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Patterns of platform choice and content consumption in streaming media

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Abstract: What Drives Consumer Choice Among Streaming Services? Today, content consumption options are more widespread than ever, offering people new ways to relax and unwind. Numerous studies have shown how successfully streaming providers have entered and dominated the media landscape—often at the expense of traditional television. It is essential that consumers not only enjoy the content itself but also have a seamless and positive experience when using the platforms and apps that deliver it. This research seeks to answer questions such as whether younger generations use streaming services more frequently than older ones. It examines consumer habits and the factors influencing them within the streaming market. In our fast-paced world, people are constantly exposed to information and stimuli, making it increasingly difficult for content to capture and hold their attention. To overcome this challenge, companies must adopt innovative approaches and offer personalized services and recommendations to maintain user engagement. The study provides an overview of the history of streaming, the current market environment, and the role of language barriers in content accessibility. To support more precise conclusions, the research analyzes data collected from consumers of various age groups regarding their viewing habits and decision-making processes. Furthermore, the paper presents the results of a primary research study focusing on the criteria consumers use when choosing a streaming provider, how they assess service quality, and how satisfied they feel with their current choices. The final section offers a summary of the findings.

Keywords: streaming service, consumer preferences, factors influencing consumer decision-making

Introduction

Over the past decade, the explosive growth of digital technology has led to a radical transformation in media consumption habits. Traditional television and schedule-based content viewing have gradually declined, giving way to on-demand consumption. One of the most prominent forms of this shift is the rise of streaming services, which have redefined entertainment by offering flexibility, variety, and personalized user experiences. From a consumer perspective, one of the greatest advantages of streaming platforms is their accessibility—anytime, anywhere, on any device, whether it's a smartphone, laptop, or smart TV. In parallel, content providers have developed new business models, marketing strategies, and technological solutions to retain and grow their user base. This study aims to explore the key factors influencing Hungarian consumers' choice of streaming providers, identify usage patterns, and examine demographic differences—particularly those related to gender and generation. Special attention is given to the role of technology use, preferred viewing times, and the impact of language barriers on user experience. The research is both theoretically and practically relevant. On one hand, it contributes to a deeper understanding of domestic media consumption habits; on the other, it offers insights for market players to better align their strategies with the real needs of Hungarian consumers. The study seeks to answer the following key questions: What preferences guide consumers when choosing a streaming service? Are there significant generational or gender-based differences in usage frequency or content preferences? To what extent does language knowledge—or the lack thereof—affect the user experience on streaming platforms? These questions were addressed using a quantitative research approach, evaluated through an online questionnaire survey.

Literature review

Streaming technology is a form of digital data transmission that enables users to access audiovisual content in real time, without the need to download the entire media file. This method significantly differs from traditional file-based downloading models, as it eliminates waiting time and allows content to be accessed anytime, anywhere. At the core of the technological infrastructure is the Content Delivery Network (CDN), which consists of a geographically distributed network of servers designed to ensure fast and seamless data delivery (Webex, 2020). A key supporting element of streaming is the Adaptive Bitrate Streaming (ABR) technology, which dynamically adjusts video quality to match the user's internet connection. This helps avoid buffering and playback interruptions (Pallas70, 2024; Broadpeak, 2025). As a result, streaming has become not only more convenient, but also more cost-effective—for both service providers and consumers (Progmatic Academy Kft., 2023; Balaskóová, 2020). The evolution of streaming gained momentum in the mid-2000s, particularly with the acceleration of internet access and the widespread adoption of mobile technologies. Content consumption has become untethered in both space and time, fundamentally reshaping media usage habits. Today, it is increasingly common for users to subscribe to multiple platforms simultaneously. Additionally, the practice of binge-watching—watching multiple episodes in one sitting—has become widespread. This behavioral pattern is no coincidence: streaming platforms are designed with features that encourage prolonged engagement, such as autoplaying the next episode and personalized recommendation systems (Kovács, 2018; Volle & Adam, 2025).

Currently, the streaming market is dominated by several key providers, each striving to establish a competitive edge through distinct content strategies and business models. Netflix, for example, was a pioneer in the streaming industry and has remained a market leader ever since. Its success can be attributed in part to its algorithm-based recommendation system, and in part to its early investment in original, exclusive content. The global popularity of titles such as House of Cards and Stranger Things demonstrated the power of high-quality series to attract and retain millions of subscribers over the long term (Dzindzisz, 2016; CNBC, 2023; Jain, 2025; Jenner, 2018; VdoCipher, 2024). HBO Max, in contrast, has focused on delivering high-quality, award-winning series. Originally launched as a cable network, the company gradually adapted to technological trends and transitioned into the streaming model. HBO Max has since integrated content from WarnerMedia and Discovery+, offering a unique combination of documentaries, sports programs, and drama series. Its entry into the European market in 2024 further expanded viewing options for Hungarian consumers as well (Gregersen, 2025; Instant INFO, 2023).

Disney+ has built its brand on family-friendly and franchise-based content. With its extensive lineup of series and films from the Marvel, Star Wars, and Pixar universes, the platform quickly gained global popularity. Although the service is not yet profitable in all regions, its long-term goal is to establish a sustainable subscriber base. This goal is supported by technological integration and strategic marketing efforts—such as bundling offers with other services (Yuan, 2024). Competition among streaming providers has become increasingly intense. Platforms are now forced to innovate continuously—not only in terms of content, but also in technology, pricing, and user experience. The Hungarian market presents unique challenges due to specific linguistic and cultural characteristics. In response, providers are placing greater emphasis on localized content, including Hungarian dubbing, subtitles, and a better understanding of regional preferences. These factors significantly influence how often, how, and why Hungarian consumers choose one platform over another (HIVO, n.d.).

Material and method

The core focus of this research was the frequency of platform usage, device preferences, and factors influencing consumer choices. The study aimed to explore how differences in gender, age group, and educational background affect the manner and intensity of content consumption, as well as how language barriers limit access to and enjoyment of various streaming services.

Three hypotheses were formulated for the research:

- Hypothesis 1 (H1): The use of streaming services is more frequent among younger age groups, particularly users aged 18 to 35.
- Hypothesis 2 (H2): Content availability and subscription pricing are the primary factors influencing consumers' platform choices.
- Hypothesis 3 (H3): There are gender-based differences in content preferences, with men and women favouring different types and genres of content.

The research applied a quantitative methodology. Data collection was conducted using an online questionnaire created in Google Forms. The survey was distributed via various social media platforms (Facebook groups, Instagram), and on university campuses using posters with QR codes. Participation was voluntary, and the data collection took place between March and April 2025. A total of 176 respondents completed the questionnaire, all of whom had at least some level of experience with streaming services. Data analysis was carried out using Excel and Google Sheets, applying basic statistical methods such as percentage distribution, frequency analysis, and simple comparative evaluations based on gender, age group, and other relevant categories. Due to the nature of voluntary online sampling, the dataset may include certain biases—particularly an overrepresentation of younger, digitally active individuals and women, which may also reflect higher willingness to participate and greater usage of streaming platforms.

Results

The vast majority of respondents (81.6%) reported using a streaming service regularly—at least several times a week. Based on usage frequency, it can be concluded that streaming is no longer just an alternative form of content consumption, but has become a dominant channel, especially among younger generations. The most common viewing time is in the evening hours, with 68.2% of respondents indicating this as their preferred time to watch content. In contrast, daytime (15.3%) and morning (2.8%) viewing are significantly less common. In terms of device preferences, younger users primarily consume streaming content on laptops (15.3%) and mobile phones (9.7%), whereas older users predominantly use television sets (27.8%). The growing popularity of mobile-based viewing suggests that streaming is increasingly becoming a "mobile activity"—one that doesn't necessarily require deep focus or dedicated time. More than half of respondents use multiple streaming platforms in parallel, indicating that users are not loyal to just one service. This "platform mix" strategy is especially typical among heavy content consumers who value quick access to new episodes and films. A correlation was also observed between usage frequency and platform selection. Netflix is by far the most popular provider among respondents, followed by HBO Max and Disney+. YouTube appears to be used more as a supplementary or occasional content platform. When it comes to choosing a platform, the most important factor for the majority of respondents was content availability: 92.6% selected this as their primary consideration, specifically the selection of series and movies offered. This was followed by the subscription price (58%). Overall, consumers appear to base their decisions primarily on functional and content-related criteria, while technical features—such as customer support—play a less significant role.

In terms of content consumption habits and preferences, significant gender-based differences were observed. Among female respondents, the most popular types of content were films (96.4%), TV series (91%), and animated shows (40.5%). In contrast, male respondents predominantly watched films (89.2%), series (78.5%), and sports content (49.2%). When broken down by genre, men showed a strong preference for action, thriller, and science fiction, while women favoured romance, adventure, and drama. These trends clearly reflect gender-specific viewing patterns and offer valuable insights for streaming providers on how to more effectively target different audience segments based on content preferences.

In addition, there was a noticeable demand for localized content among respondents. The presence of Hungarian dubbing or subtitles is often a deciding factor when choosing a platform,

especially for users who do not have strong English language skills. Many respondents expressed a preference for services where the entire content library is available in Hungarian. While language barriers do not necessarily prevent users from accessing a platform, they influence their choices within the platform. Several users indicated that they are more likely to watch a movie or series if it is dubbed or at least subtitled in Hungarian and may skip content that lacks localization. Based on these findings, it can be concluded that extensive localization can offer a competitive advantage for service providers—not only by improving user comfort but also by expanding their potential audience base.

