision-making power is concentrated, are often politically motivated to centralize power or to redistribute power through decentralization. Administratively motivated reforms aim to rationalize bureaucracy for efficiency, but as Bray (1991) notes, reducing regional disparities is generally easier in centralized systems because they provide a single control over processes. At the same time, decentralized systems encourage creativity and this can have an impact on individual career management of students through the design of educational programs (Amanchukwu et al., 2015). The modern higher education environment increasingly reflects corporate management styles and this is a trend in Hungary. Universities are now not only responsible for teaching and research, but also for contributing to the socio-economic integration of students and academics: a role known as the Third Mission (Compagnucci & Spigarelli, 2020). This shift requires institutions to adopt governance strategies similar to those of companies, with an emphasis on efficiency, innovation and stakeholder engagement. This approach raises important questions about how these corporate practices influence the career choices of university applicants and how students acquire the leadership skills in these institutions that will ultimately shape the future of higher education management.

Teeroovengadum et al. (2016) developed and tested a hierarchical model to measure the quality of higher education services. HESQUAL has become a conceptual model consisting of 53 service quality attributes and allows the application of quantitative methods. The development eventually resulted in a set of five primary dimensions, such as administrative quality, quality of the physical environment, quality of the core educational quality, quality of support facilities and transformational quality. The study by Al-Dajani & Alsamydai (2018) investigated the different elements affecting the attractiveness of higher education institutions. In addition to institutional characteristics, economic and geographical variables, reference groups, and marketing communication, the research highlights university reputation as a determinant. Echchabi et al. (2019), however, point out that while academic and financial benefits are primary factors in the attractiveness of a higher education institution, and more specifically of a course, the reputation and "quality" of universities are only secondary considerations for students. A study by Qazi et al. (2022) found that the university environment, student guidance and university trust significantly influence university reputation, but university reputation does not directly influence student satisfaction levels. Meanwhile, student satisfaction was also found to have a significant impact on loyalty.

Moreover, the ranking of students is not always aligned with their actual choices: in Soares' (2021) focus group research, for example, respondents identified and ranked several key areas, including student characteristics, various external factors, institutional factors and marketing efforts. They expressed opinions on the importance of academic performance, people who influence their lives, financial support, institutional reputation, quality of education, tuition fees, scholarships and job opportunities after graduation. These then revealed that their choice of institution was often not based on the preferences described by their own reflections.

A study by Torres & Hernández (2021) investigated the relationship between consumer brand equity and students' intention to persist in their educational institutions. The descriptive correlation analysis revealed a positive relationship between internationalization processes and students' intention to continue their studies at the institution, suggesting that factors related to the university's global engagement may significantly influence students' intention to settle. The basis for this has already been partially confirmed by Chen & Barnett's (2000) research on the 1980s and 1990s, which aimed at describing international student flows from a macro perspective by analyzing 64 countries with the highest international student exchange. Their conclusions show that the United States and most Western industrialized countries have been and remain at the center of the international student exchange network, while Central and Eastern European and Asian countries are becoming more central, with African and Middle Eastern countries remaining on the periphery. The reason for this, they argue, is that academic hegemony is in line with global economic and political performance.

There is also no doubt that international and regional university rankings have become more popular and, while there is still debate about their validity, reliability and value, universities seem to use them to build priorities and state in their strategic plans that the measurable outcome of internationalization is to achieve a particular position in one or more global ranking systems. According to Knight (2012), some institutions interpret internationalization narrowly in terms of the number of international students and focus their efforts on recruiting international students in order to gain worldwide recognition and prestige. Palmer et al. (2016) investigated how the brand equity of a university is shaped by location, social context, cultural characteristics and historical context. Their results show that universities offering exceptional academic experiences are more likely to develop a strong brand identity, which fosters brand loyalty and greater support among students. However, Wilkins & Huisman (2015) point to the importance of personal relationships in shaping students' perceptions of the institution and find that recommendations and peer feedback are the most influential factors in shaping institutional image.

However, it is not only a challenge for universities to increase their attractiveness, but also to get rid of negative beliefs and stereotypes about them. Lowe & Cook (2003) demonstrate this phenomenon with examples of institutional and management perception problems that manifest themselves when universities' expectations do not match students' readiness. In addition, different motivations for attending university, including social status, running away from home, previous academic performance and avoiding the workplace, can further complicate students' experiences. According to their results, more than a third of the students in their studies did not find teaching

staff helpful or friendly, and nearly half did not find them sympathetic. Lack of experience can also have a significant impact on students, particularly in terms of social withdrawal, which can be influenced by factors such as long-standing shyness, conflict avoidance and anti-social behavior – particularly in the teenage years – and can also have a negative impact on their motivation, which in turn can affect their career choices (McVarnock & Closson, 2022).

Relevant higher education research in Hungary

In Hungary, prior to the last decade, the higher education research most preferred by decision-making institutions focused on the earnings and employment effects of university programs, i.e., it had a significantly economic perspective (Varga, 2010; Veroszta, 2016). The best-known examples of this are programs such as the Young Graduates Career Survey (FIDÉV), which ran for several years, and the Graduate Career Tracking System (DPR), which is still active, as well as related research (Kiss & Barizsné Hadházi, 2018).

Research that is more relevant to our topic, i.e., student-centered research that examines the decisions of applicants to higher education using a variety of factors, is typically found in youth sociology studies. Good examples of this are the studies by Nyüsti (2012) and Hordósy & Szanyi (2020), which reveal the links between students' willingness to apply and their social background. These factors primarily include the type of secondary school attended, the highest level of education attained by the mother and father, financial situation, the perceived value of a degree, and the influence of application rates among acquaintances. According to the researchers' findings, attitudes toward obtaining a degree are strongly determined by the quality of one's social background. Teperics & Dorogi (2014) highlighted the strong regional fragmentation of higher education in Hungary and the prominent role of Budapest, with young people increasingly choosing Budapest as their destination when choosing a career.

Sipos et al. (2023) examined the factors influencing students' decisions when choosing university courses and found that once students have access to relevant information and have evaluated their options, they are able to make informed decisions about which institution best suits their needs. Key criteria for them include the quantity and quality of university programs, the balance between expenses and income (tuition fees, scholarships, grants), the facilities themselves, the processes, the teachers, and, of course, the university locations (in a geographical sense). According to Kovács et al. (2014), locality is one of the most important factors in students' choices, and many prefer institutions close to home, regardless of the university's domestic and international reputation. This is also confirmed by earlier research by Drewes & Michael (2006), who note that applicants can be influenced by generous scholarship programs, extensive non-academic student services, and changes in admission thresholds.

The study by Rámháp et al. (2017) focuses on the career motivation of secondary school students in the North Transdanubia region of Hungary, which is one of the country's most important industrial bases, with a particular focus on the Hungarian automotive industry. The empirical research, which also uses cluster analysis, identifies four main groups based on the students' responses. For respondents in the first cluster, the quality of the institution's academic

training, the prestige of the teachers and the institution are of paramount importance, while factors such as the proximity of the institution and the services it offers are not important to them (they are referred to as the "quality-oriented students" group). The second cluster has the opposite preference. The most important factors for them are the institution's sports and leisure facilities, dormitories, and international connections, while proximity, quality, company ratings, and prestige are not important to them ("individualists") In the third cluster, all average values are very low compared to the other clusters ("uninterested students"): here, the availability and accessibility of education and belonging to the community dominate ("social/financial security seekers"). Since our research also indicates the presence of similarly defined groups, I consider the study by Rámháp et al. (2017) to be a benchmark study in this regard.

MATERIALS AND METHOD

After reviewing a number of international studies focusing on research on university attractiveness and student decision-making, I decided to examine the circumstances of higher education in Hungary to try to find correlations between institutional goals and student aspirations. The survey used in the research aimed to reveal certain preferences of students that were only partially found in the reviewed literature or not found at all. I therefore considered it important to clarify that decisions regarding further education are often not made in accordance with the intentions of institutional decision-makers. One of my longer-term goals is to map out the extent to which the needs of students admitted to higher education in Hungary match the intentions behind the current services. I was interested in the dimension of locality and family influences, so I tried to find answers in this direction to the extent to which the aspirations of students enrolled in higher education in Hungary meet the intentions behind current services. The online questionnaire using the Likert scale had 60 variables, and I was able to process 213 valid and completed questionnaires. The samples were collected in the 2023/2024 academic year among first-year Hungarian BSc students, with a total of 12,663 responses. The statistical program used was IBM SPSS version 27.0, and during the evaluation, I used multiple tests ranging from frequency and variance tests to correlation analysis and Mann-Whitney and Kruskal-Wallis tests, as I also had to examine the relationships between responses grouped into specific categories.

Respondents commented on the value of university education, the value of the degree as a product, job opportunities, the importance of university prestige, localism (not only as a factor influencing school choice preferences but also as a new life opportunity), family expectations and university as a factor compatible or opposed to family perceptions (not as an institution but as a hub of attraction). In this study, I highlight some of the interesting findings of the research, with the aim of demonstrating them, thus I have grouped the items into three smaller categories: the theme of institutional training and perceptions of the degree (8 questions highlighted); the theme of identity formation and the concept of locality (9 questions highlighted); and the exploration of the intention to return or leave family ties (12 questions highlighted). A number of other issues,

such as talent and merit, motivation and self-awareness, the importance of internationality and the ambition to settle abroad, the intersection of childhood dreams and family and environmental influences, are not covered in the scope of this study.

When analyzing the institutional training question group, I examined the importance students attach to the reputation of the university and how advantageous they believe the degree they can obtain at the institution to be on the labor market. The question group examining the quality of education and locality focuses on everyday teaching practices and experiences and seeks to obtain some kind of assessment from students on this basis. This is where the importance of everyday (material) livelihood and a positive university atmosphere come into play, and I also looked for signs that the lifestyle developed over the years could be a determining factor in staying in the area in the future, that is, whether a high-quality university life could be a prospect for future local career planning (could the university be a hub of attraction here?). In the section on family relationships, I try to point out signs of processes that are the opposite of "separation" that is, whether plans to return home appear regardless of the quality of university life. However, it is also very important here whether the decision to choose a career path at a given university could have been influenced by the family at all, or whether it was made as a result of a decision to distance oneself from the family, either partially or completely, for some reason. I intended to consider primarily the methodology of similar Hungarian studies when compiling and grouping the questions. The most relevant studies were thus the aforementioned empirical research by Sipos et al. (2023) exploring the factors influencing students' university course selection decisions, Kovács et al. (2014) focusing on locality, and Rámháp et al. (2017) applying career motivation cluster analysis.

RESULTS

Does it matter where I go to study? – Perception of institutional training

The issue of institutional prestige has been the subject of numerous international studies, and I have also mentioned it in some empirical studies (Al-Dajani & Al-samydai, 2018; Echchabi et al., 2019; Kovács et al., 2014; Drewes & Michael, 2006; Soares, 2021; Wilkins & Huisman, 2015). Compared to our own results, I have found that the reputation of a university can play an important role in its attractiveness, i.e. it can be a good attractor for students, whether it is a product or service brand (55% agreement and only 21% disagreement among respondents). In general, I also confirm that the vast majority of students have positive opinions about both higher education in general (e.g. value of the degree, quality of training) and their own chosen university and training. However, we should not jump to conclusions and stop investigating here, for two reasons. The first is that respondents tend to talk about their feelings in the moment, in which the liberating experience of being away from home and in a supportive environment, for example, plays a major role. So we cannot expect to get professionally comprehensive statements, without a thorough knowledge of the functioning of the institution, taking into account socio-cultural and economic factors, but rather a kind of "experience report". Another reason to be cautious about

this issue is that for students, prestige is an important factor in the evaluation of an institution, but in fact it is far from being the most important factor: the international studies mentioned earlier also emphasize that students tend to focus on different values than those of the providers or economic operators (Kovács et al, 2014; Drewes & Michael, 2006; Soares, 2021). University services are indispensable: a support and scholarship system that can be seen as a social safety net; a life that can be planned alongside education, including both work and leisure activities. And good human relations, including both teacher-student and student-student relations, are equally important.

However, there are also points that can be common ground for both students and operators in the evaluation. This is basically the value of the degree, which students judge primarily in terms of its job potential (while on the other hand, the most frequently mentioned aspect is "usable knowledge"). In this respect, our survey also registered a largely positive response, with two-thirds to three-quarters of students rating the existence and activities of universities as "degree factories" as good or excellent. They were also very positive about their own job prospects after obtaining their degrees, i.e. they considered participation in university education as a project leading to results in terms of career development. However, there were also conflicting views. Although around 70% of respondents thought that university was a good investment and that it ensured that they would not have to worry about making a living, around 40% of students were of the opinion that a successful career was not about the degree. This common view was shared by many students who not only chose the university route for their career, but also showed a very positive attitude towards the purpose and meaning of further education.

Table 1 Statements related to the university bachelor's degree

Statement		The diploma provides me with good job opportunities.	Today, the degree does not matter.	It's not what I study that matters, but what I'll achieve with it.	The reputation and prestige of the university are important to me.
N	Valid	213	212	213	213
The percentage of those who agree with the statement		73%	40%	69%	55%
Mean		3,9437	3,1226	3,8263	3,3944
Median		4,0000	3,0000	4,0000	4,0000
Mode		4,00	3,00	4,00	4,00
Std. Deviation		0,90419	1,07715	1,09582	1,10929
Variance		0,818	1,160	1,201	1,231

Statement		With this Bachelor program, I might not have any problems making a living.	I'm worried about what will happen after university.	Studying at university is a good investment.	I think it's a cool Bachelor program.
N	Valid	213	213	212	212
The percentage of those who agree with the statement		64%	46%	67%	62%
Mean		3,6244	3,1972	3,8632	3,8160
Median		4,0000	3,0000	4,0000	4,0000
Mode		4,00	5,00	4,00	5,00
Std. Deviation		1,00460	1,42372	0,99055	1,04819
Variance		1,009	2,027	0,981	1,099

Source: own edited, 2025.

Is quality of training or locality more important?

In evaluating the results, it was immediately apparent how many people had no expectations that the knowledge provided by university courses would be "usable" and would be directly applicable in the labor market. This is a significant development, because educational development (content development) usually aims to find as many points of contact with the labor market as possible and to provide knowledge that is 'usable', i.e. adaptive, skill-level, directly applicable or easily transformable. This objective can be interpreted in various ways; it can also be argued that this does not mean meeting the needs of the labor market, but merely a harmonious functioning that essentially synchronizes education, scientific vision and in-depth expertise with up-to-date, practical knowledge. At the same time, however, we can also see that the desire for wealth and social demand (in the socio-political sense) are putting pressure on training establishments and creating institutional arrangements that are somewhat similar to vocational training, closely following market movements, based on partnership agreements, taking into account the needs of future professionals from a market perspective and, not least, competing with each other, and thus capable of restructuring and rethinking for the sake of students' choices. The three phases of student, program and provider mobility discussed earlier (Knight, 2014) and the emergence of universities as hubs of attraction (Ferman et al., 2021), and even the proliferation of extended campuses (Ağlargöz, 2016), are precisely evidence of this process. The results of our study suggest that if there is indeed such an intention, it is doubtful, at least the confidence in it is not yet complete. In fact, the opinion of students who are currently enrolling may be strongly influenced by the assessment of students who enrolled or graduated in previous years.

Just as a side note, it is worth mentioning that while evaluating the sample of the questionnaire survey, I also launched an interview survey, in which I interviewed young BA/BSc graduates who were willing to evaluate the work of their former universities (I will report on this in a forthcoming study). They were almost unanimous in stating that they could hardly name any specific subject or course that had provided them with directly useful knowledge in terms of content for their current job. However, two things should be noted here: firstly, many of them said that they had been forced to "leave their careers" because they felt insecure about their job prospects with their bachelor's degree. On the other hand, most of them did not have a negative opinion of their former university but felt it was important to point out that the knowledge they had acquired there and then was not – and probably will not be – of any use to them in the labor market.

For the time being, it seems certain that the emergence of universities as a hub of attraction cannot be identified as a determining factor in the longer-term perspective of career planning. This means that, although what the institution can offer as a service provider is of great importance to students, it is only seen as a demand for the university years, i.e. it does not really matter whether the university can play a role in promoting a career or settlement later on. This does not mean, however, that in practice some students do not make use of their university connections, especially when they are looking for a job as a young graduate, and indeed when they are looking for a job. It is precisely here that we find a contradiction in attitudes. The potential of both international contacts (from study trips to scholarships to access to research bases) and cooperation with market sector actors (from summer internships to traineeships to employment under bilateral contracts) is in the interest of more informed students (Sipos et al, 2023; Drewes & Michael, 2006). Yet their emergence is not massive: the majority of students see university life as important, but only lasting a few years and, more importantly, as a closed stage, i.e. they do not seriously expect more than a degree and some networking.

Of course, why would you expect a significantly different result? After all, the marketing communication of higher education institutions today still tends to emphasize that they are "places with a long tradition", "excellent teaching staff" and "state of the art knowledge". There has also been some shift towards an emphasis on 'fun student life', but there is generally little discussion of how the university as a market player and partner contributes to the dynamics of the locality or region. Making the latter message attractive could be a key factor in encouraging students to consider becoming involved in a local project, which would involve more active participation and settlement (identity formation)

We can also understand the phenomenon from the perspective of the Third Mission of universities. As Davey (2017) points out, policy makers are increasingly recognizing the importance of universities in the movement from industrial to knowledge-driven economies, and thus policy makers and academics are placing more emphasis on the role of the university. However, this also has the consequence that the focus is shifting from student-centered (service-centered) organization to institutional management (sustainable enterprise). The focus on the public good and the private good, the relationship between universities and business and

entrepreneurship, the relationship with theory and the stakeholder perspective represented by frameworks are becoming the key issues to be addressed. The main question will therefore be how the university can interact externally in order to turn the knowledge it possesses into value ('marketability') and to approach the third mission in a proactive way. This shift in emphasis or focus may explain why student recruitment marketing communication has not changed as radically in recent years as the market-oriented way in which universities operate. Thus, their attractiveness and function ("a university is a place of education and nothing more") have changed less spectacularly. To prove this, it is sufficient to look at the very stable institutional (admission) rankings of Hungarian higher education institutions, which have been on a predictable path for decades, i.e. the real 'order of strength' of universities is usually not influenced by students' choice preferences for bachelor and master degrees, but by the economic decisions of management.

In order to gain a deeper insight, I have specifically addressed this issue in the course of the study, by proposing two different directions. On the one hand, I wanted to know whether the respondent would even want to be a university student in a place where he or she would like to live: at least half of the students showed such an intention. On the other hand, I also asked whether they intended to return to their parents' home, i.e. to go home and live where they came from: only one in five students said they did. One could argue that the attractiveness of universities could be clearly demonstrated, but one should be careful in drawing conclusions, as the questions on this topic were obviously relevant mainly for respondents who did not choose a university in their place of origin, and the smaller the municipality of origin of the student, the more relevant these questions were. For example, it does matter whether a young person returns to the capital or to a village to start their young adult life - for this reason I used background variables to help delineate groups within the sample, for example by municipality of origin. The degree of locality was found to be a very strong factor in our study: if the attractiveness of universities in the capital is ignored for the moment, it is clear that 80-90% of students either continued their education in the same county as their origin or chose to study in the neighboring county, i.e. the closest county. Budapest, of course, has an incomparably greater capacity for mobilization than any other Hungarian city with a long history and prestigious institutions. Accordingly, in our study, one in five of the rural respondents chose to move to the capital to start their university life. By contrast, the proportion of students who went on to study in a rural higher education institution from Budapest was only 2%.