According to the first hypothesis, younger generations—particularly those aged 18 to 35—were expected to use streaming services more frequently than older age groups. Although younger respondents were indeed overrepresented in the sample, the data did not show a clear difference in usage frequency between age groups. High levels of usage—multiple times per week—were observed across all age categories. This indicates that streaming is no longer a privilege of the youth but has become a widely adopted habit across various segments of society. Therefore, the first hypothesis is only partially supported: while younger users are more prevalent, the intensity of usage is consistently high across generations. The second hypothesis assumed that platform choice is primarily driven by content availability and subscription pricing. This assumption was clearly confirmed. The overwhelming majority of respondents cited these two factors as their main considerations. This was particularly evident in the case of TV series, where users tended to follow specific content rather than remain loyal to a particular provider. Many indicated that they were willing to switch platforms in order to access a desired show. The third hypothesis suggested that there are gender-based differences in content consumption habits. The data support this as well. Female respondents showed a stronger preference for TV series and romantic content, whereas male respondents more frequently chose action and science fiction. These differences not only reflect distinct preferences but also indicate differing relationships with content: women often viewed series as a form of relaxation, while men tended to associate content with information seeking or stress relief. Based on the summarized results, it can be concluded that content and pricing are the primary drivers behind the choice of streaming services. At the same time, user loyalty is low, and usage frequency is high across all age groups. There are notable gender-based differences in both platform selection and content preferences. Additionally, language barriers continue to play an important role in shaping the user experience. These findings form the basis for the conclusions and recommendations presented in the following chapter.

Summary, conclusion

The aim of this study was to present, based on empirical data, the key factors that shape the decision-making preferences, usage patterns, and platform choices of Hungarian streaming service users. The results of the quantitative research clearly indicate that content availability and subscription pricing play a central role in user decisions. Streaming services are used frequently across all age groups, suggesting that these platforms have become deeply embedded in society. Gender-based differences are primarily observed in terms of content types and genre preferences, while language barriers—particularly the lack of localization—continue to affect both the user experience and platform choice. The findings also confirm that Hungarian users approach streaming platforms flexibly and are willing to switch services based on content availability. Brand loyalty is low, and consumers tend to manage their subscriptions consciously and often in a cost-effective manner. There is a growing demand for localized content, along with rising expectations for mobility and personalized user experiences—factors that service providers should prioritize in their future strategic planning. While the results of this study may not be fully generalizable to the entire Hungarian population, they offer valuable insight into the behaviour of digitally active user groups. Overall, the findings suggest that streaming services represent not just a form of entertainment, but a distinct consumption culture, one that stakeholders in the market must understand in order to remain competitive and relevant.

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Examining the performance of statistics among economics students

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Abstract: This study investigates the statistical performance of economics students, examining factors that influence their success in statistics courses. It explores the relationship between students' mathematical abilities, prior academic preparation, family background, and their performance in statistics. The research identifies key determinants, such as gender differences, the impact of admission score thresholds, and the role of theoretical and practical class timing. Additionally, the study analyzes students' attitudes towards mathematics-based subjects and the influence of high school teachers on their academic performance. The findings provide insights into how these factors affect student outcomes and suggest potential strategies to improve statistical education in higher education.

Keywords: Economics, Higher Education, Statistics

1. Introduction

Statistics is a compulsory subject for most university students. Our aim is to quantify how feasible it is to successfully complete the subject. It is also a longitudinal study of the lasting knowledge students acquire after completing the course.

The relationship between students' mathematical abilities and their choice of university course is an interesting area of investigation. This research investigates the phenomenon of students choosing majors that require significant mathematical skills, despite the fact that they may not have a strong foundation in the subject. By analysing enrolment trends, I aim to understand the factors that influence students' choices and the possible consequences for academic success. The study provides valuable insights into the challenges faced by both students and educational institutions in aligning study programmes with students' aptitudes and career plans.

Statistics plays a crucial role in many fields from the social sciences to the natural sciences, and is particularly important in economic decision-making, business problem analysis, and medical and biological research (Korpás et al., 1996). Statistics, defined as 'a scientific methodology and practice for the concise, quantitative characterisation of reality', has evolved from a background in public administration to become an indispensable tool in modern society. Advances in probability theory have significantly advanced this methodological science, extending its applications beyond the social sciences. In economics education, understanding statistical concepts is essential. For example, measurement scales, one of the first topics in statistics courses, highlight the importance of understanding the underlying meaning of numbers (Köves et al, This knowledge is essential for proper data interpretation and analysis, as misunderstanding the nature of the figures can lead to meaningless calculations (Moldan et al., 2012). When discussing or using numbers, it is essential to pay attention to the content of the numbers. It is essential to always be aware of what lies behind each character. If we ignore this, we end up with meaningless data. By calculating and interpreting the numbers correctly, we obtain derived and direct measurement data. When calculating or measuring, we must take into account the underlying content. It is not the same if we perform certain operations with different types of numbers (Moldan et al., 2012). Berliner & Rosenshine (2017) give an example of how misinterpreting grade scales can lead to wrong conclusions: a student who got an A and a B in the same subject may wrongly tell his parents that he got a total of 7 and currently has a 3 average. This makes no sense because grades are not added or subtracted. The content behind the number is not taken into account in this calculation. These data, measured with the appropriate model (paying attention to the content behind the numbers), are used to measure, compare and characterize different situations. We do not even notice them, but we use them unconsciously in our daily lives (Chi et al., 1994).

The aim of this study is to explore the challenges and importance of statistical education among economics students in preparing students for future careers and decision-making processes. By examining these aspects, we can better understand the role of statistics in higher education and its impact on students' academic and professional development.

Literature review

In the past, quality referred to the accuracy of data. Later, the concept of quality continuously expanded. Nowadays, the factors of quality are: relevance, accuracy, timeliness, punctuality of release, comparability, coherence, accessibility, and comprehensibility. All statistical offices take these same factors into account (Timmise et al, 2022).By relevance, we mean whether the data meets the user's needs. Accuracy refers to how closely the data approximates the unknown population value. Timeliness covers the time interval between the publication of statistical data and the occurrence of the given phenomenon.

On the role of mathematics in statistical sciences

Proficiency in mathematics is crucial for smooth learning of higher-level statistics. Advanced statistical studies heavily rely on proper text comprehension, accurate interpretation of formulas, and the ability to formulate and solve equations. These skills are typically developed during general and secondary school mathematics education. Kelemen (2006) highlights the connection between mathematical problems and real-life tasks requiring mathematical knowledge in her article in the Statistical Review. Multiple studies have shown that students often disregard their real-world knowledge and experiences when solving school-based word problems (Van de Schoot et al., 2021). This contradicts the international assertion by Wyndhamn and Säljö (1997) that mathematics education should prepare students for real-life problem-solving. They attribute this discrepancy to difficulties in problem comprehension and translation into mathematical language. Szendrei (2005) emphasizes the importance of mathematics in various career paths, not just for aspiring mathematicians but also for future fashion designers, winemakers, or doctors (Bretherton & Vogler, 1999). Despite complaints about mathematics being dry, rigid, and boring, and the acknowledgment that not all theorems, formulas, and proofs will be used in the future (Siegel, 2022), learning mathematics is an integral part of our cultural education, similar to studying classic literature.

Bertrand Russell, the English philosopher, viewed mathematics as a means to instill faith in reason and confidence in the truth of proven things (Russell, 1976). Mathematics encourages critical thinking and logical reasoning, urging students to question information and think rationally. The role of mathematics teachers is crucial in fostering a desire for deeper understanding of rational thinking. However, Szendrei (2005) notes a reluctance among students to become mathematics teachers, fearing they might perpetuate negative experiences. She emphasizes that modern education systems focus not only on performance but also on student motivation. The perceived divide between humanities and sciences often serves as an excuse for students to give up on mathematics early in their studies. However, Szendrei (2005) argues that those who appreciate poetry may also have an affinity for mathematics, citing the mathematical nature of rhythm in sonnets. She also mentions the golden ratio in art, exemplified by Leonardo da Vinci's work, to illustrate the interconnectedness of mathematics and arts. A good mathematics teacher aims to introduce students to the joy of mathematics, recognizing that everyone can understand mathematics if they find the right approach. Haas (1961) acknowledges the challenges in mathematics education, emphasizing the need for appropriate teaching methods to overcome these difficulties.

This literature review underscores the significance of mathematics in higher education, particularly in statistics, and highlights the importance of effective teaching strategies to bridge the gap between theoretical knowledge and practical application.

Student performance is most simply reflected by grades. Grades directly evaluate students' work. This is the most commonly used form of assessment. Grades are part of a large feedback system in which both students and teachers learn how well the students have mastered the given material. Essentially, they provide assistance in learning and evaluate the effectiveness of part of the learning process.

The two functions can only be fulfilled by separate methods. The method of grading that supports learning should not have serious consequences. The teacher must discover how much the student really knows, where they make mistakes, and how to help them. However, the qualifying grade has stakes. Obtaining this grade must be achieved under equal conditions for all students, without customization. This grade will have an impact on the student's career path. Grades must be objective, reliable, and valid.