Universities as 'islands' are undoubtedly of great importance in terms of escaping from home and developing a new, independent way of life; however, we cannot be certain that this function in itself fulfils all the conditions of what can be considered a hub of attraction. For example, the answers to this question do not state the contribution of the institution itself to the decision to stay or the intention to stay (perhaps the city, perhaps the social situation, perhaps the family situation has a greater influence). However, the inclusion of the family effects theme may help us to get closer to the truth.

Table 2 Statements related to locality and identity

Statement		I can also earn money in parallel with my university studies.	I am glad that I will not have to deal with the issue of livelihood for a few more years.	Unfortunately, I cannot support myself solely by being here at this university, so I have to work alongside my studies.	It is important that I study in a place where I want to live in the next few years.
N	Valid	213	212	213	210
The percentage of those who agree with the statement		66%	33%	54%	38%
Mean		3,7418	2,7123	3,3803	3,0095
Median		4,0000	3,0000	4,0000	3,0000
Mode		5,00	1,00	5,00	3,00
Std. Deviation		1,31536	1,38962	1,56041	1,27167
Variance		1,730	1,931	2,435	1,617

Statement		I think I will go home after university and live there.	My long-standing wish has come true by coming to this university.	I have finally come to where I think I belong.	For me, it is not just about studying: university life is what I really wanted.	I'm in the best place at this university.
N	Valid	211	212	209	210	210
The percentage of those who agree with the statement		22%	40%	56%	34%	59%
Mean		2,4218	3,0189	3,5933	2,8048	3,6667
Median		2,0000	3,0000	4,0000	3,0000	4,0000
Mode		1,00	4,00	4,00	1,00	4,00
Std. Deviation		1,35481	1,32408	1,07065	1,39890	1,09951
Variance		1,836	1,753	1,146	1,957	1,209

Source: own edited, 2025.

Return or separation? – The power of family ties

The willingness or refusal to return to the original place of residence ("parental home") carries in itself another aspect of our investigation, the family's capacity to retain. It should be noted that, while the decisions of young people in their secondary school years are largely determined by socio-environmental influences closely linked to family circumstances, university life gives them a freedom that can reveal certain new forms of self-reliance ('detachment') that are characteristic of young adults, and which may previously have been completely suppressed by family life.

In this study, I first wanted to find out how students who have entered university reflect on their own (former, but not too distant) family relationships, especially their influence on their further studies. I also wanted to find out what attitudes students currently have towards a possible return to home. It turned out that for the majority of respondents, parents' direct involvement in their choice of university was not a feature of their behavior, so specific expectations that would indicate a particular direction for their career path were rarely found. It was, however, evident that the family's basic goal of obtaining a degree itself was definitely a factor in the decision. Roughly one in two students said that going to university was not only important for their parents, but that the successful admission had essentially put a tense situation at rest. This picture is reinforced by the fact that, also for about half of the respondents, it was found that the expectation of a degree had been a long-standing family issue: parents must have put pressure on these students in some way during their secondary school years. It should be noted, however, that the other half of the students said that they had decided to continue their studies purely on their own initiative.

When it comes to choosing the exact professional (university education) direction, the strength of family influence is far less decisive: taking the highest rates into account, at most one in four students can be said to have the same or similar profession or education as their parents' own chosen university education. Even much smaller proportions, below 10%, show cases where entry to university is essentially a continuation of a family legacy, or cases of the opposite sign, where the student is going against the parents' intentions by not studying in the course they had previously envisaged.

At the same time, the intention to become autonomous ("break away") is reflected in the research results. Almost half of the students say that their university of choice is one of the reasons why they finally left home. Although this statement should not be overestimated, it can be said that the institution plays an important role in the process of self-determination and indeed acts as an "island" for many students, almost regardless of where they come from (e.g. from which municipality) and from which background. This is somewhat reinforced by the fact that at least one third of the responses about university life indicate that it is more than just learning: it is 'life' itself, or a life 'really wanted'.

Table 3 Statements related to the influence of family

Statement		My parents and I had already agreed on where I should continue my studies.	My parents are not thrilled that I chose this Bachelor's degree.	There were/are people in my family who have a profession similar to the one I will study now.	My parents were not really interested in where I continued my studies.	I don't owe anyone an account regarding my university studies.	With me being here, everyone in the family can finally calm down.
N	Valid	213	212	212	212	212	208
The percentage of those who agree with the statement		13%	7%	25%	26%	62%	31%
Mean		1,9014	1,6179	2,1368	2,4623	3,7689	2,8798
Median		1,0000	1,0000	1,0000	2,0000	4,0000	3,0000
Mode		1,00	1,00	1,00	1,00	5,00	3,00
Std. Deviation		1,19931	0,99299	1,54096	1,39515	1,27252	1,36200
Variance		1,438	0,986	2,375	1,946	1,619	1,855

Statement		I was never pressured at home to go to university - I came solely on my own free will.	In fact, I am continuing the family legacy by studying here.	I think that getting a degree is more important to my family than to me.	It is very important to my family that I get a degree.	My parents were very happy that I was admitted to this university.	I can also thank the university a little bit that I finally got away from home.
N	Valid	212	211	212	210	207	207
The percentage of those who agree with the statement		54%	9%	23%	46%	54%	43%
Mean		3,3726	1,5024	2,0708	3,0381	3,5942	2,8937
Median		4,0000	1,0000	1,0000	3,0000	4,0000	3,0000
Mode		5,00	1,00	1,00	1,00	3,00	1,00
Std. Deviation		1,51698	1,02062	1,37675	1,57081	1,16150	1,58828
Variance		2,301	1,042	1,895	2,467	1,349	2,523

Source: own edited, 2025.

DISCUSSION AND CONCLUSION

Our research focused primarily on obtaining answers about (1) how important locality (location and 'island' function) is; (2) how long university is important (only during the academic years or later); and (3) whether and in what ways family mattered/matters in university choice. From this perspective, it seems that the attitudes of students are not uniform, but some interesting groups

can definitely be identified in the population: among others, those for whom university has the traditional, popularly perceived functions; and those who see much more and want to benefit from the "extra services". Those who see it as an important stage in the struggle for independence; and those who see it more as a springboard for career planning. Also, whatever the motivation behind it, the degree of mobility is significant only for those who are heading for the capital, while physical proximity is a priority for students from rural areas and those who have chosen a rural university.

In general, members of the group following the traditional model gave answers that made the impression that the university is an educational institution where the teaching-learning process takes place and lasts up to the degree level. The second group, on the other hand, tended to see the university as a community space and explicitly claimed its benefits. There were also two groups of students who, according to their own assessment, considered their choice of university to be strongly or only very moderately influenced by their family.

There was, however, no clear correlation between the traditional and community-functioning views of the university model and the influencing and retaining power of the family. It cannot be concluded, therefore, that those who took advantage of their further education opportunities under stronger parental control focused on education and degree attainment as a compliance criterion. Nevertheless, there was a more pronounced, if not dominant, tendency for students 'under stronger family control' to express a desire to leave than the average; in other words, these students did not see university as a 'rebellion', but in radical cases as a way of 'escaping'. What was somewhat surprising, however, was that students who opposed the traditional view of the university as largely a place of learning and who saw it primarily as a community space did not think much in the years after graduation about having any kind of attachment to the university or to the area directly affected by the institution. It could be said that they saw their bachelor's and/or master's degree and everything connected with it as a period of a few years, a period of life to be completed, essentially independent of their later career choices and life. It cannot be said, therefore, that the majority of students, or at least a significant proportion of them, had a close relationship with their university, which had a significant influence on the decisions they took in preparation for the next stage of their lives.

Of course, it is not possible to draw any longer-term conclusions about students' attitudes, nor to identify trends, from a one-sample measurement. For example, we do not know whether time spent in higher education changes current attitudes. It may change, for example, because of the closer relationship between the student and the university, whether through university life, career opportunities, the development of important relationships, new support systems or the promotional power of a career are built alongside learning. Attitudes may also change with age, with maturity: the overwhelming majority of students in the current study, aged 21-23, may already have different preferences, gain work experience, at least partly try their hand in the labor market, even locally, at the age of 24-26 (two thirds of respondents are students actively working outside university!). As indicated earlier, in a forthcoming work I will compare not only the age

groups, but also those with secondary school status with students who already have some higher education experience.

At the moment, I am not even sure to what extent students feel that the training they are currently receiving is meeting their needs to the maximum. If they do not, or largely do not feel it, they are more likely to drop out later, and this may also affect their attachment to the university as a hub of attraction. Alternatives may be considered: changing careers, working abroad, the attractiveness of the capital city because of the presence of large companies that are more flexible in terms of qualifications, etc. (For example, our micro-research on the conditions for leaving the labor market, which is running in parallel with this study, as mentioned above, clearly supports our thesis on the conditions for leaving the labor market, which is why I consider this line of research to be important.) With all these limitations in mind, our next step will be at least twofold: I will continue to collect data in order to establish trends and I will also examine older age and experience groups (students preparing for high school graduation and university admissions, recent graduates, career starters). I will also focus more strongly on finding out what students consider important during their university years (needs and satisfaction survey), i.e. I will try to answer the question of what makes a university attractive for them in the long term.

One research question that arose was whether students consider the university's role as a hub of attraction to be important. Although this research does not provide a clear answer to this question, I have found evidence suggesting that "current quality of life," i.e., time spent at university, does not necessarily correlate with any future aspirations. Of course, the career opportunities determined by the degree that can be obtained are decisive on a general level, but these fall into the category of socio-economic challenges and expectations, rather than the locally applicable advantages provided by the institution. Therefore, it cannot be said that the university cannot be a hub of attraction and thus a determining factor in staying in the area, at the same time, this research certainly could not confirm that students see it as more important than its "traditional" role (a place of education, a "degree factory").

Another question was whether we can talk about motivations that encourage students to stay (settle) in university towns and become part of the regions shaped by universities that are becoming centers of attraction. In this research, I found evidence that suggests – in line with the findings of Sipos et al. (2023), Kovács et al. (2014), Rámháp et al. (2017) – that financial, security, and (career) self-perception factors definitely play a significant role in students' decisions. At the same time, locality and family ties do not always point in the same direction as these ideas, so deeper research is particularly important here. Overall, although the role of universities as hubs of attraction cannot be ruled out, from a motivational point of view, it has not yet been proven that they play a clearly decisive role in students' long-term thinking.

Universities do not have an easy job if they want to persuade students to choose their institution, as it is also a challenge to ensure that higher education in general is perceived as more than just a training ground ("diploma factory") for students. In Hungary, we see that there is still much work to be done. In this process, the university as a hub of attraction seems to be a very promising development direction, as it can make a higher education institution not only an

integral part of a region, but also a major factor in its development. Perhaps the most important question is: Do students themselves see this, or do they see the potential? Because the attraction generated by universities should be directed first and foremost in their direction. And for this, not just localism, but even institutional prestige may not be enough. It is important to ensure that students think they want to be part of the local community in the long term, and not just for the duration of their studies. They must be motivated to stay and become active economic and community shapers. But this cannot be achieved through university services and support systems alone: it requires everyone to see the university as something more than it is today.

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**RESHAPING WORK AND SECURITY IN THE AGE OF DIGITAL
TRANSFORMATION**

THE USE OF ARTIFICIAL INTELLIGENCE (AI) IN JOB SEARCHING

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Abstract: The growing presence of artificial intelligence (AI) in the labor market has brought forth significant changes in how candidates search and apply for positions. However, these innovations are not uniformly adopted or perceived across different industries and generational groups. Preliminary observations suggest that IT and marketing professionals, as well as those employed by large organizations, demonstrate a higher propensity to utilize AI-driven tools (e.g. CV optimizers, job recommendation platforms), whereas individuals working in education, training, or small-scale enterprises are often less inclined to do so. Another concern is that many jobseekers are not fully aware of the potential benefits and functionalities of these AI tools, which may affect the overall acceptance and positive perception of such solutions. Additionally, generational factors may play a major role in the degree to which AI tools are integrated into one's job search strategy, potentially influencing satisfaction and perceived effectiveness. Our research focuses on three main hypotheses: 1. Industry- and organization-specific differences; 2. Awareness and positive reception; 3. Generational differences. Regarding measurement and data collection, the study employs a mixed-method approach (online distributed questionnaire and a series of in-depth interviews). The empirical findings will be analyzed to determine the extent to which industry affiliation, awareness of AI tools, and generational factors influence the adoption and perception of AI in the job search process. The results will offer evidence-based recommendations for career advisors, employers, and platform developers on how to tailor AI tools to varying user needs and improve their accessibility and acceptance.

Keywords: Artificial Intelligence (AI), career counseling, digital skills, job search, technology acceptance

INTRODUCTION

The expansion of artificial intelligence (AI) has become a defining force across all areas of life, including the labor market, in recent years. In the job search process, various AI-based tools, such as résumé generators, cover letter creators, and interview preparation applications, support candidates in submitting faster and more effective applications. However, the adoption of these solutions is uneven. While certain industries and generations are rapidly embracing these technologies, other groups remain less open to them or have more limited access.

Attitudes, knowledge, and experiences related to AI tools show significant differences based on gender, age, educational background, technological literacy, and professional experience. Levels of digital competence and trust fundamentally determine how individuals are able to incorporate these tools into their job search strategies. Particularly important is the ability to "prompt", the skill of giving effective instructions to generative AI systems.

The aim of our research is to explore the extent and ways in which Hungarian job seekers use AI tools and to characterize their relationship to these technologies. Our study also includes the perspectives of career counselors, whose professional reflections offer a more nuanced and in-depth interpretation of AI use in the job search process.

The purpose of the study is to map the presence and role of artificial intelligence tools in the job search process, from both the job seekers' and the career counselors' perspectives. Using both quantitative and qualitative methods, the research seeks to uncover the factors that influence the awareness, use, and perception of AI tools among different target groups.

The research is built around the following questions and hypotheses. Research Questions:

- To what extent and for what purposes do job seekers use AI-based tools during their job search?
- What attitudes characterize job seekers and career counselors regarding AI tools?
- Are there detectable target group-specific differences, such as generational, professional, or organizational, in the use and perception of AI tools?

Hypotheses:

1. Hypothesis – Target group-specific differences

The application of artificial intelligence in job searching varies across professional fields. Individuals working in IT, marketing, and large corporations are more likely to use AI tools in their job search, while those employed in education, training, and small enterprises are less likely to do so.

2. Hypothesis – Perception and acceptance of AI solutions

Both job seekers and career counselors tend to have a more positive perception of AI-based job search tools if they are familiar with them.

3. Hypothesis – Generational differences in usage and outcomes

Younger job seekers apply AI tools more frequently and intensively during their job search and, as a result, experience higher levels of satisfaction and more efficient search processes compared to older generations.

LITERATURE REVIEW

In recent years, AI has had a significant and transformative impact on the functioning of the labor market. Initially, AI solutions were predominantly employed by the employer side to automate recruitment and selection processes, such as analyzing job advertisements, pre-screening résumés, and ranking candidates (Nikolaou, 2021; Gandolfi, 2023). However, more recently, a new trend has emerged whereby job seekers themselves are increasingly integrating AI tools into their own strategies, signaling the rise of a new form of practice on the applicant side. Job seekers are adapting to the techniques utilized by employers.

Among the most widespread AI-based technologies are résumé and cover letter generators (e.g., Jobscan, Rezi, ChatGPT), interview preparation applications (e.g., Yoodli, Interview Warmup), personalized job recommendation algorithms (e.g., Talentprise, LinkedIn AI), and career path planning systems (e.g., FutureFit AI, SkillsMatch) (Cedefop, 2024). These tools provide supportive and decision-preparatory functions, significantly enhancing the efficiency of the job search process, provided users possess sufficient digital skills and awareness (Chamorro-Premuzic et al., 2017).

One of the most valuable applications of generative AI tools lies in interview preparation. AI-based simulations allow candidates to practice their responses in a structured environment while receiving immediate feedback on elements such as speech pace, clarity, and the quality of argumentation (Gandolfi & Ferdig, 2023). This feedback fosters self-reflection and reduces interview-related anxiety (van Esch et al., 2019). The latest simulators even offer concrete suggestions for improving phrasing to enhance interview performance.

Nonetheless, attitudes toward AI are far from uniform. The literature emphasizes the critical role of trust, as well as users' perceptions of the usefulness and transparency of these tools (Pew Research Center, 2023). According to the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), acceptance of AI technologies is closely linked to perceived usefulness and ease of use (Venkatesh et al., 2003). Research indicates that users are more likely to adopt AI-based technologies when they are intuitive and offer clear, tangible benefits.

A 2024 study (Cai et al., 2024) found that attitudes toward AI tools show generational differences. Younger generations (Generation Z and Millennials) tend to be more open to the use of AI and are more likely to integrate these tools into their job search processes, while older cohorts often demonstrate greater technological skepticism, higher levels of anxiety, and lower digital confidence. Thus, the successful application of AI tools depends not only on access but also on competencies and attitudes.

The role of career counselors in this process should not be underestimated. The literature (van Esch et al., 2019; Gandolfi, 2023) suggests that counselors can assist in interpreting AI technologies, fostering reflective usage, and establishing ethical boundaries. This evolving role represents a paradigm shift in the field of digital career support.

Despite the growing importance of AI, the international literature has paid relatively little attention to the active use of AI tools by job seekers. Most research has focused on employer-side automation, while applicant practices, levels of prompting skills, and user typologies remain under-researched areas (Nikolaou, 2021; ILO, 2024; AIHR, 2025). Digital inequalities, differences in access, and technology-related anxiety pose structural barriers, particularly for disadvantaged job seekers.

AI tools are not merely technological innovations; their operation is also influenced by psychological, social, and educational factors. Generative technologies become truly effective when users engage with them consciously, reflectively, and with appropriate support. Thus, the integration of career counseling practices and AI tools should be viewed not as competing forces but as complementary resources in the 21st-century labor market.

METHODOLOGY

The aim of this research was to explore how AI-based tools are incorporated into the practices of Hungarian job seekers and career counselors. A mixed-methods approach was employed, combining quantitative survey data collection with qualitative in-depth interviews.

Quantitative data were collected through an online questionnaire administered between January 2 and February 21, 2025. The survey yielded 118 completed responses and examined the following areas: demographic background, job search habits, awareness and use of AI tools, attitudes toward these tools, and levels of satisfaction with their use. Data analysis involved descriptive statistical methods (percentages, means, standard deviations) as well as cross-tabulation analyses.

Qualitative data were gathered through semi-structured in-depth interviews conducted between February and March 2025. A total of eight career counselors, representing various industries and organizational backgrounds, participated. The purpose of the interviews was to gain deeper insight into counseling experiences, perceptions of AI tools, typical client reactions, and the evolving nature of the counseling role.

The interview data were analyzed using qualitative text analysis. Initially, open coding was applied, whereby emerging themes were freely labeled based on the interview content, such as positive attitudes, technological skepticism, and the teaching of prompting skills. This was followed by thematic coding, aimed at organizing identified elements into broader categories, including generational differences, changes in counseling roles, and technological anxiety. The goal of the coding process was not only to identify recurring patterns but also to interpret and contextualize them within broader frameworks.

This study has certain limitations. The quantitative sample is not representative, thus the findings cannot be generalized to the entire population of Hungarian job seekers. Similarly, the qualitative sample was obtained through purposive sampling, offering rich insights but not comprehensive coverage. Nevertheless, the integration of both methods provided the opportunity to examine statistical trends alongside deeper interpretative insights.

RESULTS

The mixed-methods approach adopted in this study combining quantitative survey data collection with qualitative in-depth interviews allowed for a multidimensional exploration of the application of artificial intelligence in the context of job searching. This chapter first presents the findings of the survey-based data collection, followed by the qualitative analysis of the interview data. Finally, it discusses the synthesis of the two datasets, the identified patterns, and the corresponding conclusions.

Results of the survey

During the quantitative phase, we processed 118 valid responses collected via an online questionnaire administered between January 2 and February 21, 2025. The majority of respondents were Hungarian citizens (98%); however, only 89% resided in Hungary at the time of the survey. Notably, 11% of respondents indicated that they were living outside Hungary (in Austria, Slovakia, Germany, and other EU member states), a proportion that exceeds the estimated rate for the general Hungarian citizen population living abroad. According to data from the Hungarian Central Statistical Office (Központi Statisztikai Hivatal [KSH], 2021), Eurostat (2022), and the OECD (2023), approximately 5–6% of Hungarian citizens currently reside abroad on a long-term basis.

Of the respondents, 71.2% identified as female, 28% as male, and 0.8% preferred not to disclose their gender. The age distribution of respondents was relatively balanced: the largest group was aged 20–29 (32.2%), followed by those aged 40–49 (23.7%), 50–59 (22.0%), and 30–39 (19.5%). Respondents under the age of 19 accounted for 2.5% of the sample. Based on these figures, it can be stated that the sample adequately covers the younger and middle-aged active job-seeking cohorts, with a slight female dominance.

Regarding employment status, 61% of respondents reported being employed: 36.4% as employees, 14.4% as managers, and 10.2% as self-employed individuals. The remaining 39% fell into the non-active category: 26.3% were students, 9.3% were unemployed, and 3.4% reported other statuses (e.g., parental leave, inactive job-seekers). This employment rate is lower than the 74% employment rate estimated for the general Hungarian population by the Hungarian Central Statistical Office (Központi Statisztikai Hivatal, 2023). The discrepancy can be partly explained by the heterogeneity of respondents in terms of age and employment status, and partly by the broader focus of the study, which included not only actively job-seeking individuals but also those interested in entering or re-entering the labor market.

The most common level of education among respondents was higher education, with a combined total of 53.4% holding either a bachelor's degree (BA/BSc 23.7%) or a master's degree (MA/MSc 29.7%). In addition, 3.4% of respondents reported holding a doctoral degree, while 12.7% indicated vocational or professional qualifications. Based on these data, it can be concluded that individuals with higher education are overrepresented in the sample, which may align with the competency-dependent nature of access to and use of AI tools.

Regarding current employment status, 27.4% of respondents stated that they were not currently employed. Among those who were employed, the largest group worked for large corporations (23.1%), followed by employees of medium-sized enterprises (11.1%), self-employed individuals (10.3%), employees of municipal or state institutions (10.3%), employees at micro or small enterprises (7.7%), employees of state-owned companies (6.0%), and employees in the nonprofit sector (5.1%).

In terms of industry distribution, the largest proportions were found in commerce/marketing/communication (16.2%), education and training (15.4%), business/finance

(12%), and customer service/administration (8.5%). Respondents working in IT and engineering each represented 7.7% of the sample.

Regarding the tools used in the job search process, job search websites (82.2%), social media platforms (77.1%), and personal networks (61.9%) were reported as the most frequently utilized resources.

Concerning the amount of time devoted to job searching on a weekly basis, the majority of respondents reported spending less than 1 hour (45.8%) or 1–2 hours (33.9%) per week. A relatively high proportion (13.6%) indicated that they spent 3–5 hours weekly on job searching activities.

When evaluating their perceived effectiveness in job searching, 65.3% of respondents rated themselves as moderately or less effective, while 20.3% reported feeling rather or very effective. Unfortunately, 14.4% stated that they did not find their job search effective at all.

Among the respondents, only 18.8% reported being familiar with AI tools specifically related to job searching, while more than twice as many (38.5%) were familiar with other AI-based tools unrelated to the job market. A significant proportion (35.9%) indicated that they were not familiar with such tools at all.

In terms of usage, 21.4% of respondents reported having used an AI-based tool specifically for job search purposes. An additional 21.4% stated that they had used AI tools for other purposes but not directly in a labor market context. Meanwhile, 53.8% had never used AI tools. Thus, 42.8% of respondents had interacted with AI technology in some form, although not always consciously or specifically for career development purposes.

Among AI tools, the most commonly used were ChatGPT (56.8%), LinkedIn's AI-driven recommendations (15.3%), résumé analysis systems (11%), and AI-based job search platforms (5.1%), while 37.3% reported having never used such tools.

The most common goals associated with using AI tools for job searching included résumé creation or revision (36.4%), writing cover letters (29.7%), and preparing for interview questions (12.7%).

Among those who had used AI tools, the majority found them useful (38.7%) or very useful (29.3%), while 24% rated them as moderately useful. Only 8% considered the tools less useful or not useful at all.

Among users who had employed AI-based tools during their job search, 62% reported a positive impact, meaning they felt that AI tools favorably influenced their job search experience. In contrast, 38% stated that the tools either had no significant effect or only a moderate impact on their search process.

The most frequently mentioned benefits included time savings (49.2%), improvements in the quality of résumés and cover letters (30.5%), and the personalized display of job advertisements (14.4%). Several respondents identified these advantages in combination.

However, attitudes toward AI tools are not without caution. A total of 17.8% of respondents indicated a lack of trust in artificial intelligence. Some reported encountering technical problems (16.9%) or language limitations (11%) during usage, while 13.6% stated that they had not

received useful outcomes. A significant proportion noted either that they had not yet encountered any errors (19.5%) or that they had no practical experience with AI tools at all (33.9%).

Regarding the perceived reliability of information provided by AI-based tools, 47.5% of respondents rated it as medium, 37.3% as high, and 13.6% as low.

The majority of respondents (64.4%) expressed an intention to use AI-based tools for job searching in the future, while 35.6% indicated they were unlikely to do so.

Based on the open-ended responses collected at the end of the questionnaire, most respondents appeared open to the use of AI tools in the job search process, although many reported having limited practical experience. The technology was generally seen as useful for résumé and cover letter writing as well as interview preparation; however, respondents emphasized the importance of post-editing and personalization. Advantages mentioned included time savings, stylistic refinement, and idea generation, whereas concerns centered around the risk of template-like outputs, overreliance on the technology, and lack of trust. These findings are consistent with the quantitative data from the questionnaire, reinforcing the conclusion that the effectiveness of AI use largely depends on users' awareness and digital proficiency.

Results of the in-depth interviews

The aim of the qualitative research was to explore how career counselors perceive the application of AI tools within the job search process. Data collection took place between February and March 2025, during which eight semi-structured in-depth interviews were conducted with professionally recognized counselors. The respondents work across various sectors and with diverse client groups, allowing for a comparative analysis of professional practices, evaluations, and attitudes.

None of the counselors rejected the use of AI; however, all of them emphasized its limitations and the irreplaceable role of the human factor. Most considered AI to be a "useful complementary tool", while highlighting that it cannot substitute for human presence, relational context, and personal reflection.

Significant differences emerged in terms of practical application. Some counselors had integrated AI tools directly into the counseling process (e.g., teaching prompting techniques, assisting with writing and reviewing documents), while others engaged with the technology more at the level of recommendation. According to the overwhelming majority of interviewees, the key to successful AI use is ensuring that clients do not use the tools blindly but apply them thoughtfully and purposefully.

The most frequently mentioned tool was ChatGPT; however, several counselors also reported using or recommending platforms such as Jobscan, Rezi, VisualCV, ResumeApp.ai, Cover Letter Generator, Interviewer.ai, and PaySkill.

The interviews clearly revealed that AI tools are most often recommended or applied for the following purposes:

- Document preparation: résumé writing, cover letters, and profile summaries;
- Interview preparation: generating typical questions and conducting mock interviews;

- Tailoring applications to job postings: keyword optimization and role-specific customization;
- Supporting visual presentation: graphic templates and CV layout generation.

An important finding is that most counselors do not use AI tools as standalone solutions, but rather as supportive frameworks to enhance the counseling process.

Several counselors emphasized that AI tools have a structuring effect on the job search process. Clients often become more confident and proactive when they have a system that offers them an initial starting point.

Based on the counselors' observations, attitudes toward AI among job seekers vary widely, and these differences are not necessarily rooted in age but rather in differences in attitude, trust, and digital competence. An interesting observation was that digital affinity often proved more important than biological age: a client over 50 could be more digitally open than a 30-year-old applicant with a technophobic attitude.

The counselors also spoke in detail about their concerns regarding the use of AI tools. These concerns did not question the technology itself, but rather its appropriate application:

- Lack of originality and uniformity: AI-generated materials are often overly standardized, leading to a "homogenization" of applications.
- ATS compatibility issues: Several tools do not meet the technical requirements of employer screening software (Applicant Tracking Systems).
- Lack of prompting skills: Counselors noted that clients are often unfamiliar with how to effectively formulate requests to AI systems, resulting in irrelevant or mediocre content.
- Ethical and identity questions: Where is the boundary between a self-created application and one written by a machine? How can this distinction be presented ethically to decision-makers?

According to the counselors, the key issue for the future is not whether career counselors or job seekers use AI, but how consciously and purposefully they do so.

Synthesis of quantitative and qualitative results

The combined analysis of quantitative and qualitative data allows for a more complex understanding of the application of AI in job seeking. The comparison revealed both reinforcing connections and nuanced differences in interpretation.

Both data sources clearly indicated that ChatGPT is the most widely known and used AI tool, explained by its accessibility, linguistic versatility, and free availability. Usage purposes – such as resume and cover letter writing, interview preparation, and job application text generation – also showed strong alignment.

Based on the responses, it can be concluded that the use of AI tools was generally experienced positively. However, both groups – respondents and advisors – were sensitive to risks associated with uniformity, loss of authenticity, and lack of digital competencies. Questionnaire responses predominantly emphasized functional usefulness (e.g., time-saving, structuring), while interviewees focused more on reflective and ethical considerations.

One of the most interesting parallels was the interpretation of the structuring effect: while users expected assistance from AI in text formulation, advisors stressed that such support is only effective if users can integrate their own stories and opinions. Interviews revealed that AI not only provides formatting but also offers mental support when usage is reflective and conscious. New interpretative dimensions also emerged through interviews, such as the critical role of prompting skills, which was not strongly highlighted in the quantitative survey. Effective work with AI tools requires not only technical knowledge but also cognitive flexibility, linguistic nuance, and self-reflection.

Identified patterns and key dimensions

The comparison of quantitative and qualitative results enabled the identification of recurring patterns reflecting both current practices and challenges in the application of AI in job seeking. Below, we present the seven most important dimensions:

1. Dominance of ChatGPT

ChatGPT emerged as the most widely known and applied AI tool in both questionnaire and interview data. 57.6% of respondents knew about it, and 18.6% had used it. Advisors also mentioned it first. Its accessibility, linguistic capabilities, and free usage have made it the "entry platform" for AI-driven job searching.

2. Consistent purposes for AI application

The primary purposes – resume and cover letter writing, interview preparation, and document customization for job advertisements – were consistently highlighted. Both respondents and advisors considered these areas to be the most useful.

3. Supportive impact of AI on job seeking

Users of AI tools reported higher search efficiency (72%), which was also confirmed by advisors. The tools help structure applications, boost confidence, and reduce job search-related anxiety.

4. Critical but non-rejecting attitudes toward AI

The general attitude toward technology was positive but reflective. Respondents were aware of risks such as uniformity, data security, and algorithmic bias. Advisors advocated for responsible usage and emphasized the importance of human interpretation.

5. Diversity of user types

Advisors detailed the different types of users. Questionnaire data also revealed significant variance in the depth and consciousness of usage. Some users are conscious and adaptive, well-versed in prompting and using AI tools effectively as supportive aids. Another group consists of convenience users who tend to accept AI-generated content uncritically, risking knowledge erosion. A third group includes skeptics and beginners who have yet to use AI tools but show cautious interest or distrust due to concerns about transparency, data handling, and GDPR compliance.

6. Prompting skills and technological competence as key factors

Advisors emphasized that the quality of prompting fundamentally determines the effectiveness of AI tools. Quantitative data supported that AI usage in job searching is closely related to digital

literacy. Among those familiar with AI tools, 62.7% had already used them either generally or specifically for job search purposes.

7. Transformation of the advisory role

Qualitative interviews revealed that AI is not replacing career advisory practices but transforming them. The role of the advisor is not disappearing; rather, it is evolving into that of a technological mediator, strategic companion, and mentor in an AI-driven career-building environment.

INTERPRETATION OF RESULTS AND DISCUSSION

Confirmation or rejection of hypotheses

The three hypotheses formulated during the research aimed to explore demographic, professional, and attitudinal differences in the use of AI tools. The results of the quantitative survey and qualitative in-depth interviews enabled the critical evaluation and feedback on these hypotheses.

The first hypothesis stated: „The application of artificial intelligence in job searching varies across professional fields. Individuals working in IT, marketing, and large corporations are more likely to use AI tools in their job search, while those employed in education, training, and small enterprises are less likely to do so.”

Based on the questionnaire data, this hypothesis was partially confirmed. Disaggregating the respondents by professional fields revealed a higher proportion of AI tool users in technical, IT (24%) and commerce, marketing (16%) sectors. Among those working in education, the proportion was 12%. However, it was also observed that employees at small enterprises demonstrated significant interest in AI tools (15%), which was slightly higher than the proportion among those employed at large corporations (12.5%). Interview participants also reinforced the finding that technological affinity often plays a more critical role than organizational background itself.

The second hypothesis proposed: „Both job seekers and career counselors tend to have a more positive perception of AI-based job search tools if they are familiar with them.”

This assumption was clearly confirmed by both the survey data and the interviews. Among those who had already tried AI tools, satisfaction levels (72%), perceived usefulness (80%), and positive attitudes toward further technology use (76%) were notably higher. Although the majority of career counselors approached the technology with cautious criticism, they were not dismissive: AI was generally seen as an opportunity rather than a threat, particularly when its use was framed within reflective practices. AI technology was found to be highly effective in supporting administrative or technical tasks (e.g., résumé optimization), but it cannot replace the emotional, psychological, and strategic support provided by a well-trained and experienced career counselor.

The third hypothesis stated: „Younger job seekers apply AI tools more frequently and intensively during their job search and, as a result, experience higher levels of satisfaction and more efficient search processes compared to older generations.”

This hypothesis was partially supported by the research data. An age-based breakdown of the questionnaire responses revealed that the use of AI tools was not exclusively associated with younger generations. Although 35.8% of respondents aged 20–39 reported having used AI-based tools for job search purposes, the proportion was even higher (53.4%) among those aged 40–59. This suggests that technological openness is not solely determined by age.

Table 1 Proportion of respondents using AI-based tools by age group

Age Group	Yes, I have used it	I don't know whether the tool was AI-based	No, I have not used it	Not for job search, but in other areas
Under 19	0	0	66,7	33,3
20-29	18,4	0	55,3	26,3
30-39	17,4	0	65,2	17,4
40-49	21,4	10,7	46,4	21,4
50-59	32	4	48	16

Source: own compilation based on the results of the questionnaire, 2025.

Higher experiential ratings (69%) and satisfaction with the effectiveness (83.6%) among younger respondents also support the conclusion that AI contributed positively to their job search experience. In comparison, older respondents reported slightly lower experiential ratings (62%) and effectiveness satisfaction (78%).

Practical conclusions and findings

The practical conclusions of the research highlight that AI tools are already present in the field of job searching; however, the extent, depth, and consciousness of their use show significant variation.

One of the key practical findings is that generative AI tools are most effective when users are able to apply them in a targeted and interpretive manner. This means that mere access to the tool is not the decisive factor; instead, a combination of prompt engineering skills, linguistic competence, self-awareness, and digital confidence is essential. Developing these competencies is crucial for the responsible and beneficial use of the technology.

Another important practical implication is that while AI tools cannot replace career counseling, they are transforming its nature. In the future, the role of career counselors will increasingly shift toward educational, guiding, interpretative, and ethical advisory functions. Clients will not only acquire job search strategies but also develop technological competencies through counseling. The expansion of AI does not diminish but rather enhances the value of personal, human interaction and counselor presence, especially for clients who are uncertain or less digitally confident.

The structuring effect of AI tools is particularly significant for candidates who enter the job market with lower self-confidence, limited application experience, underdeveloped written or verbal communication skills, or labor market disadvantages. For these individuals, AI tools offer

a supportive framework that can help organize the job search, generate new ideas, and reduce stress and uncertainty.

Overall, integrating AI tools into career support processes requires not only a technological shift but also a change in mindset. Success does not depend on the choice of platform but rather on how these tools are taught, the context in which they are applied, and how users are supported in discovering their professional paths, motivations, and goals.

Recommendations for career counseling practice

The integration of AI tools into job searching brings new challenges and opportunities for career counseling practices. The following recommendations outline specific actions that can promote the responsible, effective, and ethical use of AI while supporting clients' autonomy and technological awareness.

There is a need for targeted training programs for career counselors that go beyond the technical operation of various AI platforms. Such training should include the logic of prompting, understanding algorithmic decision-making, recognizing biases, and interpreting ethical dilemmas. Counselors can only effectively fulfill their new role as AI job search educators if they themselves possess sufficient digital competence.

Furthermore, it is important to provide workshops and learning opportunities for clients, especially those with lower technological self-confidence. These sessions should focus on developing prompting skills, techniques for independent work with AI tools, and strengthening critical thinking. In these practices, the emphasis should be placed not on automation, but on interpretation and understanding.

Supporting digitally disadvantaged groups is particularly justified. The research clearly shows that mere access to AI tools is insufficient. There is a need for specialized training programs, grant support, individual consultations, and the creation of community learning spaces. Various social media platforms could also be leveraged for this purpose. The goal is not merely the widespread use of AI tools, but the promotion of equal opportunities.

Finally, it is recommended to develop a modern code of ethics for career counseling that clearly delineates the boundary between AI-assisted application materials and content generated solely by machines. Authenticity, transparency, and the development of client competencies can not become secondary to automation.

Limitations of the research and directions for future studies

This research provided valuable insights into the application of artificial intelligence in the job search process, although it should be interpreted with certain limitations in mind.

One primary limitation is the relatively small sample size of the quantitative data collection. Although this was supplemented with qualitative approaches and in-depth interviews, it does not allow for broad generalizations of the findings. Therefore, future studies should aim to increase both the size and diversity of the sample, with particular attention to differences in age, educational attainment, professional background, and digital literacy.

The sample was drawn exclusively from Hungary, meaning the results are closely tied to the local cultural and labor market context. International comparative studies are necessary to understand to what extent attitudes toward AI tools and patterns of use are similar or different in other countries, particularly in labor markets at different stages of development.