According to Creisse et al., (2022) who conducted a study in Szeged in 7th grade, biology, history, and literature were the most popular subjects, with no significant gender differences in attitudes towards most subjects except for physics (preferred by boys) and grammar, literature, and foreign languages (preferred by girls).

By 11th grade, the differences in preferences between boys and girls became more pronounced. Overall, subject popularity decreased, with history, literature, and foreign languages being the most favored, primarily by girls, while boys preferred physics and mathematics more (Miller et al., 2021)

The determinants of performance in studying statistics

The prior knowledge acquired by students is not uniform. Inductive tests assess how well students understand a given material. A student may excel at solving a specific type of problem but may fail to connect similar calculations in different contexts. (Hirst & Thompson, 1992)

In my literature review, I will also address gender differences. Is there a disparity in statistics performance between male and female students? I will examine the impact of differences among various majors and the effect of admission score thresholds. I will investigate the relationship between theoretical and practical class timings, as well as how family background and parental education influence statistics performance. Additionally, I will explore whether having a family member who actively uses mathematical knowledge affects student performance. I believe that students' self-assessment and their intention to continue studying are significant factors. I will analyze how students' attitudes toward mathematics-based subjects influence their statistics performance. Furthermore, I consider it relevant to examine how many mathematics teachers a student had during high school and whether they liked their most recent math teacher. Key areas of investigation include:

- Gender differences in statistics performance.
- Effects of different majors and admission score thresholds.
- Relationships between theoretical and practical class timings.
- Influence of family background and parental education.
- Impact of having family members who use mathematics actively.
- Students' self-assessment and intentions for further study.
- Attitudes towards mathematics-based subjects.
  Number of mathematics teachers during high school and their influence.

Additionally, the integration of traditional and computer-based teaching methods at Óbuda University is noted as a new development whose effects on performance will be assessed.

- Hypothesis I: The performance of business students is statistically better because of higher entry cut-off points in certain courses.
- Hypothesis II: Students who perform better in mathematics exams also perform better in statistics.

- Hypothesis III: Higher parental education has a positive effect on statistical performance.
- Hypothesis IV: The better the student's mathematics grade in high school, the better the student will perform in Statistics I.

Methodology

The methodology used to investigate the factors influencing students' statistical performance is based on a quantitative research design. This approach allows the collection and analysis of data on various independent variables such as major, admission scores and previous mathematical performance in relation to the dependent variable, statistical performance.

The study involved students of economics. The diverse sample ensures that the results are representative of the student population.

Data are collected through structured surveys or questionnaires that are distributed to collect information on students' backgrounds, including their parents' educational attainment, the number of their high school mathematics teachers, and their preparation habits for statistics classes. They also access academic records to obtain performance data, including grades in statistics subjects, maths entrance tests and entrance scores. In this study, the independent variables include students' majors, parents' educational attainment, number of high school mathematics teachers, prior mathematics achievement (high school), participation in practical classes, and preparation habits. The dependent variable will be performance in statistics courses, measured by grades. Statistical analyses will be carried out using software such as SPSS or R. Descriptive statistics will summarise the data, while correlation analysis will examine the relationships between the independent variables and statistical performance. Multiple regression analysis can also be used to determine the predictive power of different factors on student performance. All hypotheses are tested using appropriate statistical methods. For example, t-tests or ANOVA are used to compare means between groups based on major or parental education. Multiple regression analysis will assess the effect of several independent variables on statistical power.

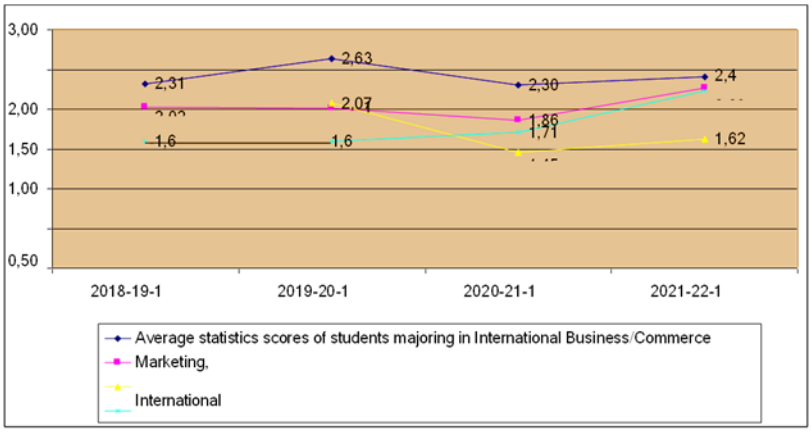
Results and discussion

Students are advised to take the course in the spring semester and only data from this semester will be analysed. The study period covers the second semesters of the academic years 2018-2022. The course content has changed slightly over the years, but attendance in practical classes is still compulsory and only two absences are allowed. To obtain a signature of completion of the course, students must pass a theoretical examination. In the 2018-19 spring semester, students can obtain practical marks through three final examinations, the marks must meet the specified thresholds: 51 points for a grade 2, 63 points for a grade 3, 76 points for a grade 4 and 89 points for a grade 5. Students were required to have a maximum of two absences and to pass the theory test.

For the 2019-20 spring semester, the only change was that students had to achieve at least a 30% on the second and third tests. Course topics included statistical concepts, frequency distributions, indicators and correlation analysis.

The statistics curriculum for the spring 2021-22 semester has not changed from the previous year. The average grades achieved by students are illustrated in Figure 3, which shows that the highest average was in the Spring 2019-20 semester. Although this semester had a higher variance (standard deviation), the relative standard deviation was lower at 39% compared to 46% in 2018-19 and 37% in 2020-21 and 2022. This improved performance is likely explained by the introduction of minimum requirements for the exams, which motivated students to study more effectively in order to obtain a passing mark.

Figure 1.: The development of the average statistical scores of students.



Source: own compilation

Figure 1 shows how the distribution of grades has evolved over the years. It is noticeable that the proportion of students receiving a grade of 1 has drastically decreased since the spring semester of 2019-20. This may be due to fewer students successfully obtaining their signatures. However, those who did achieve this performed better overall. The quantity of students earning a grade of 2 was highest in 2020-21, at 53%. This impact is also reflected in the average grades. The proportion of students receiving a grade of 3 remained relatively stable during the examined years. Conversely, the distribution of grades of 4 and 5 significantly decreased in the 2020-21 semester. Although there was a slight increase in these grades in the following year, the values remained very low, with grades of 4 constituting 10% and grades of 5 making up only 2% of the issued grades in the last examined year. In the 2019-20 academic year, students could earn a practical grade in statistics if they had no more than two absences and performed well on two closed tests. The grading thresholds were as follows: -50 (fail), 51-60 (pass), 61-74 (medium), 75-84 (good) 85- (excellent). For Technical Management students, the requirements included a maximum of two absences and a minimum score of 15 on each of the two tests. The grading thresholds for determining the practical grade were the same as for students in Commerce and Marketing. In the 2020-21 fall semester, the curriculum for Technical Management students expanded to include topics on time series and seasonality. Meanwhile, Business Administration and Management students transitioned to two tests worth 0-50 points each, aligning their grading thresholds with other majors. By the 2021-22 first semester, Business Administration and Management students were required to achieve a minimum total of 20 points across their two tests, while there were no changes for Technical Management students. Figure 3 shows the average grades for students in both majors. First-year Technical Management students performed equally well as their Business Administration and Management counterparts. However, there was a decrease in average grades in the 2020-21 academic year, despite no changes in requirements for Technical Management. In the following semester, the average for Technical Management students increased slightly.

Table 1. Distributions of successful passing of the Statistics I. C subject among Technical Managers and Managers of Business administration.

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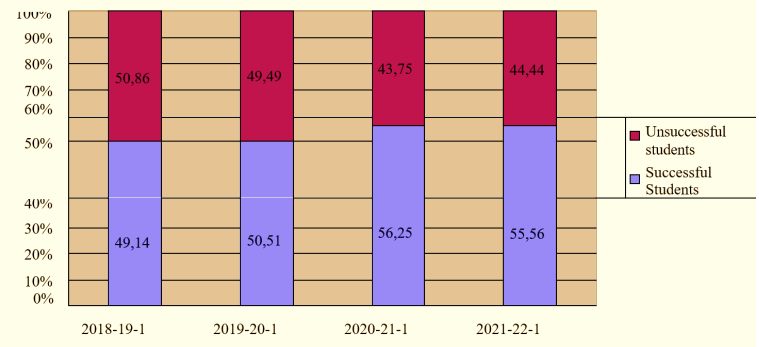
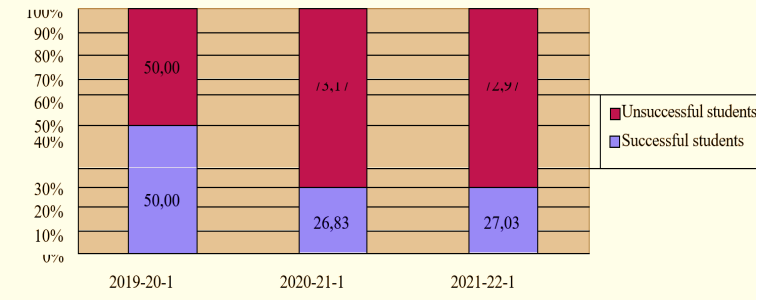
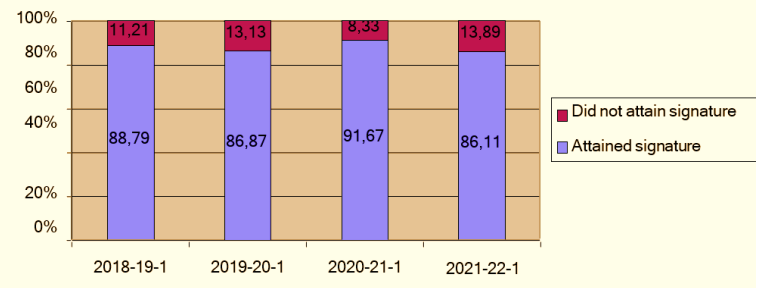