During the qualitative data collection, interviews were conducted with eight experienced career counselors, allowing for deeper exploration of the underlying dynamics. However, the limited number of participants affects the representativeness of the findings. While the counselors' perspectives are professionally relevant, they were shaped within a specific interpretative framework. It would be beneficial in future research to conduct in-depth interviews with a larger number of counselors, collecting more differentiated data by sector and client base.

Future studies should also examine the long-term effects of AI tool usage, such as employment outcomes, job search efficiency, and career adaptation, to better understand the real career-building value of the technology.

Finally, it is crucial to initiate longitudinal studies capable of tracking changes in AI usage, learning trajectories, and the development of individual attitudes over time. Such research could shed new light not only on the evolution of job seekers but also on the professional development of career counselors themselves.

CONCLUSION

This study provided a comprehensive and nuanced picture of how job seekers and career counselors in Hungary relate to the use of AI tools. By combining quantitative survey data with qualitative interviews, it was possible to gain a deeper understanding of usage patterns, attitudes, and challenges, as well as to map the current practices from multiple perspectives.

The findings reveal that although the availability of AI tools is becoming increasingly widespread, effective and meaningful use extends beyond mere technological access. Motivation, digital competence, the skill of prompt engineering, an understanding of how algorithms function, and external support collectively determine whether users can truly leverage the technology to their advantage. Job seekers who are able to integrate AI-generated suggestions into their application materials and preparation processes tend to extract greater value from these systems.

Looking forward, the principal value of career counselors lies in the human dimension: building trust, supporting self-awareness, strategic planning, and offering mental and emotional support throughout the job search process. Several interviewees emphasized that "the human side is the real topic", such as uncovering clients' motivations and fears, and strengthening their self-confidence. The counselor's role does not diminish with the rise of AI; rather, it evolves. Counselors are increasingly becoming interpreters of digital content, ethical guides, and technological mentors. Their expertise remains indispensable, particularly for those who are uncertain about AI use or are starting from a position of digital disadvantage.

The research also underscored structural differences: generational divides, industry-specific practices, and digital inequalities significantly influence who benefits most from AI tools. Without targeted responses to these disparities, there is a risk that AI could exacerbate, rather than mitigate, labor market inequalities.

In summary, artificial intelligence is not merely a technological innovation; it is increasingly a societal, psychological, and pedagogical challenge as well. Successful integration of AI into the job search ecosystem will only be possible if it is accompanied by appropriate educational, trust-building, ethical, and support structures. Future research should continue to explore the evolving relationship between humans and intelligent systems, particularly within the context of the world of work.

Conflict of interest:

The authors declare no conflict of interest.

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IMPLEMENTING UNESCO PRINCIPLES IN PRACTICE: NGOS' CONTRIBUTIONS TO ADULT LEARNING IN INDIA

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Abstract: India has a rich and diversified non-governmental organisation (NGO) environment that plays an important but understudied role in adult learning and education. While worldwide frameworks like UNESCO's Recommendation on Adult Learning and Education define a humanistic and inclusive vision of lifelong learning, little empirical research has looked at how these ideals are implemented in localised learning ecosystems. In India, non-governmental organisations (NGOs) play critical roles in adult learning ecosystems by putting global frameworks like UNESCO's Recommendation on Adult Learning and Education (RALE) and Sustainable Development Goal 4 into action. This study fills that gap by conducting a qualitative, multi-case analysis on the contributions of non-governmental organisations (NGOs) to adult education in India. The study examines adult learning practices in five NGOs: Manjari Foundation, Titli Foundation, UDAI (Working Together Works), Ramakrishna Charitable Trust, and Participatory Research in Asia (PRIA), using documentary analysis and twenty semi-structured interviews with organisational leaders, program staff, facilitators, carers, and adult learners. The findings show that NGOs act as ecosystem mediators, applying global adult learning concepts to local socioeconomic realities via context-responsive pedagogies. Adult learning occurs not only through literacy and vocational programs, but also through health education, caregiving practices, civic involvement, and inclusive education initiatives that include people with disabilities and their families.

Keywords: adult learning, inclusive, india, lifelong learning, vocational training

INTRODUCTION

Adult learning has acquired relevance in global development discourse as societies grapple with economic insecurity, growing disparities, and democratic participation gaps (UNESCO Institute for Lifelong Learning, 2016). Adult education is increasingly being positioned as a key component of lifelong learning systems, with a focus on literacy, skill development, civic involvement, and personal empowerment. However, the availability of global policy frameworks does not guarantee effective implementation in varied socioeconomic circumstances.

These gaps reflect structural disconnects between centralised policy design and adult learners' lived circumstances, which are affected by labour precarity, gender norms, and unequal access to institutional resources.

In this framework, NGOs hold a unique institutional position. NGOs operate at the crossroads of community participation and policy alignment, allowing them to tailor adult learning efforts to local conditions while remaining sensitive to national and international objectives. This study contends that NGOs do more than just supply adult education programs; they actively restructure adult learning environments by mediating between global ideas and local practice.

This study analyses how adult learning is situated within broader socioeconomic and institutional processes using qualitative case studies of five non-governmental organisations working in literacy, health education, livelihood training, and participatory governance. It promotes a conceptual change by identifying NGOs as institutional players who shape the meaning, structure, and outcomes of adult education in India.

THEORETICAL FRAMEWORK

This study uses an integrated theoretical framework that incorporates human capital theory, lifelong learning theory, participatory learning and empowerment theory, the capacity approach, ecological systems theory, and adult learning motivation theory. These views are used in linked ways to capture the economic, social, pedagogical, and institutional characteristics of adult learning practice (Jarvis, 2004).

Literacy, vocational, and financial education efforts organised by non-governmental organisations (NGOs) help people generate income, especially in informal labour marketplaces. However, this study views human capital development as socially mediated by gender relations, job instability, and community support structures, rather than as an inevitable result of skill gain.

Lifelong learning theory broadens the analysis by conceptualising learning as continuous and non-linear over the life period (Jarvis, 2004). Non-governmental organisations (NGOs) operationalise lifelong learning by developing non-formal learning environments that address individuals' urgent living challenges. Health education, financial literacy, and civic learning programs show how learning is incorporated in daily life rather than being limited to formal institutions (UNESCO Institute for Lifelong Learning, 2016).

Participatory learning and empowerment theory redefine adult learning as a relational and political activity. Drawing on Freire's dialogical approach, adult education is viewed as a practice of critical consciousness rather than passive knowledge transfer (Freire & Macedo, 1970). Participatory techniques seen in organisations like PRIA and Uday position learners as co-creators of knowledge and contributors to communal decision-making.

The capabilities approach broadens this paradigm by focusing on substantive freedoms rather than skill learning (Sen, 1999). Adult learning interventions help people make more informed decisions about their livelihoods, health, and civic involvement. This paradigm allows for the evaluation of results that go beyond traditional educational indicators and is consistent with rights-based interpretations of adult education.

METHODOLOGY

This study adopts a qualitative case-study methodology to investigate how NGOs put adult learning ideas into reality. The study's focus on meanings, processes, and institutional mediation within adult learning ecosystems lends itself to a qualitative approach (Yin, 2018).

Data were gathered from three main sources: organisational documents, programme materials, and semi-structured interviews. A total of 20 semi-structured interviews were held with NGO practitioners, program coordinators, and adult learners from five organisations: Manjari Foundation, Titli Foundation, UDAI (Working Together Works), Ramakrishna Charitable Trust, and Participatory Research in Asia (PRIA). Purposive sampling was used to choose participants who represented a wide range of positions and experiences relevant to adult learning programs.

Interviews focused on program design, learner engagement, pedagogical techniques, perceived outcomes, and problems in implementing adult education initiatives. Interviews were performed in English for 50–70 minutes and audio-recorded with informed permission. Ethical factors, such as anonymity and voluntary involvement, were maintained throughout the research procedure.

Data was analysed using a thematic and framework-based methodology. The interview transcripts and documentary materials were coded iteratively, first inductively to uncover emergent themes and then deductively using the study's theoretical framework. This technique permitted a systematic relationship between empirical insights and conceptual categories such as lifelong learning, participation, capability expansion, and institutional mediation. These perspectives informed the coding framework and interpretation of NGO practices as economic, relational, and capability-enhancing learning processes.

NGO CONTRIBUTIONS TO ADULT LEARNING: EMPIRICAL FINDINGS

Manjari Foundation

Manjari Foundation provides functional literacy, financial education, and livelihood development to women's self-help organisations. According to interview data, adult learners are more likely to continue participating when their learning is directly related to economic behaviours. According to the Head of Education, Gender and Youth of Manjari, literacy classes gained traction when women were able to apply what they had learnt to savings management and household budgeting right away. (Interview MF-1, Head of the program, 2025). This integration reflects a contextualised view of adult learning that emphasises usability and relevance.

Titli Foundation

Titli Foundation views menstrual health education as a sort of functional literacy that is integrated into larger gender and health awareness efforts. According to the founder, removing stigma and misinformation fosters an environment conducive to continuing participation in learning spaces. One field facilitator observed that health-focused learning frequently serves as a gateway to broader educational involvement among adult women (Interview TF-1, Founder,

2025). This demonstrates how adult learning goes beyond formal literacy and includes bodily autonomy and social participation.

Participatory Research in Asia (PRIA)

PRIA's adult learning activities are centred on governance, citizenship, and participatory research. According to interviews, learners interact critically with institutional systems when education is portrayed as a tool for social action. Adult learning, according to a programme lead, is a process by which communities gain knowledge and voice (Interview PR-1 Programme Lead, 2025). This situates adult education as a democratic practice rather than a technical solution.

Ramakrishna Charitable Trust

The Ramakrishna Charitable Trust works at the nexus of adult education, inclusive learning, and community development, with a particular emphasis on children and young people with special needs. While the Trust's core beneficiaries are young people with disabilities, its programs provide significant adult learning opportunities for carers, parents, educators, and community members, emphasising the relational and ecosystemic aspects of learning.

The founder explained that carers and instructors frequently learn new pedagogical and management skills, allowing them to support independent living, social participation, and holistic development in children and young adults with disabilities (Interview RKT-1, Founder, 2025).

UDAI (Working Together Works)

UDAI works with children and young adults with exceptional needs, focusing on inclusive education, carer engagement, and transitional learning. Although UDAI's programs primarily benefit young people with disabilities, they also generate major adult learning processes by engaging parents, carers, educators, and support workers as active learners.

According to interview data, adult learning at UDAI takes place through formal training, counselling sessions, and interactive reflection on caregiving methods. According to the director, parents and carers frequently view learning as transformative, particularly when it comes to understanding disability, navigating institutional systems, and supporting independent living skills in young adults with special needs (Interview UDAI-1, Director 2025).

DISCUSSION

NGOs in India act as intermediaries within adult learning ecosystems, transforming foreign concepts into locally appropriate, socially rooted activities. Adult learning is relational, participative, and frequently indirect, with carer and educator learning alongside primary beneficiaries.

The cases of UDAI and the Ramakrishna Charitable Trust demonstrate inclusion-focused learning, indicating that adult education goes beyond traditional literacy or employment training to relational, capability-enhancing practices. These findings corroborate Freirean participatory

pedagogy and the capacity approach, harmonising with UNESCO's humanistic goal of lifelong learning. (Freire & Macedo, 1970; Sen, 1999; UNESCO, 2015).

Limitation

This study has a few drawbacks that should be noted. First, the study is based on qualitative data from five non-governmental organisations and twenty interviews, which gives valuable insights but restricts the statistical generalisability of the results. The gathered experiences are specific to organisational contexts and may not represent all NGOs operating in India's adult learning ecosystem (Yin, 2018).

Second, the study focuses largely on NGO-led programs and does not compare them to state-run adult education programmes. While this approach coincides with the study's goal of exploring civil society actors as mediators of adult learning, future research might look into interactions between NGOs and government institutions to acquire a more complete picture of the ecosystem.

Third, the data only captures participants' viewpoints at a specific point in time, making it difficult to analyse long-term learning results or persistent benefits. Although the combination of interviews and documentary analysis adds credibility, longitudinal research could provide more in-depth insights into how adult learning grows over time inside these programs. Despite these limitations, the study provides important conceptual and empirical insights into the role of non-governmental organisations (NGOs) in operationalising inclusive adult learning, focusing on relational, participatory, and capability-enhancing processes that go beyond traditional literacy and vocational frameworks.

CONCLUSION

This study shows that by converting global frameworks into locally responsive, inclusive, and participatory practices, NGOs in India play a critical role in bolstering adult learning ecosystems. Empirical data from five NGOs demonstrates that adult education encompasses relational, experiential, and community-centered learning for carers, educators, and community members in addition to core beneficiaries. It goes beyond reading and vocational skills.

The study has consequences for both policy and practice. NGOs must be formally acknowledged as essential players in the creation, execution, and maintenance of inclusive learning initiatives in order to strengthen adult education in India. Adult learning outcomes are likely to be improved by policies that encourage civil society involvement, cross-sector cooperation, and context-sensitive pedagogy. Longitudinal effects, NGO-state collaborations, and systemic factors that support ongoing capability-building and inclusion in adult education should all be investigated in future studies.

In conclusion, NGOs in India construct learning ecosystems where adult education is transformative, inclusive, and relational in addition to delivering programs. These organisations offer a paradigm for how adult education may promote equity, empowerment, and lifelong engagement by integrating global concepts and local realities. Their insights are pertinent to researchers and policymakers worldwide.

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GENERATIONS, AGEING, AND SOCIAL CHANGE

CIVIL ORGANIZATIONS IN GYŐR AND THE REGION, IN THE LIGHT OF VOLUNTEERING OPPORTUNITIES OF THE TRANSITIONING AGE GROUP

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Abstract: The trend of an aging society experienced in Europe, including Hungary, and the extension of the post-parental period in family life justify a more comprehensive examination of the concepts related to active aging than ever before. This study explores the role of the different civil organizations operating in the city of Győr and the Győr-Moson-Sopron County, focusing on the community participation opportunities of the age group between 50 and 60 years (called the age of transition). The research highlights the importance of community engagement within the examined age group, and discusses the key functions and the different types of volunteer activities. Additionally, it examines the main motivations behind volunteering, as well as the differences in the motivations of the younger and older generations. The study also collects and presents a list of civil organizations in the Győr-Moson-Sopron County, through which the individuals of the transitional age (1) can engage in voluntary activities, or (2) can participate in programs organized involving volunteers, and describes the civil organizations that are willing to open to the examined age group in their future activities. In addition to exploring the practices of local civil organizations, the research also examines their effectiveness and shortcomings. The study also addresses the role of the local governments in social participation and in promoting and expanding the community engagement opportunities of civil organizations.

Keywords: civil organisations, community activity, social participation, transitioning age, volunteering

INTRODUCTION – THE AGE OF TRANSITION

The term „age of transition” refers to the social and biological stage of life between 50 to 60 (Kaszás et al., 2021), and marks the transition between adulthood and old age. This particular period of life is not only about aging, but it also covers the gradual exit from the labor market, as well as significant changes in quality of life and social roles. The 50–60-year-old age group thus experiences a phase characterized by significant biological, social, economic, and psychological changes. During this period, most individuals are still active participants in the labor market, while simultaneously preparing for retirement, and face new social challenges and opportunities related to aging. This means that the transitional generation requires particular attention in terms of community activities and social integration, as these factors significantly impact the maintenance of quality of life and the social construction of aging.

According to the World Health Organization (WHO), active aging plays a key role in enabling older individuals to recognize their own potential, thus experiencing their aging process positively (Mendoza-Ruvalcaba & Arias-Merino, 2015). Therefore, the community activity of the transitional generation holds significant importance: the concept of active aging emphasizes not

only the feeling of satisfaction but also physical and mental health, as well as social support (Vajda, 2017).

Retirement marks the beginning of a new life phase, which often comes with the loss of daily routine, workplace challenges, and social relationships. This makes it crucial for individuals to remain active in community life, as it promotes not only entertainment but also personal development. It is difficult to address the problem of loneliness, and the loss of daily routine afterwards, which is why participation in the community should be encouraged long before retirement.

Community activity opportunities can help maintain social connections. With the cessation of social interactions in the workplace, those who find it difficult to build social relationships can easily become isolated. By enhancing interactions between individuals through community activities, we also assist them in preserving their social identity. Such communal experiences, therefore, have a positive impact on mental health as well.

Additionally, community activity opportunities contribute to the meaningful use of leisure time, which can not only support active mental and physical well-being but also helps the transitional generation maintain their goals. Exiting from the labor market leads to the losing of the previous daily routine, which may also result in the loss of life purposes and ambitions. Participation in community life can set new, active directions for life, providing opportunities for self-realization, acquiring new skills, or even sharing experiences.

VOLUNTEERING – LITERATURE REVIEW

Conceptual approaches

The term „volunteerism” has been defined by numerous researchers. Czike and Kuti, for example describe it as an activity that is performed voluntarily, and for which the individual does not accept monetary compensation, and is primarily conducted for the benefit of others, social groups, and the community, beyond any potential personal or familial gain (Czike & Kuti, 2006). The two Voicus emphasize the formal framework of volunteer activity in their definition, interpreting volunteerism as an action carried out within a civil organization, of one's own free will, without compensation, and in the interest of the community (Voicu & Voicu, 2009). Anheier and Salamon, on the other hand, highlight the cultural and economic aspects of the concept (Anheier & Salamon, 2001). In her PhD dissertation titled *Volunteering and Community Development*, Éva Perpék, side by side with other authors, argues that volunteer work requires human, cultural, and social capital (Perpék, 2011). At the same time, she also points out its reciprocal effects: during volunteer work, the volunteer not only gains relational social capital and enriches their cultural experiences, but also goes through self-development (Czike & Kuti, 2006) (Bartal & Kmetty, 2011).

Volunteering is, therefore, a complex social phenomenon, and although its interpretations may differ in focus, the definitions are consistent in that, during voluntary activities: (1) there is no monetary compensation, (2) it is done with a helping intent or for the sake of a cause, and (3) it is

carried out by the individual's free will. This article deliberately uses the term "voluntary activity" instead of "work," as the academic field tends to replace the previous terminology in order to avoid confusion with the term "work," which refers to paid activities (Czike & Kuti, 2006).

Types of volunteering

Researchers often distinguish between forms of volunteering based on whether they are formal or informal, with the main difference lying in who coordinates the activity and the framework within which it occurs. Formal volunteering refers to volunteer work directed by organizations (non-profit organizations, state institutions, corporations). The activities of these organizations are structured, and their operations follow specific rules. In contrast, informal volunteering is primarily based on personal relationships (Kardos, 2021), and the voluntary activity tends to be more occasional and spontaneous rather than regular.

Einolf breaks down these personal relationships and classifies the types of informal volunteering based on whether they take place in primary socialization environments (family, relatives, friends), in the acquaintanceship environment, or with strangers (Einolf, 2008). Finkelstein and Brannick distinguish two categories: person-oriented informal volunteering (e.g., elderly, children, people with disabilities, etc.) and task-oriented informal volunteering (e.g., pet care, household chores, administrative tasks, etc.) (Finkelstein & Brannick, 2007).

Based on the Hungarian research examining the distribution of formal and informal volunteering, it has been found that in Central and Eastern Europe, including Hungary, informal volunteering predominantly prevails (58–94%) (Bartal, 2019). However, Perpék, Wilson and Musick point out that these two forms of volunteering positively correlate with each other (Wilson & Musick, 1997). Therefore, those engaging in informal volunteer activities (for example, helping acquaintances) are also likely to take part in formal volunteering. It can be stated that the reverse of this observation is also true (Perpék, 2011).