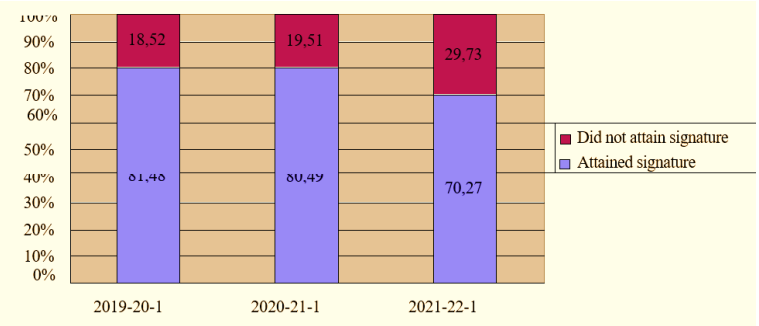
Distribution of success rates (%). Source: own compilation



Distribution of success rates (%). Source: own compilation



Distribution of success rates (%) in obtaining signatures. Source: own compilation



Distribution of success rates (%) in obtaining signatures in statistics. Source: own compilation

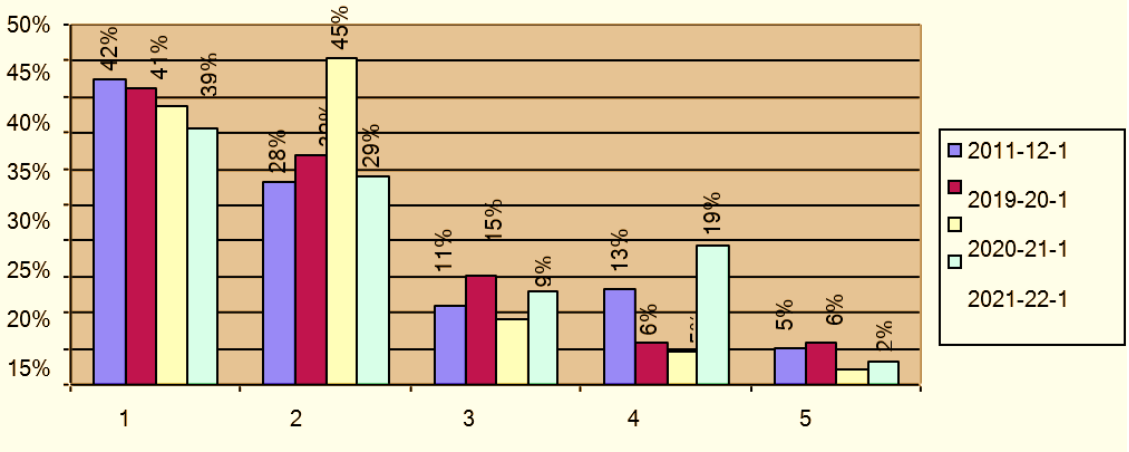
Based on the provided information in Table 1, it can be observed that Technical Management students performed less successfully than Communication and Media Studies students in the last two semesters of the examined period. This trend is supported by average grades, which indicate that after an initial period of success, Technical Management students' performance declined. The change in curriculum cannot be blamed for this decline; rather, it may be attributed to the introduction of a new course on social media. Since this course was recently implemented, students had not yet formed preconceived notions about it. Research by Paul Rendulic and Steve Terrel discusses students' anxiety and biases regarding statistics courses. Additionally, Dina El Kayaly points out that negative attitudes toward statistics hinder students' learning processes. The statistics course was first introduced in the 2019-20 academic year for Technical Management students, so they had no prior benchmarks for comparison. In subsequent years, however, information about the course became available, which may have negatively impacted students' motivation and their confidence in their knowledge.

The findings from various studies support the notion that social media can affect academic performance. For instance, research indicates that excessive social media use can lead to distractions and decreased academic achievement among students (Gordon & Ohannessian; Madaiah et al., 2017). While some studies suggest that social media can enhance communication and collaboration in educational settings, others highlight its potential to disrupt focus and contribute to anxiety (Dhiman, 2023; Huang et al., 2023).

The decline in performance among Technical Management students may be linked to their experiences with the new social media course and its associated challenges, compounded by existing biases and anxieties regarding statistics.

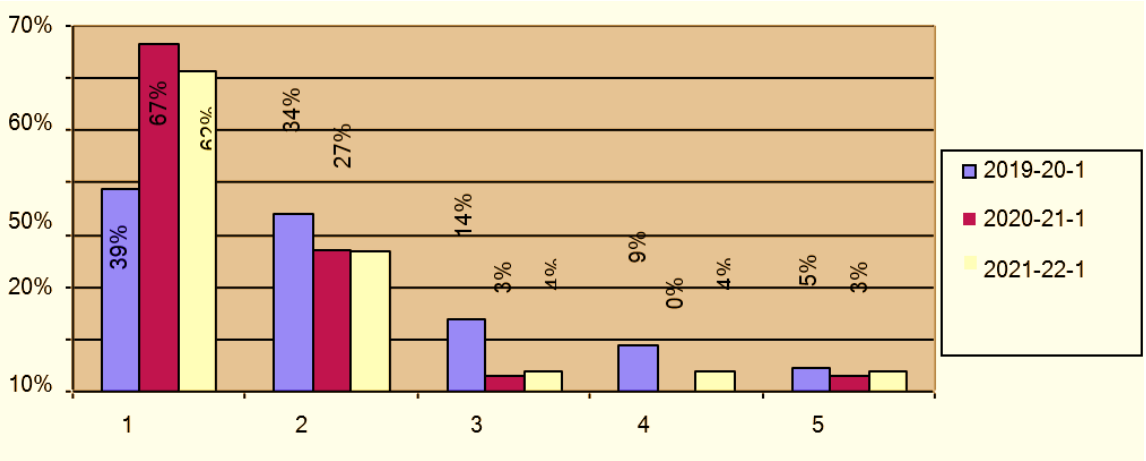
Figures 5 and 6 illustrate the changes in grade distribution over the examined periods. It is evident that the number of failing grades has decreased year by year for Business Administration and Management students, while there was a sudden increase in failing grades for Technical Management students, rising from 39% to 67%, with only a slight decrease in the following year. The grade of 2 was clearly the most common during the analyzed period. For Business Administration and Management students, the average shows that the proportion of grades of 4 increased to 19% in the 2021-22 academic year. The initial average of 2.07 for Technical Management students demonstrates a decline in performance, as reflected in the distribution of grades.

Figure 2.: The distribution of grades (%) achieved by students



Source: Own compilation

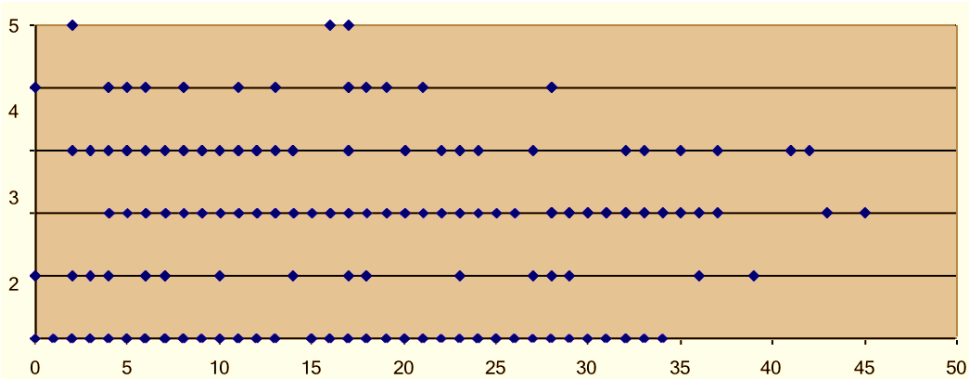
Figure 3.: The distribution of grades (%) achieved by students statistics course



Source: Own compilation

Before examining the relationship between the chosen major and the scores achieved in the assignment, I will conduct a variance analysis. The null hypothesis (H0) states that there is no relationship between the variables, while the alternative hypothesis (H1) posits the opposite. I applied an F-test, which yielded a value of 0.3591 at a 5% significance level, where the critical value was 3.195. This value falls within the acceptance range of H0. Therefore, there is no relationship between the chosen major and the scores achieved on the closed test assignment. In my third hypothesis, I stated that if students performed well on the placement test, meaning fewer students attended remedial courses in that academic year, then that cohort would perform better in Statistics 1. The mathematics placement test is only taken by students majoring in Technical Management (both English and Hungarian) and Commerce and Marketing. In my investigation, I looked for a correlation between the results of the mathematics placement test and the statistics course outcomes for Technical Management and Commerce and Marketing students in the 2021-22 academic year. The average score on the placement test was 10.91 points for that semester, with an average deviation of approximately 9.92 points, indicating a 62% average deviation. This shows that there were many extreme results among the students who took the placement test.

Figure 4.: The grades in statistics and the results of the placement test, with a grade of 0 indicating the denial of the signature



Source: Own compilation

Since both variables are quantitative, correlation analysis must be conducted to examine the relationship between them. According to Figure 4, where the X-axis represents the scores achieved on the mathematics placement test and the Y-axis represents the grades in statistics, it is evident that there is no correlation between the two quantitative variables. If there had been a correlation, the arrangement of points on the graph would have followed a trend line. However, in this case, that is not observed, so it can be concluded that the results of the mathematics placement test do not affect performance in statistics.

Conclusions and summary

I examined the statistics results for five programs at the Keleti Károly Faculty (Technical Management, Commerce and Marketing, Technical Management in English, Business Administration and Management). First, I reviewed the curricula detailing the course content and requirements. Among these, students in Technical Management and Commerce and Marketing find statistics to be the most challenging subject. I analyzed the statistics exams from three groups in the 2021-22/1 semester. Although the groups belong to different programs, the content of the first exam was nearly identical. By excluding differences between programs, I determined that students in Technical Management and Commerce and Marketing performed the best. Reviewing previous cohorts' performances led me to conclude that these students excel even under varying requirements. Changes in admission score thresholds over the past five years have also impacted students' performance in statistics. A sudden decrease in admission scores for self-funded programs during the 2019-20 academic year did not show immediate effects but became evident in subsequent statistics results. Lower thresholds allowed more students with weaker abilities to gain admission.

Upon examining the relationship between the timing of practical and theoretical classes, I concluded that, excluding different teaching styles, there is no significant relationship between the timing of theoretical and practical classes regarding course performance. However, it is noticeable that students attending practical classes closer to their theoretical lectures achieve better grades.

Students' performance in statistics is influenced by many factors. To successfully complete the statistics course, students need to be aware of their level of knowledge. It is important to ensure a high level of self-motivation and to maintain a positive attitude. Having set goals can motivate them throughout the learning process. Moreover, it is beneficial for students to have a flow of information about statistics among themselves, as the limited hours for practical sessions and the extensive material require quick comprehension, recognition of relationships, and practice with tasks. From the instructors' perspective, there is a need for a positive and engaging teaching style. Clear explanations of relationships and providing multiple practice problems for students are essential. It is evident that many factors contribute to the successful completion of the statistics course. The question remains whether teachers are correct in asserting the necessity of this type of statistics education, or if students would fare better with an easier version. Only 36% of surveyed students believe that the level of statistics education at Óbuda University’s Keleti Károly Faculty is worthwhile considering their future workplaces. This group also has a higher average than those who think this level of difficulty is not beneficial.

However, the answer to this question can only be provided by employers. Until then, students must wait to find out if studying statistics at Óbuda University’s Keleti Károly Faculty was worth it.

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Exploring Energy Drink Consumption Habits of Z Generation Economists: A Consumer Perspective

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Abstract: This study explores the energy drink consumption habits of Generation Z and Alpha, focusing on the sources of knowledge about their harmful effects. With data from 710 respondents, the research highlights how energy drinks have become an integral part of students' and young professionals' lives, especially in high-pressure environments like academia and economics. Key sources of knowledge include parents, TV, internet, teachers, and school health staff, with most respondents acknowledging the health risks associated with energy drinks. Despite this awareness, a significant portion continues to consume them, driven by work demands, social influences, and marketing. The study underscores the need for increased health education and alternative solutions to cope with fatigue and stress, particularly for younger generations entering the workforce.

Keywords: Z Generation economists, Energy drink consumption, Consumer behavior, Health implications

Introduction

The transition to university life significantly impacts students' healthy eating habits and preferences. As Deliens, Clarys, De Bourdeaudhuij, and Deforche (2014) emphasize, the increasing independence of students also intensifies the pressure to make healthy food choices. Due to the energy-demanding, cognitively intensive tasks in university and the limited time students have, they often turn to quick and convenient solutions, such as consuming energy drinks. In the United States, brands like Gatorade, Rockstar, Red Bull, and PowerAde are popular among students .

The U.S. energy drink market, valued at $24,3 billion by 2023 , is regularly used by 33% of adolescents. Existing literature provides ample evidence of significant energy drink consumption among students . Due to their high caffeine content and reported mental performance-enhancing effects, energy drinks are attractive to students, especially during exam periods. However, excessive consumption of energy drinks is associated with psychological and physiological side effects, such as reduced alertness and weakened mental performance (Hossain et al., 2014). Other studies also mention health risks and psychological impacts, such as mild euphoria, restlessness, and anxiety.

In the absence of parental guidance, students often rely on social media or peer advice to shape their eating habits. While these habits may reflect personal taste, self-discipline, availability, and the cost of energy drinks, peers and friends also play a significant role in shaping consumption habits. At the same time, energy drink companies have adopted increasingly aggressive marketing strategies, utilizing social media, television commercials, and celebrity endorsements to capture the young adult market.

As consumer engagement with brands grows, marketers are increasingly using creative approaches, such as social media, to promote their products. According to Media Richness Theory, social media facilitates quick and diverse communication, reduces information gaps, deepens brand awareness, and helps marketers better understand consumer preferences. However, the impact of social media platforms on student brand preferences remains under-researched in the literature.

This study aims to explore the influence of social media on students' preferences for popular brands, such as energy drinks, to better understand how social media marketing transforms brand perceptions among students.

Literature

Energy drink consumption has become increasingly common among young people, especially Generation Z, who currently represent one of the most rapidly growing groups in the workforce. Economists, in particular, who are often exposed to high levels of stress and long working hours, may be inclined to use energy drinks to boost their performance and energy. This consumption habit raises important social and health questions, which, when examined, can impact not only the well-being of these young professionals but also their long-term careers.

The importance of Generation Z in the labor market

Generation Z, born between 1997 and 2012, is gradually entering the workforce in increasing numbers and already plays a crucial role in various professions, including economics (Dimock, 2019). This generation grew up in the digital world, as digital natives, which has resulted in unique working methods and lifestyles. Constant connectivity, multitasking, and the ability to process information quickly provide significant advantages in the modern workplace, but they also bring increased stress and overload.(Tariq et al.,2024) Economists, especially younger generations, often face high expectations, tight deadlines, and significant mental strain. In such environments, many turn to energy drinks to enhance concentration, reduce fatigue, and meet workplace demands.Forgács et al.,2024) However, excessive consumption of energy drinks can lead to long-term health problems that may affect both performance and career prospects (Smith & Jones, 2020). Energy drinks contain high levels of caffeine and sugar, which can help combat fatigue in the short term, but their long-term health consequences can be severe. Excessive caffeine intake, for instance, can cause anxiety, insomnia, heart problems, and high blood pressure (Hossain et al., 2014). Young professionals, such as Generation Z economists, may be particularly vulnerable to these effects as they focus much of their lives on job performance and career development.(Csiszárik et al.,2024) Generation Z often seeks quick fixes for fatigue and stress, and the marketing of energy drinks effectively targets them by promising an immediate energy boost and better performance (Jackson & Harris, 2018). This is especially true in high-stress, fast-paced professions like economics, where young professionals may feel compelled to use every tool available to succeed. Long working hours, constant mental challenges, and maintaining a work-life balance can all contribute to the popularity of energy drinks in this demographic.(Khan et al.,2023) Understanding energy drink consumption habits is crucial to preserving the health of Generation Z. Since this generation is just beginning to enter the workforce and faces long careers ahead, developing health-conscious habits is essential (Doe, 2019). Failing to address these issues in time could result in regular energy drink consumption leading to long-term health problems that could affect the careers and quality of life of young economists. It's not only about individual health risks. The habit of consuming energy drinks can be interpreted in a broader social and cultural context. Generation Z, heavily influenced by social media and marketing campaigns, often encounters images that associate energy drinks with successful and energetic lifestyles (Kim, 2020). These marketing strategies can convey messages that downplay the health risks of energy drinks while suggesting that they are essential tools for efficiency and productivity. In the workplace, the trend of energy drink consumption raises important questions about workplace well-being and health policies. Employers need to increasingly consider the health of their employees and the workplace culture that either promotes or hinders a healthy lifestyle.(Varga et al.,2024) Examining the energy drink consumption habits of young economists can help develop workplace policies that reduce the need for excessive caffeine and sugar intake.(Garai-Fodor et al.,2023) For example, if workplaces support regular breaks, stress management techniques, and provide healthy alternatives to energy drinks, the overall well-being and long-term health of employees could improve (Roberts et al., 2017). It is vital to examine the energy drink consumption habits of Generation Z economists, as this generation is playing an increasingly significant role in the world of work, and their habits can have long-term impacts on their health and careers. Energy drinks offer a short-term solution for young professionals to combat fatigue and enhance performance, but excessive consumption comes with serious health risks. Workplace culture, social expectations, and marketing all contribute to this phenomenon, making awareness and the promotion of healthy alternatives essential (Williams & Brown, 2019).