Volunteering and motivation

Pólya and Martos' findings confirm that volunteering enhances life satisfaction (Pólya & Martos, 2012). Therefore, it is important to understand the motivational factors underlying volunteer behavior in order to promote voluntary engagement and, consequently, the sense of well-being.

Bartal and Kmetty examined volunteering based on the results of the standardization of the Hungarian Volunteer Motivation Questionnaire. They found that, similarly to the non-profit sector, the formal sector in Hungary is characterized by a kind of duality: on one side, there are organizations that employ volunteers with significant financial and knowledge capital, while on the other side, there are organizations that operate in a less professionalized manner, engaging occasional volunteers to carry out their activities within the framework of specific programs (Bartal & Kmetty, 2011).

Their sample included only individuals engaged in formal volunteer activities within organizational frameworks. The results of their research show that in Hungary, volunteers are primarily motivated by socially-oriented values, rather than social norms or religion. Social

values ensure that volunteers perform their tasks selflessly and with commitment. Fundamental social values include helpfulness, especially towards those facing difficulties, as well as empathy and the desire to make another person's life better. Volunteering strengthens emotional connections through empathy and helpfulness, which, as we will see later, is also an important motivational factor. Solidarity, the fight against social inequalities, and the desire for justice and equality are also relevant values (Bartal & Kmetty, 2011).

The values are followed by recognition and social interaction. If an organization wants to retain its volunteers, it is important to consider the role of recognition in the motivations behind volunteering. Recognition helps strengthen a volunteer's commitment and contributes to their continued participation in similar activities. When a volunteer feels that their work is not only useful but also important, it can enhance their personal satisfaction and active involvement, deepening their commitment to the volunteering process. In addition to ensuring internal satisfaction and sustained motivation, recognition also plays a role in the learning process, as it helps volunteers recognize where they have performed well, allowing them to continue developing and stay motivated for further growth. The importance of recognition is supported by a 2023 study that examined the motivations of volunteers at the Sziget Festival: the findings showed that for the participating volunteers, recognition (with organizational recognition ranked the highest) had the highest average scale value as a motivational factor (Bodor-Eranus et al., 2023).

The two studies discussed above show that social interactions are important motivational factors for volunteers. Social relationships and social support contribute significantly to an individual's quality of life (Fekete, 2007) and have a positive impact on their mental and emotional well-being. Opportunities for community interactions allow volunteers to form relationships and work together with others toward a common goal. This experience can strengthen bonds, enhance the feeling of importance, and play a role in the development of a stronger community.

In addition to these points, it is important to mention that researchers in the 1970s observed different motivational focuses among young volunteers and retirees. For example, Lawrence Pitterman's findings suggest that while young people are primarily motivated by economic benefits, the older generation is primarily driven by social recognition (Pitterman, 1973).

Civil organizations and volunteering

There are many domestic and international terms used to describe the civil sector, which often overlap. The most common terms are non-governmental organizations (NGOs), voluntary organizations, and non-profit organizations (NPOs) (Kákai, 2009). The concept of a civil organization was introduced into Hungarian law with the Civil Code, which came into effect on January 1, 2012 (Act CLXXV of 2011), and encompasses civil partnerships, associations (excluding political parties, trade unions, and mutual insurance funds), and foundations (excluding public foundations and party foundations) (Kaprinay, 2015). The characteristics of these organizations include: (1) stable organizational structure, (2) prohibition of profit

distribution, (3) independence from the state institutional system, (4) ability to self-manage, (5) reliance on volunteer work in their activities (Kuti, 1998; Bartal, 2005; Kaprinay, 2015).

In the operation of civil organizations, the involvement of volunteers is one of the most important atypical forms of employment. While social workers provide valuable services to civil organizations, the lack of human capital remains a significant issue in the social sector (Csizmadia et al., 2023). Kákai (2009), in examining the challenges of the non-profit sector, concluded that the number of volunteers greatly influences the functioning of these organizations. The performance of volunteers creates economic value, and their involvement can be a solution for organizations to provide more efficient services and achieve their goals (Acus, 2018).

Volunteers do not only provide resources to the civil organizations that employ them, but also offer an opportunity to strengthen their relationships with communities and influence social changes. Volunteering provides civil organizations with the ability to mobilize resources for their projects and initiatives without financial compensation. In addition, volunteers can enrich the work of civil organizations with fresh perspectives and ideas, leading to creative solutions and new, innovative projects. Therefore, volunteering not only supports the operation of organizations but also generates broader social and economic benefits, strengthening the sense of community and social responsibility.

VOLUNTEERING AND LOCAL GOVERNMENT

Volunteerism can be an integral part of a community. It can allow communities to grow and prosper, and can have many benefits for a local community in the sphere of community building, addressing social issues, personal development or encouraging civic engagement. Western societies have much greater traditions not only of volunteering, but also of conscious management of volunteering by local government actors. Historical-political traditions and heritage have meant an unfavorable state for volunteering in Hungary, so the modern volunteer movement could only start in our country with the change of regime. However, outside of the Central and Eastern European countries, we can find many good practices for local government involvement in promoting volunteering.

Cuthill and Warburton (2005) examine the framework, elements and opportunities for management tasks related to volunteering in local governments. Choudhury (2010) examines the relationship between volunteering and local government actors in his study, with particular attention to how to motivate, attract and manage volunteers at the local level. We find numerous summary studies, studies and reports related to the English-speaking areas, which collect local good practices and highlight with examples that volunteering is also constantly changing in parallel with the changing political environment (Volunteering in Local Government, 2018).

When examining the relationship between local government and volunteering in a Hungarian context, it is worth starting with a legal foundation. According to the relevant Act on Public Interest Activities (Act LXXXVIII of 2005), the local government may be an organization hosting volunteers within the scope of the public services and disaster management tasks it

provides. Among the strategic documents defining the history of volunteering in Hungary, it is necessary to mention the National Volunteer Strategy for the period 2012–2020, the main goal of which was to spread the concept of volunteering, to develop the sector extensively, and to increase the proportion of volunteers among people aged 18–26 and over 60. The goals formulated were appropriate and well suited to the contemporary situation of Hungarian volunteering, but the strategy was not widely debated and evaluated in the social and civil sectors (Bartal, 2021). Furthermore, the strategy did not address the relationship between volunteering and local governments at all (Government Resolution number 1068/2012, III.20).

Research on the relationship between volunteering and local government has been less the subject of researches in Hungary in recent decades. However, it has been established that non-profit organizations mainly help local governments in the performance of their tasks through the activities they perform, namely in the form of (public) tasks or volunteer work related to or related to public spaces, and it can also be said that this form of assistance occurred in the majority of municipalities (Sebestyén, 2012). These researches also revealed that volunteer work was primarily carried out in the course of free work provided during cultural events and programs, and was mostly not related to environmental goals.

Conscious management of volunteering is even less widespread among local governments in Hungary, but we can already identify some good examples. The city of Szombathely launched a volunteer initiative in order to channel the free capacities of the population during the Covid pandemic. Based on the many positive experiences and feedbacks, the municipality decided to build a stable, well-organized volunteer system, in which the municipality is a decisive player. As a first step, a volunteer-related working group was set up in 2021 (Resolution number 96/2021. (IX.30.) Szombathely MJV Kgy.), then in 2022 the city's volunteer concept and strategy were created and adopted. The main objectives of the strategy include, among others, the operation of a long-term sustainable local government system based on volunteer work, the performance of coordination tasks between citizens performing voluntary charitable work and host organizations dealing with volunteering, and the operation of a steering working group (Resolution number 31/2022. (I.27.) Szombathely MJV Kgy.).

The launch of the volunteer program in Székesfehérvár is also related to the period of the Covid epidemic, as many volunteers have indicated to the local government that they would be happy to volunteer outside of the emergency, so they have created an interface on the city's website through which you can get involved in performing various tasks, such as organizing cultural and sports events, city beautification activities, environmental protection, caring for the elderly, dealing with children, providing social assistance, education, animal care, and disaster management. The local government plays a coordinating role in all of this (onkentes.szekesfehervar.hu, 2025).

Although not in the field of volunteer management, but in terms of individual volunteer initiatives, it is also worth studying the connections between the Győr local government and volunteering. An earlier study (Laczkovits-Takács, 2019) presents good practices of social participation and volunteering within the framework of the Healthy Cities Program. The Healthy

Cities Program is one of the defining pillars of the human service model of the city of Győr, in addition to the pillars related to social policy, housing and primary health care, and it is also a voluntary task undertaken by the municipality. The majority of the related volunteer initiatives are related to the older age group. The Conversation Network established in 2009 was launched on the basis of the results of the 2006 Health Picture of the Elderly, which showed that every 4th respondent lives alone with the phenomenon of loneliness and different levels of depression, while 20% of the respondents would like to undertake volunteer work. The initiative is practically implemented in the form of peer support, where active pensioners visit a lonely elderly person in their home for 2 hours 1 time a week for a chat (Resolution number 137/2006. (V.18.) GYŐR MJV Kgy.) A project initiated by the municipality was also closely related to volunteering, which was based on the survey of the 2014 Győr City Health Picture, according to which 60% of the population does not do any volunteer work at all and only 10% is an active volunteer (Resolution number 217/2016. (XII.21.) GYŐR MJV Kgy.) As a result of the project, a workshop on volunteering was carried out with the aim of finding good practices. Walking clubs were established and still operate in the city, which are led by volunteers. Affecting the younger age group, a peer support group was established under the name Youth for Youth. The Volunteer Mission initiative was established, the aim of which was to recruit volunteers and to create a volunteer database in order to be able to carry out smaller projects in the city's health, social, educational and sports facilities on a regular basis. Furthermore, as an element of the project, the Volunteer Grandma Service was established, which aims to provide a grandparent-grandchild experience for those who do not have the opportunity to do so, as they live in state care, for example.

METHODOLOGY

The aim of our research

The main goal of our research was to assess the presence of volunteers from the examined age group in civil organizations operating in Győr and the surrounding region. The study is also aimed to understand how civil organizations perceive the role of volunteers aged 50–60, what tasks they assign to them, and how they view the social involvement of these volunteers.

Research methods

The research was conducted through a questionnaire consisting of 11 questions. It was distributed online and was available for 1 month. It was completed by representatives of civil organizations operating in Győr and the surrounding region. The questions focused on the following main topics:

- Presence of age groups in the organization: The questionnaire inquired about the age groups involved in the civil organizations and how many of them belong to the pre-retirement age group (50–60 years old).

- Role of pre-retirement volunteers: The research is aimed to identify the different types of tasks performed by volunteers aged 50–60 and how they contribute to the daily operations of the organization.

Importance of volunteering: We asked respondents for their opinions on the importance of involving the pre-retirement age group and also how it is managed within the civil organizations.

Expected results

The research is expected to reveal the extent to which volunteers aged 50–60 are present in civil organizations in Győr and its surrounding region. This will help to assess to what extent organizations rely on the older age group and whether these people are truly active participants in the daily operations of the organizations.

Additionally, the study will explore whether the volunteers in the examined age group take on leadership roles, mentoring, administrative tasks, or possibly direct assistance roles. The results could help organizations better utilize the experience and expertise of the older generation.

The results of the questionnaire are also expected to show how important the involvement of the 50–60 age group is to the civil organizations. The responses will provide insight into how organizations evaluate the role of this age group and to what extent they need their active participation in their programs.

Furthermore, the research is likely to shed light on whether civil organizations are aware of the requirements of the Public Interest Volunteering Act and whether they ensure that volunteers receive the compensation and recognition stipulated by the law. Based on the results, civil organizations will have the opportunity to reflect on and improve their legal compliance if necessary.

At the end of the research, the opinions and suggestions provided by respondents will offer valuable information on how civil organizations could better integrate and support older volunteers, as well as how they could increase their social involvement. This will help the development of future programs, mentoring opportunities, and supportive measures.

Results

This study explores the topic of volunteering from the perspective of civil organizations, which means the questionnaire contained questions for the representatives of these organizations. In the future, we believe that it is necessary to complement the research with a study that explores the opinions and experiences of volunteers.

Among others, the following civil organizations were approached via questionnaire to share their perspectives on the topic.

- Adyvárosért Egyesület (Győr)
- Arrabona Városi Nyugdíjas Egyesület (Győr)
- Babót Királyfa Nyugdíjas Klub Egyesület (Babót)
- Egy Hullámhosszon Kulturális Egyesület (Mosonmagyaróvár)
- Evangelizáció 2000 Egyesület (Győr)
- Győr-Moson-Sopron Megyei Diabetes Egyesület (Győr)

- Győr-Moson-Sopron Megyei Pannon Nyugdíjas Egyesület (Győr)
- Kisalföld Terület- és Vidékfejlesztő Egyesület (Écs)
- Majki Népfőiskolai Társaság (Tatabánya)
- Mosonmagyaróvári Nagycsaládosok Életfa Egyesülete (Mosonmagyaróvár)
- Muszáj Természetvédelmi Koordinációs Egyesület (Győr)
- Punkok Nem Halottak Terepfutó Egyesület (Győr)
- SOLIDARITAS Magyar-Lengyel Közéleti Egyesület (Budapest)
- Start IT up Egyesület (Győr)
- Szárföldi Hagyományőrző Egyesület (Szárföld)
- TIT Pannon Egyesülete (Győr)
- Vig Zoltán Emlék-Alapítvány (Sokorópátka)

In the first question, we wanted to assess whether the examined age group is present in the civil organizations operating in Győr and the surrounding region. Based on the results, more than half of the organizations that responded (59%, 10 organizations) collaborate with individuals from the examined age group. The following data applies to these 10 organizations.

The proportion of pre-retirement civil participants varies by organization: for 40% of them (4), 1–2 individuals belong to this age group, for 30% (3), it is 6–10 individuals, and for 20% (2), it exceeds ten individuals. Regarding the role of the examined age group within the organizations, only one organization reported that there are no board members among the pre-retirement members. In the majority of organizations (80%, 8 organizations), 1–3 individuals from this group hold leadership positions. There is one organization where this number is higher, with 5 individuals in leadership positions.

We also surveyed what other tasks, besides leadership roles, are performed by the examined age group in civil organizations. 90% of respondents (9) indicated that their pre-retirement members perform some voluntary tasks. Additionally, 6 organizations (60%) reported that these individuals take on administrative or supporting roles, and 3 organizations (30%) stated that they are involved in training or mentoring. Based on the results, it is common for one individual to hold multiple roles within the civil organization. Breaking down the question by task types, in 80% of organizations (8), individuals from the examined age group are involved in organizing and executing programs, in 50% (5) in financial or other background tasks, and in 50% (5) in administrative duties. Direct assistance to target groups is only indicated as a task by 20% of the organizations (2).

In the following, more general questions were interrogated, so the answers from all 17 organizations were relevant to the research. The following data applies to all respondents. 76.5% of organizations (13) consider the involvement of volunteers in their work very important, while 11.8% (2) consider it important. One organization (5.9%) stated that it is of medium importance, and another one (5.9%) considers volunteer involvement unimportant. 64.7% of respondents (11) believe that volunteers play a key role in the life of civil organizations, while 11.8% (2) think that although volunteers are important, their role can be substituted, and 2 organizations (11.8%) consider their role to be smaller and limited to background tasks, or they do not consider them to have a significant role at all.

We also asked civil organizations whether they think it is important to pay more attention to the situation and role of pre-retirement volunteers. 35.3% (6) of the organizations thought it was very important, 41.2% (7) considered it important, 11.8% (2) thought it was not very important, and another 11.8% (2) deemed it unimportant.

The questions also included the 2005 LXXXVIII law on public interest volunteer activities (Act LXXXVIII of 2005 on Public Interest Volunteer Activities). Just over half of the organizations (52.9%, 9 organizations) had not registered under the voluntary law, while 47.1% (8 organizations) had. When asked whether the organization can provide the compensations guaranteed by the public interest volunteer law to recognize volunteers' work, 8 organizations (47.1%) responded negatively. 6 organizations (35.3%) can do so to a small extent, 1 organization (5.9%) to a large extent, and 2 organizations (11.8%) fully implement it.

The final question of the survey required a written response, and unlike the other questions, it was not mandatory to answer. Here, we asked for the organizations' opinions and suggestions regarding the role of pre-retirement volunteers and how to manage their presence in civil organizations. Six organizations provided evaluable responses, which are as follows:

- Their expertise could be important, but their flexibility is questionable.
- It does not matter whether the volunteer is in the pre-retirement group or not. There is no relevant difference.
- It would be important to have a government funding program that would provide extra income for those performing volunteer work in the organization.
- It would be practical for civil organizations to utilize the free time of volunteers belonging to the pre-retirement group. Volunteering is important for members reaching retirement age as it provides them with mental activity and tasks after "losing" their work.
- There is a need for an organization that manages this age group.

It would be better if these individuals could be employed with a decent salary.

CONCLUSIONS AND RECOMMENDATIONS

In this study our main goal was to explore the role of civil organizations in Győr and the Győr-Moson-Sopron County, focusing on the volunteering opportunities of individuals between 50 to 60 (age of transition). Our research highlights the importance of community engagement for this age group and discusses the different types of volunteer activities available, the motivations behind volunteering, and differences between younger and older generations' motivations. The study also identifies local civil organizations that may offer opportunities for volunteers who would like to participate in community activities. We also examined the volunteer programs local governments can offer. We found that these volunteer programs are still less widespread in Hungary, but we uncovered some good practices, for example in Győr and Szombathely.

Furthermore, we conducted a survey among civil organizations. The results show that while pre-retirement individuals are not highly represented in the civil organizations, they hold significant roles, including leadership positions. Organizations recognize the importance of this

age group, but more attention should be given to them. Following legal regulations for public interest volunteer activities and compensation is also a concern, as only half of the respondents confirmed they comply with these rules. In conclusion, pre-retirement volunteers could play a crucial role in the civil sector, but more support and proper attention to legal frameworks are necessary. For future research we suggest expanding the number of respondents and involving other stakeholders, including volunteers.

The results indicate that while the pre-retirement age group is not significantly present, they are indeed involved in the life of civil organizations in Győr and the surrounding region. Their involvement within organizations can be considered strong, with them holding key roles, including leadership positions.

The organizations rely heavily on volunteers and consider it important to involve the pre-retirement age group in their activities. However, the majority of respondents believe that more attention should be paid to this group. While the significance of involving pre-retirement volunteers is not yet fully recognized, those organizations that value their role find it essential that changes occur in this area.

An important area is also compliance with the legal provisions related to public interest volunteer activities and the compensations provided to volunteers. This is something organizations should carefully consider and implement, as only half of the respondents confirmed that they follow these regulations.

It can be concluded that pre-retirement volunteers can be key players in the civil sector, but there is a need for proper support and consideration of legal frameworks to further strengthen their role.

To gain a more comprehensive and deeper understanding of the topic, it is necessary to expand the number of respondents, which could help uncover and understand the arguments and counterarguments behind the commitment of civil organizations. Further research should also take into account other stakeholders in the topic, including volunteers themselves.

Conflict of interest:

The authors declare no conflict of interest.