The Health Risks of Energy Drink Consumption

While energy drinks may offer short-term benefits, their long-term effects on health can be detrimental, especially when consumed in large quantities. The primary active ingredient in most energy drinks is caffeine, often in combination with large amounts of sugar and other stimulants such as taurine and guarana. (Pató et al.,2023)These ingredients can lead to a quick energy spike, but they also come with significant health risks. One of the most immediate risks is the potential for caffeine overdose. High doses of caffeine can cause symptoms such as increased heart rate, high blood pressure, anxiety, and digestive issues. In extreme cases, excessive caffeine consumption can lead to more severe problems like heart palpitations, seizures, or even death (Hossain et al., 2014). Given that many energy drinks contain the same or more caffeine than a standard cup of coffee, and are often consumed in larger quantities, the risk of overconsumption is real.(Dániel & Patrik,2021) Another concern is the impact on mental health.(Csiszárik,2021) Regular consumption of energy drinks can lead to increased levels of anxiety and disrupt sleep patterns, which can, in turn, reduce productivity and worsen overall mental well-being (Smith, 2021). For young economists who are already dealing with high levels of stress and long work hours, this can create a vicious cycle. The temporary relief provided by energy drinks may lead to dependence, with individuals needing more and more to achieve the same effects, further exacerbating health problems.(Csiszárik et al.,2024) Over time, the high sugar content in many energy drinks can also contribute to weight gain, increased risk of type 2 diabetes, and other metabolic disorders (Roberts et al., 2017). For Generation Z economists, who may be focused on short-term productivity gains, these long-term health risks are often overlooked or underestimated.(Garai-Fodor et al.,2024)

Workplace Culture and the Role of Employers

The widespread use of energy drinks among Generation Z economists also highlights the need for a broader discussion about workplace culture and employee well-being.(Csiszárik et al.,2016) Many workplaces, especially in high-pressure fields like economics, prioritize output and performance above all else. In such environments, there is often little emphasis on taking breaks, (Claudia et al.,2021) managing stress, or promoting healthy lifestyle choices. Employers can play a crucial role in addressing this issue by fostering a workplace culture that encourages healthier habits. This could include offering healthier alternatives to energy drinks, such as access to water, herbal teas, or snacks that provide a more sustainable energy boost. Workplaces can also promote regular breaks and encourage employees to disconnect during non-working hours to reduce burnout. Additionally, offering workshops on stress management and mental health could help young professionals develop healthier coping mechanisms, reducing their reliance on stimulants like energy drinks. By prioritizing the well-being of employees, companies not only contribute to better health outcomes but also create a more sustainable and productive workforce (Doe, 2019).

Understanding the energy drink consumption habits of Generation Z economists is critical for both individual health and overall workplace productivity. While these drinks offer a short-term solution to the fatigue and mental strain often experienced by young professionals, their long-term health risks cannot be ignored. Employers and employees alike must be aware of these risks and take steps to promote healthier alternatives. By creating a supportive workplace culture and encouraging healthier lifestyle choices, companies can ensure that Generation Z economists thrive in their careers without compromising their health.(Simon et al.,2021)

The Role of Advertising and Social Media in Increasing Energy Drink Consumption

Advertising and social media have played an undeniable role in increasing the consumption of energy drinks among Generation Z. The constant exposure to advertisements, sponsored posts, and influencer content normalizes the consumption of energy drinks, making it appear as a standard part of daily life. For many in this generation, seeing their favorite influencers or peers consume energy drinks fosters the idea that these beverages are an integral component of success, productivity, and social acceptance (Smith, 2020). Social media platforms are particularly effective in spreading energy drink trends because of their ability to engage users through interactive content. Brands encourage users to share their own experiences with energy drinks, often through challenges, hashtags, and user-generated

content campaigns. This not only amplifies brand visibility but also creates a sense of community among users who share similar consumption habits.(Viktor & Judit,2020)

The psychology of social media consumption also plays a role in how Generation Z responds to energy drink marketing. Research has shown that social comparison is a common behavior on platforms like Instagram and TikTok, where users often compare their lives, appearances, and activities to those of others.(Viktor & Szeghegyi,2022) When influencers or peers appear to be more productive, energetic, or successful due to energy drink consumption, young users may feel compelled to emulate those behaviors in the hopes of achieving similar results. Furthermore, the constant bombardment of ads and influencer posts creates a subconscious association between energy drinks and positive outcomes such as increased focus, heightened alertness, and social recognition. The repetitive nature of these messages can create a lasting impression on consumers, ultimately influencing their purchasing decisions (Brown & Johnson, 2019). Cultural norms also play a significant role in shaping the consumption habits of Generation Z. In today's society, there is a prevailing emphasis on productivity, efficiency, and constant self-improvement. Generation Z, as a product of this environment, often feels pressured to perform at their best at all times, whether in academic, professional, or social settings. This cultural expectation drives many young people to seek out products that promise to enhance their abilities and help them keep up with the demands of modern life. Energy drinks fit neatly into this narrative of performance enhancement. The cultural norm of always being “on” and pushing oneself to the limit makes energy drinks an appealing choice for young people who want to excel in their endeavors (Williams et al., 2018). Another cultural trend that influences energy drink consumption is the increasing value placed on hustle culture. This refers to the glorification of working long hours, sacrificing rest for productivity, and constantly striving to achieve more. Generation Z, growing up with this mindset, often views fatigue and rest as obstacles to success. Energy drinks are marketed as a solution to overcome these obstacles, further reinforcing the notion that it is necessary to consume such products in order to keep up with the fast-paced demands of life. Fashion and peer pressure also play a significant role in shaping Generation Z's energy drink consumption habits. The consumption of energy drinks has, in many cases, become a trendy activity, particularly in social and academic settings. For some, carrying a branded energy drink can be a status symbol, signifying membership in a group of high-achieving or active individuals (Doe, 2019). In this sense, energy drinks are not only consumed for their functional benefits but also as a way of fitting in with peers. Peer pressure, whether overt or subtle, can strongly influence consumption patterns. Among young people, there is often a desire to conform to group norms, and this extends to behaviors like drinking energy drinks. If energy drinks are popular within a certain social circle or community, individuals may feel pressured to consume them in order to gain acceptance or approval. This is especially true in environments where high energy levels and productivity are valued, such as academic institutions or competitive workplaces.(Hamza et al.,2022)

Fashion trends also play into this dynamic. Energy drink brands often collaborate with popular fashion labels or sponsor high-profile events, further embedding their products into the cultural zeitgeist. The association with fashion and lifestyle brands helps to elevate energy drinks from mere beverages to lifestyle accessories that symbolize a certain level of coolness and status. The energy drink consumption habits of Generation Z are deeply influenced by social and cultural forces. Marketing strategies that emphasize productivity, excitement, and success have successfully tapped into the desires and insecurities of this generation, making energy drinks an attractive option for those seeking to boost their performance and social standing. Social media further amplifies these messages, normalizing the consumption of energy drinks and creating a sense of community around them (Garai-Fodor & Csiszárik-Kocsir, 2018). Cultural norms that prioritize constant productivity and hustle culture also play a significant role, as do fashion trends and peer pressure. Energy drinks have become more than just a quick fix for fatigue—they are now a symbol of success, productivity, and belonging in certain social circles. Addressing the health implications of these consumption trends will require a deeper understanding of the social and cultural context in which they occur. By recognizing the forces that drive Generation Z’s energy drink consumption, stakeholders can work towards promoting healthier alternatives and fostering a culture that values well-being over unsustainable productivity.(Katalin& Mónika,2024)

Material and methodology

Energy drink consumption is a growing trend, particularly among Generation Z (those born between 1997 and 2012), who are entering the workforce in increasing numbers. With energy drinks promising improved focus, energy, and productivity, young professionals, including economists, are often drawn to these beverages to meet the demands of their fast-paced lifestyles. This study aims to explore the energy drink consumption habits, motivations, and health implications among Generation Z economists. Building on previous research into the energy drink consumption habits of younger populations, including adolescents this study extends the focus to professional environments, specifically targeting economists.

The objective of this study is to understand the patterns and motivations behind energy drink consumption among Generation Z economists. It aims to identify the social, cultural, and health-related factors that influence consumption, as well as the potential risks associated with excessive use. The findings will contribute to developing strategies for promoting healthier alternatives in the workplace.

Table 1.: 1 Demographic Data by Generations

Generation	*Boys (%)*	*Girls (%)*	*Living in city (%)*	*Living in village (%)*	*Living in rural area (%)*
Generation Z (1997-2012)	*43*	*57*	*88*	*6*	*6*
Generation Alpha (2013-present)	*39*	*61*	*83*	*6*	*11*

Source: Own research

A survey was conducted in 2024 among 710 respondents from the Generation Z cohort, all of whom were employed in the field of economics. The survey was designed based on previous studies which examined caffeine and energy drink consumption habits among younger age groups. The respondents answered a 40-question online survey that collected data on demographics, consumption frequency, preferred brands, motivations, and awareness of health risks. The data was analyzed using statistical software, and comparative analysis was conducted to identify significant trends.

The 710 respondents consisted of 57% males and 43% females. The average age of respondents was 25 years old, with a range between 22 and 28. The majority of the respondents (69%) worked in corporate or governmental economic roles, while the remaining 30% were employed in academic or consulting positions.

The results revealed that 68% of respondents consumed energy drinks at least once a week, with 24% consuming them daily. The highest consumption rates were reported among those working in high-pressure environments, such as corporate financial analysis, where long hours and tight deadlines are common. Respondents who reported working 50 or more hours per week were twice as likely to consume energy drinks daily compared to those working fewer hours. The primary motivations for energy drink consumption were fatigue (55%) and the need for increased concentration during demanding work periods (49%). Social factors also played a role, with 34% of respondents indicating that they consumed energy drinks during social events or when out with colleagues. Similar to the findings from adolescent studies taste and brand loyalty were significant factors influencing product choice. Among respondents, 44% cited taste as their primary reason for choosing a specific energy drink brand, while 35% mentioned brand recognition. Price was a secondary consideration for most respondents. The survey also explored the respondents' awareness of the health risks associated with energy drink consumption. Interestingly, while 80% of respondents were aware of potential health risks such as heart palpitations, high blood pressure, and insomnia, 38% of them continued to consume energy drinks regularly, indicating a disconnect between knowledge and behavior. This echoes previous research among younger populations, where awareness of risks did not always result in a decrease in consumption.

Respondents reported several health issues they had experienced after consuming energy drinks. The most common complaints included sleep disturbances (35%), increased heart rate (28%), and digestive issues (22%). Despite these concerns, the majority of respondents (58%) did not seek medical advice, and 72% stated that they had not considered reducing their consumption. Workplace culture and social norms were found to have a significant influence on consumption habits. Respondents working in high-pressure environments where performance is closely monitored were more likely to consume energy drinks to maintain productivity. The culture of "hustle" and constant availability appeared to normalize the use of energy drinks as a productivity tool. Furthermore, the social acceptability of energy drink consumption in professional settings contributed to its regular use. Some respondents mentioned that energy drinks were often provided at work events, reinforcing their association with professional success. Culturally, energy drinks were also tied to social gatherings and after-work events. Respondents frequently mentioned consuming energy drinks mixed with alcohol during social outings, a behavior that was more prevalent among younger professionals. This trend aligns with prior studies on adolescent energy drink consumption, where social events were also a significant motivator.

The findings suggest that the consumption of energy drinks among Generation Z economists is driven by a combination of work-related stress, cultural norms, and social influences. Despite being aware of the health risks, many young professionals continue to consume energy drinks due to the perceived benefits of increased productivity and alertness. These findings are consistent with studies conducted on younger populations, which also highlighted the role of social and cultural factors in driving consumption.

Table 2.: Estimated Age of First Energy Drink Consumption by Generation

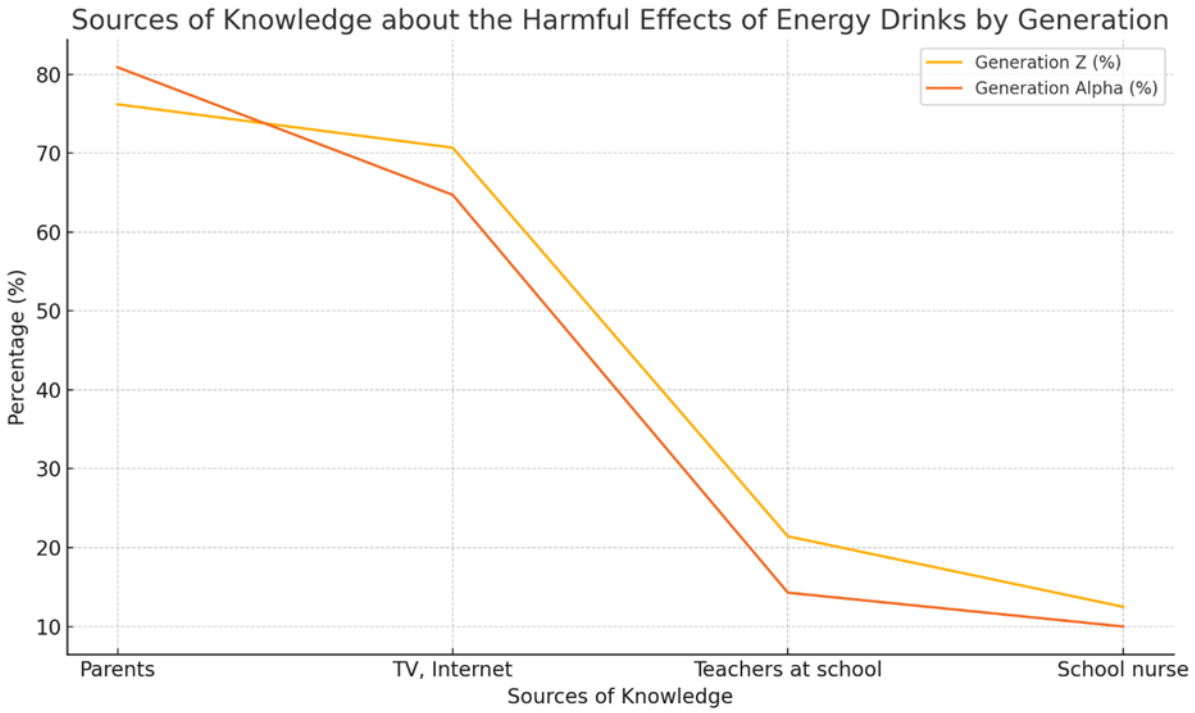
Generation	***Average age***	***Standard deviation***
Generation Z (1997-2012)	*12,24*	*1,592*
Generation Alpha (2013-present)	*10,83*	*1,814*

Source: Own research

The study highlights several health risks associated with regular energy drink consumption, particularly for those working in high-stress environments. The prevalence of sleep disturbances, cardiovascular issues, and digestive problems among respondents suggests that energy drinks, while providing temporary relief from fatigue, may have long-term negative effects on health.

Given the findings, there is a clear need for intervention in workplace settings. Employers should consider offering healthier alternatives to energy drinks, such as herbal teas or smoothies, and promote a culture of regular breaks and manageable workloads. Additionally, educational campaigns aimed at raising awareness about the long-term health risks of energy drink consumption could help reduce dependency on these beverages. This study provides valuable insights into the energy drink consumption habits of Generation Z economists, revealing the influence of workplace pressures, social norms, and marketing strategies on their consumption patterns. While many respondents are aware of the potential health risks, the demands of their professional lives often outweigh these concerns, leading to regular use of energy drinks. To promote healthier lifestyles and reduce the long-term health risks associated with energy drink consumption, both employers and policymakers should consider targeted interventions that address the cultural and social factors driving this behavior.

Figure 1.: Sources of Knowledge about the Harmful Effects of Energy Drinks by Generation



Source: Krug & Hörning (2013, fri: 11)

There can be no doubt that, in addition to the favorable conditions described, the functioning of the cluster has also made a significant contribution to growth and positive changes in competitiveness.

Summary of our research

The findings from this study offer a comprehensive understanding of the energy drink consumption habits of Generation Z economists, highlighting the key factors driving their behaviors. With data collected from 710 respondents, the analysis reveals significant trends related to the frequency of energy drink consumption, underlying motivations, health awareness, and the broader social and workplace influences. The results provide insights into the extent to which energy drinks have become ingrained in both personal and professional routines for these young professionals. The survey results demonstrate a high prevalence of energy drink consumption among Generation Z economists. A notable 68% of respondents reported consuming energy drinks at least once a week, with 24% admitting to daily consumption. This frequent usage reflects the deep integration of energy drinks into their routines, particularly among those in high-stress, high-demand roles such as corporate finance or economic analysis. The correlation between long working hours and energy drink consumption is particularly striking. Respondents working over 50 hours per week were twice as likely to consume energy drinks daily compared to those with more moderate work schedules. This finding highlights a direct link between the pressures of their work environment and their reliance on energy drinks as a quick source of energy. These professionals often face tight deadlines, intense cognitive demands, and long hours of sustained focus, which drive their need for external energy sources. Furthermore, the data indicated that those in academically focused roles, such as research and teaching positions, showed lower rates of energy drink consumption compared to their corporate counterparts. This suggests that the nature of their work—potentially offering more flexibility and fewer immediate pressures—may reduce their dependence on such stimulants. The survey explored the various motivations behind energy drink consumption, revealing that the majority of respondents turned to these beverages primarily to combat