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BUSINESS STRATEGIES AND ECONOMIC DEVELOPMENT

EVALUATION OF THE EFFECTIVENESS OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT TO ENHANCE CUSTOMER SATISFACTION IN THE FAST-FOOD DELIVERY SECTOR: A STUDY IN GYŐR, HUNGARY

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Abstract: This study investigates the impact of logistics and supply chain management practices on customer satisfaction in the fast-food delivery industry in Győr, Hungary. This paper examines issues related to delivery speed, order accuracy, service quality, and customer retention through a systematic literature review and primary data analysis of surveys collected from 105 customers and 53 delivery riders. It particularly examines the efficiency achieved through the integration of technologies, such as mobile applications and GPS tracking, into logistics processes to enhance operational effectiveness and the end-user experience. The results, obtained from the Scopus and ScienceDirect databases, expose the pros and cons of the logistics countermeasures used and provide practical examples for the fast-food sector to improve its delivery systems. The study highlights the role of logistics efficiency in raising customer satisfaction levels and contributing towards service performance in the rapidly growing fast-food delivery industry.

Keywords: customer satisfaction, delivery speed, logistics, order accuracy, technology integration.

INTRODUCTION

Effective supply chain management (SCM) and logistics planning are essential for efficient operations and customer satisfaction in the fast-food delivery segment. There is a need for logistics services in linking the fast-food delivery market with customers, thus directly influencing customer happiness as well as facilitating the sustainable growth of fast-food businesses (Yang et al., 2024). Given the rising demand for fast and reliable food delivery services in today's market, businesses seeking success must leverage strategic logistics planning. Advances in technology, as well as digital platforms, have propelled the expansion of the food delivery market, as well as efficiency in supplier competitiveness. As such, businesses are required to sustain higher standards of service that directly affect the consumer experience as they deal with increasingly complex supply chains.

Effective logistics entails the planning, execution, and management of the flow of products, services, and information from the point of origin to the point of consumption (Tan, 2001). As fast food becomes more popular, companies that focus on logistics efficiency can significantly improve their delivery service. By minimizing lead times and order faults, these companies can significantly improve customer satisfaction levels.

Fast food delivery in several urban regions has experienced fast adoption of technology. Mobile ordering applications, GPS delivery tracing, and route optimization data analysis have become increasingly popular (Nagy et al., 2018). These technologies not only enhance customer experience but also provide valuable data for logistics optimization as well as supply chain management optimization. Sustainable practices in the fast-food delivery business are increasingly important as environmental consciousness raises awareness on this front. It means doing partnerships with restaurants focusing on local ingredient sourcing, green packaging, and route optimization for minimizing carbon footprint. In addition, efficient logistics cooperation as well as optimization is necessary for building sustainable supply chains. Essential measures include the implementation of consolidation hubs, improved route optimization, and efficient practices in the final miles of delivery towards minimizing waste as well as resource optimization (Muchenje, 2024).

The study aims to establish the contribution of supply chain and logistics practices to customer satisfaction in the fast-food delivery business. It aims to establish the most critical logistical issues that influence delivery speed, accuracy of order, as well as quality of service. In order to realize the objective, the review is designed to thoroughly consider and synthesize research on supply chain management and logistics practices that optimize customer satisfaction within the fast-food delivery sector.

LITERATURE REVIEW

Logistics and supply chain management in fast food delivery services

Logistics management in meal delivery services plays a vital role in ensuring that food reaches consumers quickly and in the best possible condition. It involves several key steps, starting with order processing, where customer orders are received and confirmed. Next comes packaging, which is essential to keep the food fresh and secure while it is on the move. Transportation involves choosing the most efficient routes and methods to deliver the food as quickly as possible. Finally, there is the actual delivery, when the meal is handed over to the customer.

The main goal of logistics management in this sector is to ensure that meals are delivered not only on time but also safely, while keeping customers happy by maintaining food quality throughout the process (Yang et al., 2024). In the fast food delivery industry, this system is supported by a network of interconnected logistics elements, like real-time tracking, route optimization, and effective communication among restaurants, delivery personnel, and customers. By coordinating all these moving parts, the service can provide a seamless and efficient experience for everyone involved.

Key components of fast-food delivery logistics

Order Processing Systems: The research conducted by (Dirsehan & Cankat, 2021) suggests the role of integrated order processing systems to guarantee effective, fast food delivery services. These systems can easily handle multiple input channels, such as mobile applications and phone orders, to ensure effortless integration with inventory management and dispatch delivery systems. The authors report that fast food restaurants that are investing in computerized order handling technologies see highly significant improvements in key performance factors, including processing speed and accuracy of orders.

Inventory Management: Inventory management with Just-in-Time (JIT) has transformed the fast-food sector by emphasizing efficiency and freshness (Ufua et al., 2022). This approach allows restaurants to receive food and materials at the appropriate time, helping offset the issues associated with excess inventory that goes bad and leads to waste. By monitoring customer demand and stock in real time, quick-service restaurants can ensure meals are prepared with the freshest ingredients possible, significantly improving taste and overall quality, and lowering overheads for companies.

Transportation and Route Optimization: As order density escalates, particularly during peak hours, the necessity for effective transportation and route optimization has intensified. Reyana & Kautish (2024) examine the increasing application of artificial intelligence and machine learning algorithms for enhancing supply chain visibility, optimizing route planning and resource allocation, facilitating predictive maintenance, improving inventory management, automating warehouse operations, and bolstering risk management and security protocols.

Real-time tracking: Delivery dispatchers must reevaluate their competitive advantages in the current technology-driven landscape and seek possibilities to improve their processes. Mobile applications have developed into a distinct category of e-commerce that offers consumers the convenience of tracking their food from any location at any time, thereby conserving time and effort (Dirsehan & Cankat, 2021).

Last-mile Delivery: Last-mile delivery refers to the final stage of the delivery process, where products are transported from a distribution center or local warehouse directly to the consumer's doorstep (Aggarwal et al., 2024). This phase is often considered the most critical part of the delivery chain, as it directly impacts the customer experience and satisfaction. Efficient last-mile delivery can enhance a brand's reputation, encourage repeat business, and ultimately foster customer loyalty. Challenges in this stage can include traffic congestion, varying delivery locations, and the need for precise timing, all of which require effective logistics strategies to ensure timely and accurate deliveries.

Customer satisfaction in fast food delivery

Customer satisfaction in fast food delivery companies has emerged as a significant field of research, driven by the industry's rapid evolution, fueled by technological advancements and shifts in consumer demand. Many factors affect consumers' satisfaction, including service quality, delivery time, food quality upon delivery, order accuracy, ease of ordering systems, and driver courtesy. In the context of fast-food delivery, Yang et al. (2024) contextualize these attributes, citing the need for meal quality, delivery speed, and order accuracy. Meal quality, delivery service quality, and pricing and promotions played a significant role in enhancing consumer satisfaction with food delivery services. Customer satisfaction is valuable to comprehend for several reasons. Customer satisfaction levels can be a powerful driver of customer loyalty, repeat business, and the prosperity of fast-food chains in the competitive fast-food delivery business.

Technology integration in fast food logistics

The application of technology in fast-food logistics is an imperative step toward increasing efficiency in supply chain management, inventory management, and delivery systems. Digital technologies are advancing rapidly, so the fast-food industry needs to embrace them to remain competitive. Technology has become a differentiator within the fast-food delivery segment, with some of the key areas of focus.

Mobile apps and GPS tracking: Dirsehan & Cankat (2021) highlight the importance of customer satisfaction in fostering brand loyalty within the restaurant industry. Mobile applications have emerged as a distinctive form of e-commerce, providing consumers with convenience by saving both time and effort. Notably, mobile apps equipped with GPS tracking have become standard in numerous fast-food delivery services. These applications not only streamline the ordering process but also enable customers to monitor their orders in real time.

AI and machine learning: The utilization of AI and machine learning for demand forecasting and route optimization is on the rise, as noted by Reyana & Kautish (2024). Machine learning algorithms can enhance the intricate process by forecasting client preferences and optimizing routes accordingly. Logistics 4.0 addresses personalized customer demands without increasing expenses and improves the efficacy of relief operations. The influence of disruptive technologies on multiple facets of logistics, encompassing inventory management, route optimization, predictive maintenance, and last-mile delivery. Utilizing real-time data and sophisticated analytics, AI algorithms provide precise demand forecasting, automated replenishment systems, and customized delivery alternatives, resulting in enhanced efficiency and customer satisfaction.

Blockchain technology: Although in its nascent phase, blockchain technology is being investigated for its potential to improve transparency and traceability, mitigate risk, and, crucially, bolster confidence among many stakeholders within fast food supply chains (Pandey et al., 2022). Thakur & Ahuja (2024) assert that the implementation of this solution will provide all stakeholders in the supply chain with access to an immutable and full record of all transactions and activities. As a result, the likelihood of fraudulent activity will be reduced, efficiency will be

enhanced, and expenses associated with traditional supply chain management systems will be lowered.

Internet of things (IOT): The swift progress in supply chain management, propelled by digitization, has transformed the logistical landscape in the fast food industry. The implementation of technologies like the Internet of Things (IoT) enabled real-time monitoring of supplier products to retail locations, therefore decreasing delivery times and enhancing coordination (Nagy et al., 2018). These enhancements in visibility has enabled fast food companies to adapt to consumer demand dynamically, thereby maximizing inventory levels and minimizing waste. The incorporation of IoT sensors enables real-time monitoring of environmental variables, improving visibility and enabling proactive problem-solving.

Factors influencing customer satisfaction

Service quality: is a crucial determinant of customer satisfaction in fast food delivery services (Koay et al., 2022). Cheng et al. (2021) have created a service quality scale tailored for the online meal delivery sector, delineating elements such as responsiveness, assurance, and empathy. Their research emphasized that consumer quality perception profoundly influences satisfaction, underscoring the necessity of dependable service provision. Conversely, inadequate quality can result in detrimental customer experiences, as illustrated by the findings of Burlea-Schiopoiu et al. (2022), which revealed that service inconsistency negatively influenced the behavior of Romanian consumers during the Covid-19 pandemic.

Delivery speed: Another basic factor for satisfaction is the delivery's speed and accuracy. Studies suggest short delivery times correlate positively with customer satisfaction (Pal et al., 2024). Utilization and growth in the rapid food delivery service during the pandemic underlined the demand for fast-service delivery. These platforms have created an essential connection between consumers and restaurants, reflecting strongly in customers' views of service efficacy.

User-friendly ordering platforms: Increased mobile app ordering has actually made ease of use of such platforms an essential consideration. Ma et al. (2024) found that usability of digital interfaces and marketing strategies were key drivers in promoting all levels of performance in terms of satisfaction. Adoption of technology is necessary to promote consumer satisfaction (Anbumathi et al., 2023). A recent study reports that consumers increasingly embrace and accept technology-driven delivery options (Seo & Roh, 2025). Research explored the integration of online and offline delivery parameters, elucidating the effect of technology acceptance on consumer happiness and loyalty. From their research, the enactment of new technologies can automate operations and promote positive user experiences, allowing fast food restaurants to exceed and meet customers' expectations.

Driver courtesy: Even while often overlooked, interaction between the consumer and the delivery driver can have a significant impact on overall customer satisfaction. Hsu et al. (2024) examined the difference in driving behavior at non-meal-peak and meal-peak periods, purportedly due to the incentive scheme introduced by the platform. It was discovered that, in contrast to non-on-demand food delivery drivers, on-demand food delivery drivers are more

prone to engage in aggressive and hazardous driving behaviours, as evidenced by their increased longitudinal and lateral speeds, more abrupt acceleration and deceleration, higher incidence of weaving manoeuvres, reduced safety gaps, and diminished time-to-collision. Their aggressive and hazardous driving conduct is more likely to manifest during peak eating hours. Operators implement these advances to maintain competitiveness and satisfy evolving consumer demands.

METHODOLOGY

Research goals

The research aims to examine how logistics and supply chain management practices enhance customer satisfaction in the delivery of fast food. The review aims to establish the most significant logistical determinants of order accuracy, delivery speed, and service quality. The research will also examine the technological alternatives that are being implemented in supply chain management based on optimizing customer experience.

Research objectives

1. To identify and analyze the key logistical factors that significantly influence customer satisfaction and loyalty in fast food delivery services, including delivery times, order accuracy, and service quality.
2. To examine the current supply chain strategies employed by fast food delivery services, focusing on their impact on operational efficiency and customer satisfaction.
3. To assess customer perceptions regarding service performance and quality assurance in fast food delivery services, determining how these perceptions correlate with overall satisfaction levels.

Research questions

1. How does the concept of service quality influence customer perceptions of logistics efficiency in fast food delivery services?
2. What role does technology play in streamlining supply chain processes and augmenting customer satisfaction within the food delivery sector?
3. What is the influence of delivery times and order accuracy on customer satisfaction within the fast-food delivery sector?
4. What logistical strategies are employed by fast food delivery services to enhance customer satisfaction?

Research design

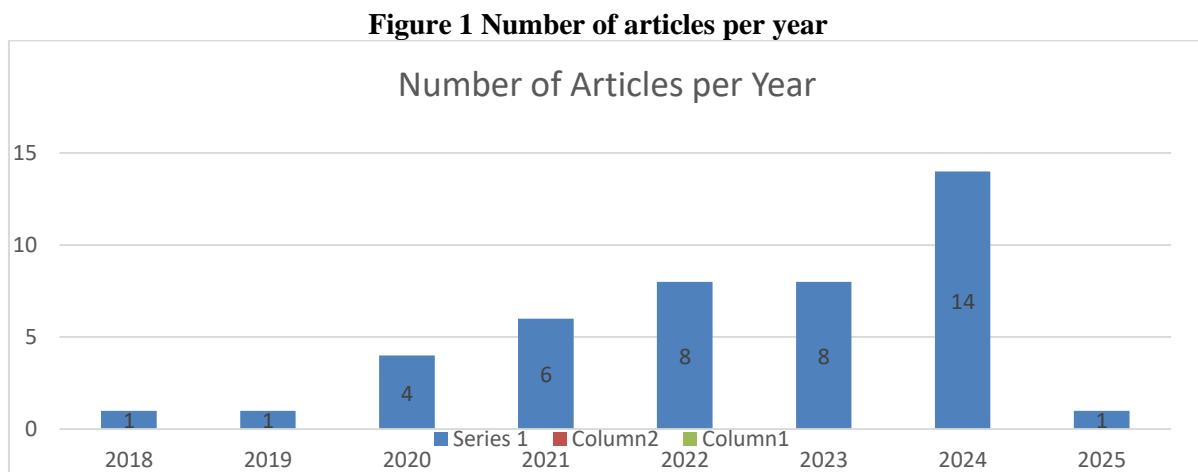
The study uses a mixed-methods approach, combining qualitative and quantitative methods, with a systematic literature review to inform sampling and derive insights in real-world settings. The main research is dedicated to assessing customer satisfaction and the determinants of logistical factors that impact service quality, delivery speed, and order accuracy.

Systematic literature review

A systematic literature review is applied by using the Scopus and Science Direct databases to collect and categorize articles. During the preparation of the systematic literature review, the following inclusion and exclusion criteria were formulated:

- The articles have to be freely accessible.
- The articles must have been published between 2018 and 2025.
- Documents should be either articles or conference papers.
- Subject areas should be limited to logistics, supply chain management, business management, and economics.

During keyword identification, the research also considered the most common synonyms and alternatives for customer satisfaction and fast-food delivery. An initial keyword search yielded 1,099 articles from ScienceDirect and 270 from Scopus. After removing 14 duplicate articles and applying inclusion and exclusion criteria, the results were narrowed down to 114 articles. A subsequent title-based screening further filtered this to 44 articles. Based on keywords developed through the PEO model, open-access articles from the Scopus database and Science Direct were selected through a PRISMA screening, and they were analyzed using a systematic literature review. Figure 1 displays the above-described PRISMA steps.



Source: own creation based on ScienceDirect and Scopus databases.

To organize the chosen keywords and to achieve more relevant research results during the database search, the PEO (Population, Exposure, Outcome) framework was applied to organize the keywords into the three major categories.

Primary data collection

Primary data were gathered with the help of questionnaires completed by two main groups of stakeholders:

- 105 Residents of Győr who have utilized fast food delivery services,
- 53 delivery riders offering fast-food delivery services in the area.

A survey questionnaire was developed to assess the different dimensions of delivery performance, including delivery speed, order accuracy, service level, and technology adoption. Closed questions were posed alongside open questions in a survey to gather both quantitative and qualitative information.

Data analysis

Statistical analysis software (e.g., SPSS) was used to analyze survey data. Descriptive statistics, correlation analysis, and regression analysis helped identify relationships between logistics factors and customer satisfaction. Thematic analysis was used in the analysis of qualitative responses in open-ended questions in the surveys, extracting riders' and customers' challenges and common themes in logistics performance and customer experience.

DATA PRESENTATION AND ANALYSIS

This chapter presents the results of the primary data collected through surveys distributed among 105 customers and 53 delivery riders in Győr, Hungary. It evaluates the practical experiences of food delivery riders to understand how logistics and supply chain practices impact customer satisfaction. The results are organized around key thematic areas: demographics, delivery efficiency, service quality, order accuracy, technology adoption, and logistics challenges. Each finding is discussed in relation to the study's research objectives and questions, connecting the data to both theoretical insights and real-world implications.

Demographic characteristics

The majority of both riders and customers fall within the 25-34 age range, accounting for nearly half of each group. Riders tend to be slightly younger (41.5% in the 1824 age group) than customers (32.4% in the same age group). This suggests that younger people, likely familiar with technology and mobile apps, dominate both the rider and customer segments in the fast-food delivery sector.

A large majority of both riders and customers are international (non-Hungarian), accounting for over 90% of each group. This reflects the multicultural nature of Győr's population, particularly in urban areas, where fast-food delivery services often cater to diverse communities. The majority of the riders (39%) work part-time, and a smaller proportion (14%) are full-time employees. This shift suggests that many riders may be using delivery work as a secondary source of income or to supplement their regular jobs. It is also possible that flexibility in working hours could be appealing to individuals seeking part-time opportunities.

Riders use different modes of transportation. Bicycle has the highest frequency, with more than 30 riders. Bicycles and scooters have fewer riders, with 2 riders each. Car is another smaller group, with 2 riders. 5 riders are on motorcycles, while 9 riders use scooters. The graph indicates that bicycles are the most commonly used mode of transportation, while the other categories have fewer riders.

Customer ordering behavior

As Table 1 shows, the overwhelming majority of customers (93.3%) use mobile apps to place orders, with only a small number using websites (4.8%) or phone calls (1.9%). This highlights how crucial mobile apps are in the fast-food delivery business, as they provide a convenient, user-friendly way to place orders on the go.

Table 1 The platform used to place orders by the customer

	Frequency	Percent	Valid Percent	Cumulative Percent
Mobile App	98	93.3	93.3	93.3
Website	5	4.8	4.8	98.1
Phone Call	2	1.9	1.9	100.0
Total	105	100.0	100.0	

Source: own compilation with SPSS.

How would you rate the ease of use of the ordering platform (app/website)?

According to SPSS analysis (Table 2) most customers find the ordering platform either "very easy" (48.6%) or "easy" (41%) to use. However, 10.5% rated it as difficult, indicating some frustration with the platform among a small segment of customers. This suggests that while the platform is generally user-friendly, there may be room for improvement for those who find it harder to navigate.

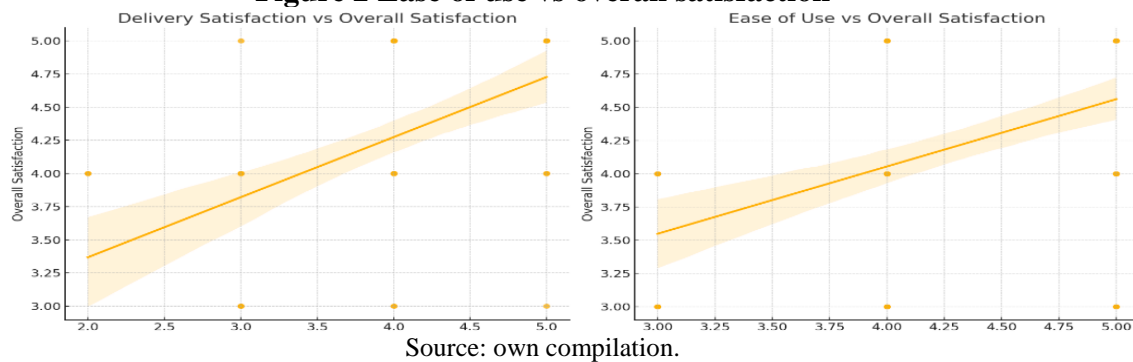
Table 2 Rate the ease of use of the ordering platform

	Frequency	Percent	Valid Percent	Cumulative Percent
Very easy	51	48.6	48.6	48.6
Easy	43	41.0	41.0	89.5
Difficult	11	10.5	10.5	100.0
Total	105	100.0	100.0	

Source: own compilation with SPSS.

The regression visualizations are shown in Figure 2:

- Left Plot: Shows a clear positive relationship between delivery satisfaction and overall satisfaction.
- Right Plot: Also indicates a positive trend—users who find the platform easier to use tend to be more satisfied overall.

Figure 2 Ease of use vs overall satisfaction

Source: own compilation.

Delivery time and satisfaction

Are you satisfied with the delivery time?

Table 3 Customers time satisfaction

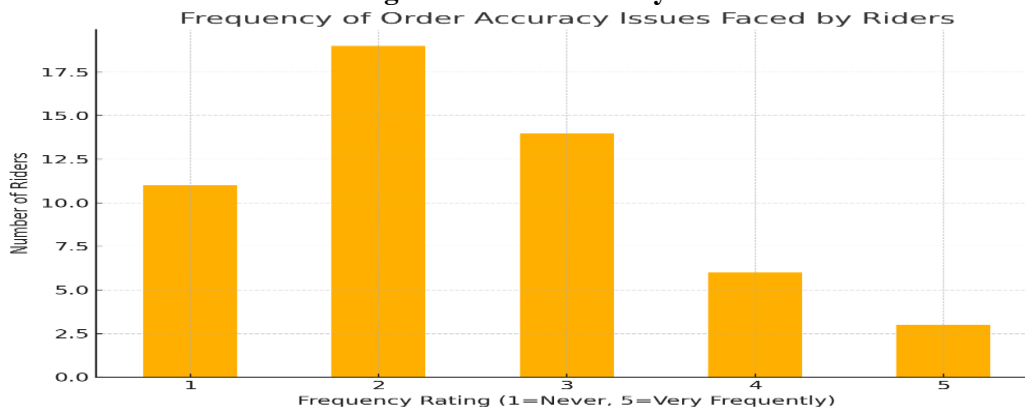
	Frequency	Percent	Valid Percent	Cumulative Percent
Very Satisfied	25	23.8	23.8	23.8
Satisfied	52	49.5	49.5	73.3
Neutral	24	22.9	22.9	96.2
Dissatisfied	4	3.8	3.8	100.0
Total	105	100.0	100.0	

Source: own compilation with SPSS.

The majority of customers are either satisfied (49.5%) or very satisfied (23.8%) with delivery times, while only 3.8% are dissatisfied (Table 3). This is a positive indicator that timely delivery is a strong point for the fast-food delivery service in Győr.

Order accuracy faced by riders

How frequently do you face challenges with order accuracy (e.g., incorrect orders, missing items)?

Figure 3 Order accuracy

Source: own compilation with SPSS.

Figure 3 shows that riders generally report low to moderate frequency of order accuracy issues, aligning with customer feedback. Mistakes happen, but they are not widespread, suggesting that while order accuracy could still be improved, it is not a significant issue for most of the deliveries.

Use of tracking technology

Table 4 highlights a low usage of mobile tracking apps by riders, with 68% of riders reporting that they either rarely or never use tracking apps. Only 5.7% always use them. This indicates a significant opportunity to improve the use of technology for more efficient delivery tracking and communication. How often do you use mobile apps for delivery tracking and communication with customers?

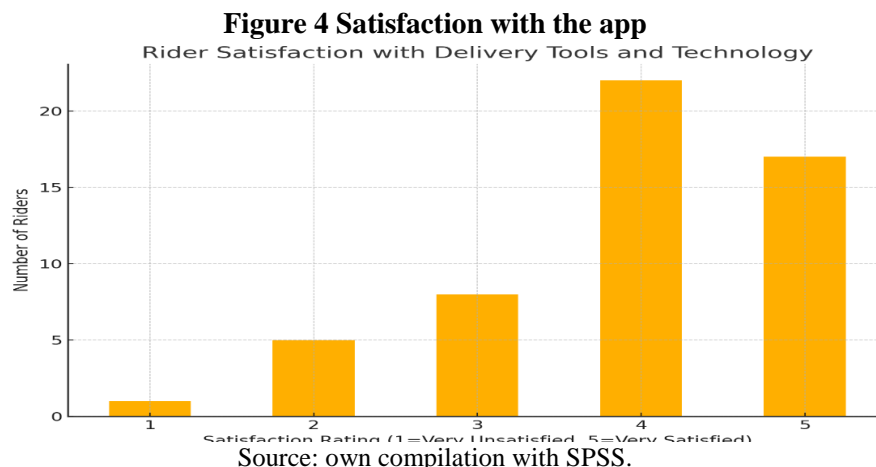
Table 4 Use of apps for tracking and communication

	Frequency	Percent	Valid Percent	Cumulative Percent
Always	3	5.7	5.7	5.7
Often	6	11.3	11.3	17.0
Sometimes	8	15.1	15.1	32.1
Rarely	21	39.6	39.6	71.7
Never	15	28.3	28.3	100.0
Total	53	100.0	100.0	

Source: own compilation with SPSS.

How satisfied are you with the app?

As shown in Figure 4, most riders report moderate to high satisfaction with the tools and technology provided. This suggests that current systems are mostly functional but could still be improved, especially considering the operational delays riders mentioned earlier.

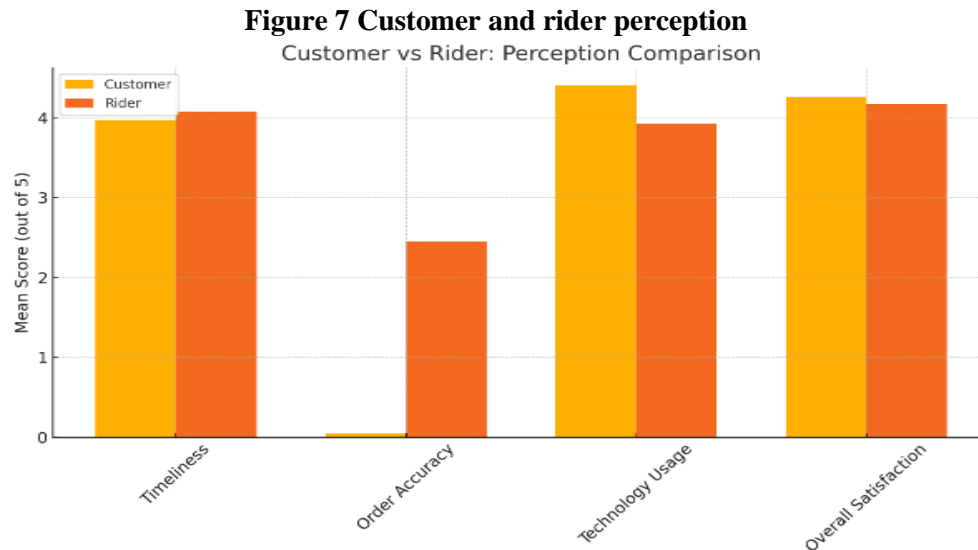


Platform usage

The majority of riders (67.9%) use the company's mobile app for their deliveries, while 15.1% use both the app and GPS tracking systems, and another 15.1% rely solely on GPS. This suggests

Riders face logistical difficulties such as restaurant delays, system/app issues, and safety/navigation risks. These challenges directly affect delivery times and service quality consistency, suggesting that improvements in communication and restaurant coordination could lead to better rider experiences.

Customer vs. rider: perception comparison



Source: own compilation with SPSS.

Figure 7 compares how customers and riders perceive key factors in the delivery experience:

- Customers rate technology and overall satisfaction higher.
- Riders feel slightly better about timeliness, but struggle more with order accuracy.

This contrast helps highlight where operational improvements can have the most impact.

Rider suggestions for improvement

In your opinion, what could be improved to make deliveries more efficient and reduce delays?

Riders point to higher pay, safety concerns, better communication with the company, and more efficient order processing systems as the most-needed improvements. These directly influence rider motivation and the efficiency of the delivery chain.

DISCUSSION AND RECOMMENDATIONS

Insights from riders

- Logistical processes and order processing efficiency: Riders consistently rated the order processing system highly, indicating that digital orders are managed effectively from placement to assignment. The streamlined process reduces wait times at the restaurant and improves overall service efficiency. Riders' feedback indicates that a well-integrated IT system is a cornerstone in reducing time lags, which directly correlates with customer satisfaction.

- **Timeliness of deliveries:** Riders' ratings indicate that most deliveries meet customer expectations, with delivery times generally falling within an acceptable range. However, occasional discrepancies (for example, delays due to external factors) suggest that further improvements in route optimization and dynamic scheduling might elevate timeliness even further.
- **Transportation modalities:** Riders predominantly use motorcycles and bicycles. In areas with dense urban layouts, such as Győr, these modes offer the flexibility to navigate traffic and narrow streets, ensuring faster delivery of orders. There is also an observed need to match logistical routes to rider transportation capabilities, suggesting an opportunity to integrate mode-specific routing algorithms to enhance delivery speed and safety further.

Insights from customers

- **Customer experience and platform usability:** Customer feedback underscores the importance of platform ease of use. Many customers said that an intuitive, responsive mobile app contributes significantly to their overall satisfaction. This reaffirms the idea that logistics extend beyond physical delivery digital touchpoints are essential in creating a seamless ordering experience.
- **Delivery time and order accuracy:** Customers have clearly articulated the importance of prompt, accurate order dispatch. Delays or inaccuracies result in direct dissatisfaction. Positive comments about timely deliveries and accurate orders highlight a critical relationship: well-managed logistics are vital to maintaining high service quality.
- **Overall satisfaction and service quality:** Customers who rated service aspects highly (especially on scales regarding timeliness and order processing) align with riders' reports of operational efficiency. Moreover, the consistency between customer satisfaction ratings and riders' self-assessed performance suggests that improved internal logistics processes (through better order processing systems, real-time tracking, and effective routing) have a direct, measurable impact on customer satisfaction.

Assess customer perceptions of service performance and quality

- **Objective:** Understand how perceptions regarding delivery performance and various quality aspects correlate with overall satisfaction.
- **Correlations between delivery metrics and satisfaction:** Analyzing customer feedback reveals that satisfaction scores are highly correlated with two primary factors delivery timeliness and order accuracy. Customers who report lower waiting times also tend to rate their overall satisfaction higher. Likewise, comments on the proper fulfilment of orders further underscore the importance of accuracy in service performance.
- **Platform-driven satisfaction:** The ease of use of ordering platforms, as frequently mentioned in the customer responses, is directly related to positive customer perceptions. Customers value intuitive interfaces and reliable digital interaction, which reinforces the role of comprehensive supply chain management that extends into digital service delivery.

Provide actionable insights for local fast-food providers

- **Technological advancements:** Both data sources advocate increased investment in technology, including improved mobile app interfaces, AI-based rider routing, and enhanced real-time communication systems. These technological improvements are seen as essential not only to maintain but also to enhance customer satisfaction.
- **Training and support:** The responses indicate that rider training could be further optimized, especially tailored to the unique challenges of urban delivery. This includes training on digital tools and adaptive routing strategies, which could increase efficiency and reduce human errors that affect order accuracy.
- **Customer relationship management (crm):** For customers, continuous feedback mechanisms should be integrated into the ordering systems. Encouraging customer reviews and promptly addressing any concerns (e.g., order delays or inaccuracies) would help bridge any service gaps. This responsive approach is crucial for improving service quality over time.

FUTURE RESEARCH

By addressing the research goals and objectives with a multi-faceted analysis that incorporates both customer and rider insights, the findings strongly suggest that optimizing logistics and supply chain management practices can significantly enhance customer satisfaction in Győr's fast-food delivery sector. This report provides actionable strategies and theoretical insights that stand to benefit local fast-food providers in their ongoing efforts to improve service delivery and operational excellence.

Future studies can investigate the following aspects:

- **Cross-region studies:** Broadening research scope to involve other regions or cities can offer an extended line of analysis on the logistics problems for fast-food delivery businesses.
- **Technological advancements:** Future research can investigate how new technologies like drones and automated delivery vehicles would affect efficiency in logistics as well as customer satisfaction.
- **Incorporating restaurant perspectives:** That would involve incorporating the voices of restaurant staff as well as their managers. This can provide a broader picture of the challenges and prospects within the fast-food delivery supply chain.

CONCLUSION

The purpose of this study was to assess the impact of logistics and supply chain management practices on customer satisfaction in the fast-food delivery market in Győr, Hungary. It entailed a systematic literature review, where 1,099 articles were initially searched in ScienceDirect and another 270 in Scopus based on a keyword list covering customer satisfaction, supply chain management, delivery time optimization, and order accuracy, among others. After excluding 14

duplicate documents and applying the inclusion and exclusion criteria, the studies were trimmed to 114 documents, then screened to 44 through title screening. Open-access documents on both sites were selected using the PEO model and the PRISMA diagram for a systematic literature review. In addition to the literature review, primary data were collected through surveys completed by 105 customers and 53 riders. Mixed-methods were applied in the research design, with the literature providing qualitative insights and surveys generating numerical data. Statistical analysis software (e.g., SPSS) was used to analyze survey data. Descriptive statistics, correlation analysis, and regression analysis helped identify relationships between logistics factors and customer satisfaction, and thematic analysis helped establish the main logistical problems and opportunities. From the findings, it is evident that effective logistics, reinforced by technologies such as phone applications and GPS, contribute significantly to customer satisfaction. Shortcomings, such as riders' failure to utilize technologies, as well as safety issues, such as the possibility of bicycle theft, were also pinpointed. Optimizing logistics operations as well as eliminating safety concerns about riders are recommended as having significant roles in outrightly improving efficiency in operations as well as customer satisfaction.

Conflict of interest:

The authors declare no conflict of interest.

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INVESTIGATION OF CONSUMER PREFERENCES IN FRUIT JUICES INDUSTRY: AN APPLICATION OF CONJOINT ANALYSIS

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Abstract: This study investigates consumer preferences for fruit juices in the Iranian market, using a conjoint analysis method to examine the influence of product attributes, such as flavor, pulp, vitamins and minerals, and price. Binomial logistic regression was applied to analyze the data, due to the type of outcome variable. Results indicate that flavor, especially tropical, is the most influential attribute in consumer decision-making, while pulp and the addition of vitamins and minerals play a lesser role. Price, though secondary to flavor, is also a significant factor. Findings provide insights for manufacturers to develop products that align with consumer preferences, emphasizing flavor as a key factor. The data also highlight segment-based differences in preferences, with males showing lower interest in added vitamins, and older age groups displaying a higher sensitivity to price. This study offers valuable guidelines for product development, suggesting a focus on flavor innovation and competitive pricing strategies.

Keywords: conjoint analysis, product development, statistical modelling, market research

INTRODUCTION

Consumer preferences are crucial to product development, shaping the evolution of goods before they reach the marketplace. The role of consumer feedback is particularly vital in identifying weaknesses or opportunities for improvement. Through such feedback, companies can fine-tune their products to better align with market expectations. This approach allows companies to address gaps in product features that may not have been obvious during the initial development stages.

Conjoint analysis has emerged as a critical method in product design, enabling researchers and companies to understand consumer preferences by evaluating the trade-offs between various product attributes. This technique allows for the systematic breakdown of products into their constituent features – such as price, quality, and design – enabling a comprehensive assessment of how these elements interact to influence consumer choices (Green & Srinivasan, 1990). For example, studies have shown that using choice-based conjoint analysis can reveal the relative importance of aesthetic features, functionality, and pricing in consumer preferences, providing valuable insights for product managers during the design and development phases (Wittink & Cattin, 1989). Furthermore, the insights gained from conjoint analysis not only inform product development but also guide marketing strategies by identifying key drivers of consumer preference and potential market segments (Sambandam, 2023). The application of conjoint analysis in product design facilitates data-driven decision-making that aligns closely with consumer needs and market demands. The results of the mentioned analysis in the food and

beverage sector not only aid in optimizing product offerings but also enhance the ability to meet evolving consumer demands. In beverage industry, Ong et al. (2021) employed conjoint analysis to evaluate consumer preferences for milk tea attributes such as sugar level, pearl size, and price. The study reveals which attributes are most significant for consumers when making purchasing decisions in the beverage market. For instance, a study focusing on orange juice in India highlighted the importance of attributes like price, brand reputation, and nutritional information, demonstrating that consumers are willing to pay more for products perceived as healthier or of higher quality (Kumar et al., 2021). Sreerupa Sarkar et al. (2014) also primarily focused on the nutritional aspects of various fruit juices, this study discusses the implications of consumer preferences and how attributes like taste and health benefits can be assessed through methods like conjoint analysis to inform product development.

Understanding these preferences enables firms to enhance their competitiveness, by producing items that reflect what matters most to consumers. Transitioning to the fruit juice market, several studies emphasize flavor as a key factor in consumer decisions, along with attributes like pulp, price, and nutritional content (Bahrami et al., 2016). By analyzing these factors systematically, manufacturers can better tailor their products to meet consumer demands, thereby increasing their market share and customer loyalty.

LITERATURE REVIEW

Conjoint analysis with its various applications is a beneficial tool in the Fast-Moving Consumer Goods (FMCG) sector, enabling companies to understand consumer preferences and optimize product offerings. This statistical method helps businesses evaluate how different product attributes influence purchasing decisions, ultimately guiding product development and marketing strategies. In this study the main goal is to determine the most influential aspects of fruit juices by implementing conjoint analysis which enables researchers to investigate trade-offs among different features of a product with a more precise method. This literature review integrates both global and Iranian perspectives, highlighting the key factors of price, packaging, and taste in consumer brand choice within the fruit juice industry.

The influence of price on consumer choice

Consumer preference analysis, particularly through conjoint analysis, has been widely used in various industries to measure how different product attributes affect consumer choices. This method offers valuable insights into trade-offs that consumers are willing to make between different product features. For instance, previous studies in the beverage sector suggest that flavor and price are often more influential than secondary attributes like packaging or nutritional enhancements (Ghasemi et al., 2017).

Price is a fundamental factor influencing consumer purchasing decisions across various industries, including the fruit juice market. According to Monroe and Krishnan (1985), price serves as a signal of quality and value, and consumers often use it as a primary criterion when selecting products. Research by Zeithaml (1988) supports this, indicating that consumers tend to

associate higher prices with superior quality, which can increase their willingness to pay for a product.

However, the relationship between price and consumer choice is not linear. A study by Rao and Sieben (1992) suggests that while low prices may attract budget-conscious consumers, extremely low prices may also lead to perceptions of inferior quality, thereby deterring some buyers. In the fruit juice industry, this balance between affordability and perceived quality is crucial for optimizing consumer choice.

In the Iranian context, a study by Bahrami, Kazemi, and Mokhtari (2016) explored the impact of price sensitivity on consumer behavior in the fruit juice market. The study found that while Iranian consumers are generally price-conscious, they are willing to pay a premium for juices perceived as high quality, particularly those with natural ingredients and no added sugars. This indicates that pricing strategies should carefully consider the perceived value of the product to maximize brand choice.

The influence of pulp and fruit pieces on consumer choice

The addition of pulp and fruit pieces in fruit juice may influence consumer preference, primarily by enhancing the sensory experience and perceived health benefits of the product. A research indicates that consumers often prefer juices with pulp due to the texture and flavor complexity it adds, which can create a more satisfying drinking experience (Kumar et al., 2021). Moreover, as consumers become more aware of the benefits of whole fruits versus processed options, juices containing pulp are likely to be viewed as healthier alternatives to those that are completely filtered.

The role of vitamin addition in brand choice

The addition of vitamins and minerals to fruit juices significantly enhances their health value, influencing consumer preferences and dietary habits. Fortification with essential nutrients such as vitamin C, vitamin D, calcium, and magnesium not only improves the nutritional profile of fruit juices but also addresses common deficiencies in the population (Ruxton & Myers, 2020). Moreover, studies have shown that consumers who regularly consume fortified fruit juices tend to have better overall diet quality, as indicated by higher Healthy Eating Index scores (O'Neil et al., 2019). This correlation suggests that the health benefits associated with vitamin and mineral addition can enhance the perceived value of fruit juices, leading to increased consumption. Additionally, the presence of health claims related to vitamin and mineral content on packaging can significantly increase the likelihood of purchase; products with such claims were found to be twice as likely to be selected by consumers compared to those without (Luckow & Delahunty, 2004). Thus, the strategic addition of vitamins to fruit juices not only enhances their functional properties but also supports public health initiatives aimed at improving nutrient intake among various demographics.

The impact of taste on consumer preferences

Taste is one of the most important sensory attributes that directly influences consumer satisfaction and brand loyalty in the fruit juice industry. Research by Cardello and Schutz (2003) emphasizes that taste is a primary determinant of repeat purchase behavior, as it directly affects consumer enjoyment and satisfaction with the product. Brands that consistently deliver a superior taste experience are more likely to build strong customer loyalty and command a higher willingness to pay.

In the context of product testing, Tuorila et al. (1994) found that consumers are more likely to choose and pay a premium for fruit juices that offer a balanced flavor profile, combining sweetness, acidity, and freshness. This highlights the importance of rigorous product testing and sensory evaluation in the development of fruit juices that meet consumer expectations.

In Iran, a study by Ghasemi, Ghazizadeh, and Mahmoudi (2017) explored consumer taste preferences in the Iranian fruit juice market. The study revealed that Iranian consumers particularly favor fruit juices with natural sweetness and a balanced acidity level. The research also noted that taste preferences are influenced by cultural factors, with certain traditional flavors being more popular in specific regions. This suggests that taste testing and product development should consider local taste preferences to optimize brand choice and market success.

In the context of fruit juices, the addition of functional ingredients such as vitamins and minerals has been explored as a potential driver of consumer interest. However, studies suggest mixed results regarding the effectiveness of these enhancements in influencing purchasing decisions (Luckow & Delahunty, 2004). Transitioning from theoretical to practical insights, it is important to assess how these attributes rank in a specific cultural and economic setting, such as Iran.

CHARACTERISTICS OF PARTICIPANTS

This study is conducted with 384 respondents in Tehran province. In total, 384 answered and completed the questionnaire. A total of 190 (49 %) participants were female. One third of respondents had bachelors and masters, respectively. The mentioned proportion was also the same in participants ages. The survey descriptive statistics also follow population pattern related to civilians in Tehran.

Table1 Descriptive statistics of survey respondents

Categorical Variable	Groups	Proportion
Gender	Women	49
	Men	51
age	20 To 30	33
	30 To 40	34
	40 To 50	33

Source: own edited, 2025.

SURVEY DESIGN

This study employs conjoint analysis to assess consumer preferences for fruit juice attributes. Conjoint analysis is a robust method for understanding how individuals value different features of a product. The design included combinations of four attributes: flavor, pulp, the addition of vitamins and minerals, and price.

A design for conjoint analysis involves creating profiles that showcase various combinations of product attributes (levels) to understand consumer preferences. In this study, the conjoint design is made by combination of fruit juice attributes, that is crucial for understanding how various elements influence consumer preferences and decision-making. By systematically varying attributes such as flavor, price and pulp, vitamin and mineral addition, researchers can identify the trade-offs that consumers are willing to make among their favored levels.

As noted this research is focused on investigation of flavor, pulp and vitamin addition and price as attributes of study. At next step these attributes are defined in related levels.

Table2 Attributes and related levels of this study

Attribute	Levels
flavor	citrus
	melon
	tropical
	berries
pulp	yes
	no
vitamin	yes
	no
price	15,000 Tomans
	17,000 Tomans
	19,000 Tomans

Source: own edited, 2025.

To do so, orthogonality plays a significant role in this process as it ensures that the effects of different attributes can be estimated independently and accurately. Properly designing a conjoint study with orthogonality in mind leads to valid insights that can guide research goals, but a full factorial approach may impose an excessive burden to respondents and takes too much time for choosing their most favored profiles (Palumbo et al., 2011). In this study, using an orthogonal approach, we narrowed down 48 potential combinations to 15 profiles to simplify the decision-making process for respondents, ensuring each profile represented a unique set of attribute levels.

Table3 Profiles based on orthogonal design

profiles	Flavor	Pulp	Vitamin	Price (in Thousands Tomans)
c1	citrus	yes	no	19
c2	berries	no	no	17
c3	berries	yes	yes	15
c4	berries	yes	no	15
c5	melons	no	yes	15
c6	tropical	yes	yes	19
c7	melons	yes	yes	17
c8	tropical	no	no	15
c9	citrus	no	yes	17
c10	tropical	no	yes	19
c11	berries	no	yes	19
c12	tropical	yes	no	17
c13	melons	no	no	19
c14	melons	yes	no	19
c15	citrus	yes	yes	15

Source: own edited, 2025.

Then the survey was conducted among a representative sample of Iranian consumers, with data collected via a structured questionnaire. The questionnaire featured profiles that varied systematically in terms of flavor, pulp addition, vitamin and mineral inclusion, and price. Respondents were asked to rank these profiles based on their preferences.

MODEL STRUCTURE

The literature on binomial logistic regression reveals its extensive application in various fields, particularly in medical and social sciences research. A review conducted on 37 research articles published between 2000 and 2018 highlighted that logistic regression is frequently employed to model the relationship between multiple independent variables and a binary dependent variable. This method is favored for its ability to produce odds ratios, which facilitate understanding the impact of predictors on the likelihood of an outcome (Bender & Grouven, 1998). However, the review also identified significant deficiencies in the reporting and application of logistic regression, particularly regarding the ratio of outcome events to predictor variables, which can affect model accuracy (Kleinbaum et al., 2013). Furthermore, a study published in Family Medicine and Community Health noted that approximately 24.6% of original research papers from 2013 to 2020 utilized binary logistic regression, emphasizing its importance in family medicine research for predicting health outcomes (Harris, 2021). Overall, while binomial logistic regression remains a cornerstone of statistical analysis, attention to methodological rigor and comprehensive reporting is essential for enhancing the validity of research findings.

A review on application of binomial logistic regression in market research emphasizes its utility in predicting consumer behavior and decision-making processes. This statistical method is particularly adept at modeling the likelihood of binary outcomes, such as whether a customer will purchase a product or not, based on various independent variables like demographic factors, past purchasing behavior, and marketing campaign responses. For instance, a study highlighted in Marketing Science demonstrated how logistic regression can effectively identify key predictors of customer conversion rates, enabling marketers to tailor their strategies for higher effectiveness (Lilien et al., 2013). Additionally, research has shown that logistic regression provides interpretable results through odds ratios, which help quantify the influence of different factors on purchasing decisions (Hastings et al., 2015). However, the literature also points out challenges related to model specification and the need for careful selection of independent variables to avoid multicollinearity issues. Overall, binomial logistic regression remains a fundamental tool in market research, offering valuable insights into consumer behavior while necessitating rigorous methodological practices. In this study, this approach was implemented on collected data to gain related insights.

RESULTS

After data collections and data analysis based on Logistic approach, results are prepared for presentation. Table 4 provides the obtained results driven from analysis of total data. The analysis depicts the impact of flavor as the most influential factor among attributes of this study. Among the levels of this attribute, tropical tastes were the most favorite in participants' minds. Results are obtained by STATA 17 software.

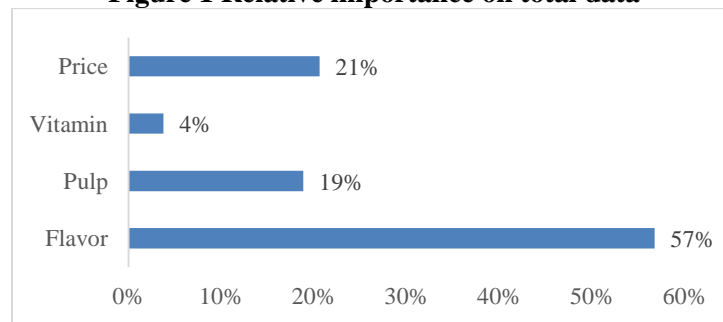
Table 4 Results on total data

Attribute	Levels	Coefficient	Relative importance	Partworth utilities
flavor	citrus	-0.55	57%	-28%
	melon	0.74		10%
	tropical	1.38		29%
	berries	0.00		-11%
pulp	yes	-0.64	19%	-9%
	no	0.00		9%
vitamin	yes	0.13	4%	2%
	no	0.00		-2%
price	15,000 Tomans	0.00	21%	-9%
	17,000 Tomans	0.70		12%
	19,000 Tomans	0.20		-3%

Source: own edited, 2025.

Another notable point is low impact of vitamin addition to the product.

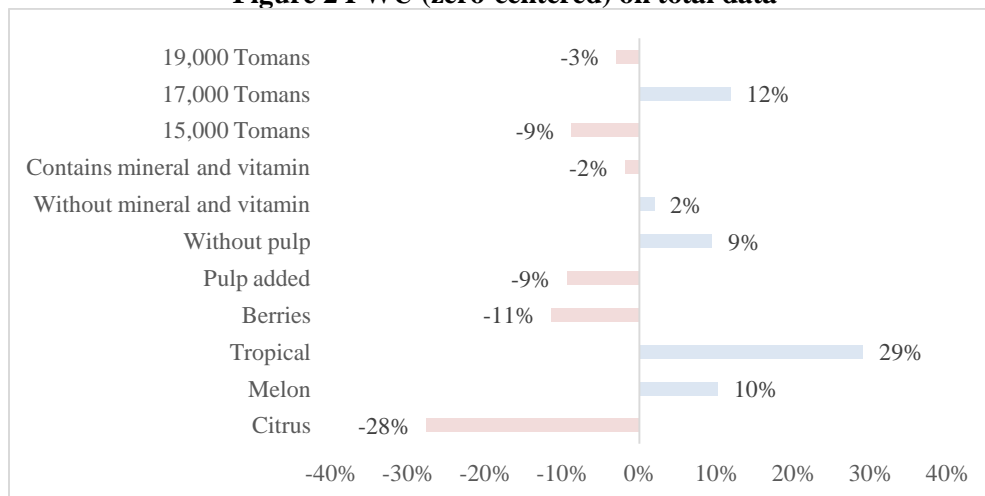
Figure 1 Relative importance on total data



Source: own edited, 2025.

Partworth utilities as indicators for utility scores, reveals that citrus and berries were the least preferred flavors. Another point refers to low interest of participants in pulp, vitamin and mineral addition to a product.

Figure 2 PWU (zero-centered) on total data



Source: own edited, 2025.

Results by gender

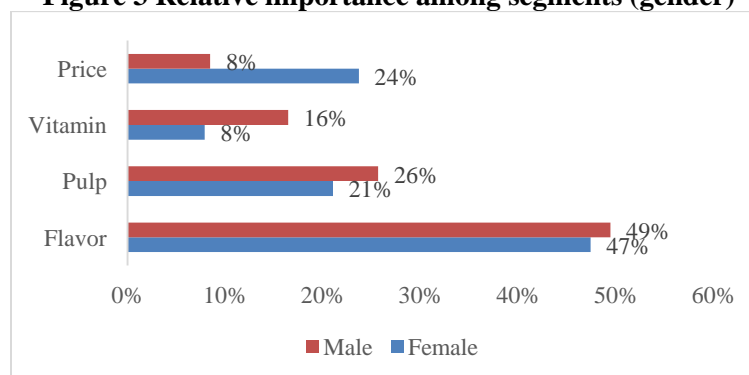
Among both genders, flavor remains the most influential attribute, accounting for 47% and 49% of the relative importance for female and male participants, respectively. However, there were some differences in how they valued other attributes.

Table 5 Results among segments (gender)

Group /attribute	Levels	Relative importance	partworth utilities	
Female	flavor	citrus	-28%	
		melon	47%	
		tropical	20%	
		berries	8%	
	pulp	yes	21%	-11%
		no		11%
	vitamin	yes	8%	4%
		no		-4%
	price	15,000 Tomans		-10%
		17,000 Tomans	24%	14%
		19,000 Tomans		-4%
	Male	flavor	citrus	-3%
melon			49%	
tropical			0%	
berries			-23%	
pulp		yes	26%	-13%
		no		13%
vitamin		yes	16%	-8%
		no		8%
price		15,000 Tomans		-2%
		17,000 Tomans	8%	-3%
		19,000 Tomans		5%

Source: own edited, 2025.

Female respondents showed a higher preference for juices with added vitamins and minerals, while male respondents showed a greater preference for juices without pulp or additional vitamins.

Figure 3 Relative importance among segments (gender)

Source: own edited, 2025.

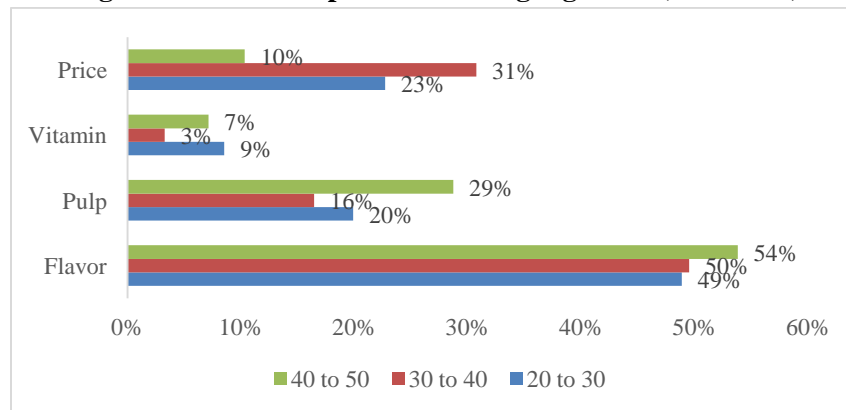
Results by age

Among respondents grouped in different ages, flavor and added vitamin and mineral are the most and least important attributes. Price seems to be more impactful at second place, and with higher influence among 30 to 40 year-old participants hence vitamin, mineral and pulp addition is the least preferred attribute in their minds.

Table 5 Results among segments (age)

Group /attribute	levels	Relative importance	partworth utilities	
20 to 30	flavor	49%	citrus	-29%
			melon	2%
			tropical	20%
			berries	7%
	pulp	20%	yes	-10%
			no	10%
	vitamin	9%	yes	4%
			no	-4%
	price	23%	15,000 Tomans	-9%
			17,000 Tomans	13%
			19,000 Tomans	-4%
	30 to 40	flavor	50%	citrus
melon				9%
tropical				25%
berries				-10%
pulp		16%	yes	-8%
			no	8%
vitamin		3%	yes	2%
			no	-2%
price		31%	15,000 Tomans	-12%
			17,000 Tomans	19%
			19,000 Tomans	-7%
40 to 50		flavor	54%	citrus
	melon			3%
	tropical			28%
	berries			-5%
	pulp	29%	yes	-14%
			no	14%
	vitamin	7%	yes	4%
			no	-4%
	price	10%	15,000 Tomans	0%
			17,000 Tomans	-5%
			19,000 Tomans	5%

Source: own edited, 2025.

Figure 4 Relative importance among segments (education)

Source: own edited, 2025.

The analysis revealed that flavor is the most influential attribute, with tropical flavors emerging as the most preferred. This was followed by price, which ranked as the second most important attribute. Interestingly, the addition of pulp and vitamins played a much smaller role in consumer preferences. The partworth utility scores further indicated that citrus and berries were the least preferred flavors, while tropical flavors had the highest utility.

The use of logistic regression allowed us to control for individual-level differences, revealing that males and older age groups were less inclined to favor juices with added vitamins or pulp. Price sensitivity was more pronounced among participants aged 30 to 40, indicating that this demographic is more focused on cost-effective options. These findings align with earlier research suggesting that while consumers appreciate health-related features, flavor and price dominate decision-making.

DISCUSSION

The results underscore the critical importance of flavor in consumer decision-making. Tropical flavors, in particular, were significantly favored across most demographic groups. This insight is vital for fruit juice manufacturers who are looking to develop or refine products for the Iranian market. Furthermore, the relative insignificance of pulp and vitamin additions suggests that these attributes may not be the most effective selling points.

Price sensitivity remains a key factor, especially among older consumers, highlighting the importance of competitive pricing strategies. The findings also reveal gender-based differences in preferences, with males showing a stronger aversion to products with added vitamins and pulp. These nuances should inform the marketing strategies of juice manufacturers aiming to target specific consumer segments.

CONCLUSION

The study highlights the importance of understanding consumer preferences in product development, particularly in highly competitive markets like fruit juice. Flavor emerged as the most influential factor, particularly tropical flavors, with price playing a secondary but still significant role. The addition of pulp and vitamins, while valued by some, was not a major driver of consumer choice, suggesting that these features may not need to be prioritized in new product development.

For juice manufacturers in Iran, these findings provide actionable insights into what consumers value most. Focusing on flavor innovation, especially tropical varieties, and adopting competitive pricing strategies will likely yield the best market outcomes. Additionally, targeting specific demographic groups, such as older and price-sensitive consumers, can further refine product positioning and marketing efforts.

In summary, integrating consumer preferences into product development not only fosters innovation but also ensures that products are relevant and appealing to target audiences. This approach enhances competitiveness and drives long-term success in an ever-evolving marketplace.

Conflict of interest:

The authors declare no conflict of interest.

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