fatigue (55%) and increase focus during periods of high mental demand (49%). These motivations align with the typical work requirements of economists, who often need to maintain high levels of concentration over extended periods to process complex data and perform in-depth analyses. In addition to work-related reasons, social factors also play a significant role in energy drink consumption among Generation Z economists. Approximately 34% of respondents noted that they consumed energy drinks in social contexts, such as during after-work events or gatherings with colleagues. This reflects the increasing normalization of energy drinks in professional settings, where their consumption is not only a response to work demands but also a part of social interactions and networking activities. The survey also highlighted that taste and brand loyalty were important factors in the choice of energy drinks, with 44% of respondents selecting brands based on taste and 35% prioritizing brand recognition. Price was a secondary consideration for most, suggesting that for these young professionals, the perceived quality of the beverage outweighed its cost. This finding echoes the growing trend in energy drink marketing, where brands are often associated with lifestyle and status, making them more than just a functional choice. Despite the frequent use of energy drinks, a significant portion of respondents (80%) were aware of the potential health risks associated with their consumption. These risks include issues such as increased heart rate, high blood pressure, anxiety, and sleep disturbances, all of which are linked to high levels of caffeine and sugar found in energy drinks. However, awareness of these risks did not always translate into behavior change. Of those aware of the risks, 38% continued to consume energy drinks regularly, citing the immediate need for increased energy and focus in their demanding jobs. This suggests a disconnect between knowledge and action, where short-term productivity gains are prioritized over long-term health considerations. The health impacts reported by respondents were varied, with 35% experiencing sleep disturbances and 28% reporting an increased heart rate after consuming energy drinks. Digestive issues, including nausea and upset stomach, were also common, affecting 22% of respondents. Despite these negative effects, the majority of respondents (58%) did not seek medical advice, and 72% indicated that they had not considered reducing their consumption. This highlights a tendency to downplay the seriousness of these symptoms, potentially due to the high demands of their professional environments. The finding that many respondents continued to consume energy drinks despite experiencing adverse health effects suggests a degree of dependency or at least a reliance on these drinks to meet their daily work demands. This reliance could be indicative of a broader issue of overwork and burnout within the profession, where individuals feel they have no choice but to use stimulants to keep up with their responsibilities. Workplace culture emerged as a significant influence on energy drink consumption among Generation Z economists. Many respondents described an environment where energy drinks were not only available but also normalized as part of the professional culture. In high-pressure roles where performance is constantly monitored, energy drinks were seen as a necessary tool to maintain productivity and meet expectations. This aligns with broader societal trends that promote "hustle culture," which emphasizes working long hours and pushing oneself to the limit, often at the expense of personal well-being. The availability of energy drinks at work events, such as conferences and training sessions, further reinforces their association with professional success. Many respondents reported that energy drinks were commonly offered at such events, creating a direct link between these beverages and work-related achievement. This normalization contributes to a workplace culture where consuming energy drinks is seen as not only acceptable but expected. Social norms also play a critical role in driving energy drink consumption. For many respondents, drinking energy drinks with colleagues was not only a way to stay energized but also a social activity. Energy drinks were frequently consumed during after-work gatherings or social events, often in combination with alcohol. This behavior mirrors trends observed in younger populations, where energy drinks are commonly associated with socializing and fun, further solidifying their place in social interactions among young professionals. The role of marketing and media in promoting energy drinks to Generation Z economists cannot be ignored. Energy drink companies have employed highly effective marketing strategies that resonate with the values and aspirations of this generation. Many of these strategies focus on the idea of increased productivity, mental sharpness, and success, which are particularly appealing to young professionals eager to make an impact in their careers. Through social media platforms and influencer marketing, energy drink brands have successfully embedded themselves into the daily lives of young professionals. The use of influencers, athletes, and celebrities to promote energy drinks as essential for high performance has created a powerful association between these beverages and success. For Generation Z economists, who are navigating competitive professional environments, the allure of an

easily accessible boost to energy and productivity is strong. The social implications of regular energy drink consumption are wide-reaching. On one hand, energy drinks have become a symbol of modern, fast-paced lifestyles, particularly among young professionals who are expected to balance demanding work schedules with social lives. On the other hand, the health risks associated with this consumption cannot be overlooked. The findings suggest that while energy drinks may provide short-term benefits in terms of increased alertness and energy, their long-term impact on health could be detrimental. As this generation of economists progresses in their careers, it will be important to monitor how continued reliance on energy drinks may affect their overall well-being, both physically and mentally. The results of this study provide a detailed overview of the energy drink consumption habits of Generation Z economists, revealing the complex interplay between workplace pressures, social influences, and health awareness. While many respondents are aware of the risks associated with energy drinks, their professional and social environments often drive them to continue consuming these beverages.Addressing the root causes of this behavior will require targeted interventions that promote healthier alternatives and foster workplace cultures that prioritize well-being. Employers and policymakers must take into account the cultural and social factors that drive energy drink consumption and implement strategies to reduce reliance on these products, ensuring that the long-term health of Generation Z economists is safeguarded.

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Exploring Real Estate Purchasing Habits of the Z. Generation in Iran Using an Agent-Based Model

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Abstract: The Z generation, also known as Gen Z, comprises individuals born between the mid-1990s and early 2010s, and they are gradually entering adulthood and becoming active participants in various markets, including the real estate sector. This study aims to investigate the real estate purchasing habits of the Z generation in Iran using an agent-based model. Agent-based modeling is a powerful computational approach that allows the simulation of individual decision-making processes to understand collective behaviors and trends. To examine the real estate purchasing behavior of the Z generation, an agent-based model is developed, considering various factors that influence their decision-making process. The model incorporates parameters such as age, income level, family status, education level, location preferences, and financial constraints. Each agent in the model represents an individual of the Z generation, and their interactions and decisions within the simulated environment lead to emergent patterns of real estate purchasing behavior. Data for the agent-based model are collected through surveys and interviews with a diverse sample of Z generation individuals in Iran. The survey covers questions related to their preferences, motivations, and concerns when considering purchasing real estate. The information obtained from the surveys serves as the basis for defining the initial parameters and decision-making rules of the agents in the model.

The agent-based model simulation provides valuable insights into the real estate purchasing habits of the Z generation. The results reveal patterns and trends in their preferences for property types, locations, and budget allocation. The model allows the identification of factors that significantly influence their decisions, such as the influence of family support, proximity to amenities, and perceived investment potential of the property. The findings suggest that the Z generation in Iran tends to prioritize convenience and accessibility when choosing a property. Proximity to educational institutions, workplaces, and public transportation options are crucial factors that impact their preferences. Additionally, the study identifies that the Z generation's affinity for technological advancements also affects their real estate decisions. They tend to seek properties with modern amenities and smart home features that align with their tech-savvy lifestyle. Furthermore, the agent-based model provides insights into the financial constraints faced by the Z generation when purchasing real estate. It illustrates how income levels and student loan burdens influence their affordability and down payment capabilities. Understanding these financial constraints is crucial for real estate developers and policymakers to devise targeted solutions and create accessible housing options for this generation. The implications of this research are significant for various stakeholders in the real estate industry in Iran.

The insights from the agent-based model can inform marketing strategies of real estate developers to better align their offerings with the preferences and needs of the Z generation. Policymakers can also utilize the findings to design housing policies that address the specific challenges faced by this generation, fostering a more inclusive and sustainable housing market. In conclusion, the agent-based model approach provides a comprehensive understanding of the real estate purchasing habits of the Z generation in Iran. By simulating individual decision-making processes and interactions within a virtual environment, the model uncovers collective patterns and trends in their preferences and priorities when considering real estate investments.

The insights from this study can guide the development of targeted strategies and policies to cater to the needs of the Z generation and ensure a thriving and dynamic real estate market in Iran.

Keywords: Gen Z, Real estate purchasing habits, Agent-based model, Iran, Preferences

Introduction

The real estate market in Iran has been subject to significant transformations over the past few decades, driven by a combination of economic reforms, demographic shifts, and evolving consumer preferences. As of 2024, the market is valued at approximately $3.36 trillion, with the residential real estate segment accounting for the largest share at $2.68 trillion. This substantial growth is reflective of broader economic trends and the increasing demand for housing, which is influenced by a variety of socio-economic factors (Atefi, 2010).

One of the most notable demographic groups contributing to this market shift is Generation Z, also known as Gen Z. This cohort, comprising individuals born between the mid-1990s and early 2010s, is now entering adulthood and beginning to exert significant influence on various markets, including real estate. The purchasing power and preferences of Gen Z are reshaping the real estate landscape in Iran, as they are in many other parts of the world. In Iran, the share of home purchases by those born after the year 2000 is steadily increasing, reflecting a broader global trend where Gen Z is becoming more active in property investments.(Varesi, 2024)

To understand the real estate purchasing behavior of Gen Z in Iran, this study employs an agent-based model (ABM) (Alonso, 1960). Agent-based modeling is a powerful computational approach that simulates the actions and interactions of autonomous agents to assess their effects on the system as a whole (Chang, 2006). This method is particularly useful for studying complex systems where individual behaviors and interactions lead to emergent phenomena. In the context of this study, each agent represents an individual from Gen Z, and their interactions within the simulated environment help to reveal collective behaviors and trends in real estate purchasing.

The agent-based model developed for this study incorporates a variety of parameters that influence the decision-making process of Gen Z individuals (Jacono, 2006). These parameters include age, income level, family status, education level, location preferences, and financial constraints. By simulating the decision-making processes of these agents, the model aims to provide a comprehensive understanding of the factors that drive real estate purchasing behavior among Gen Z in Iran.

Data for the agent-based model are collected through surveys and interviews with a diverse sample of Gen Z individuals in Iran. The survey covers a wide range of questions related to their preferences, motivations, and concerns when considering purchasing real estate. This data serves as the basis for defining the initial parameters and decision-making rules of the agents in the model. The use of survey data ensures that the model is grounded in real-world observations and accurately reflects the preferences and behaviors of the target population.

The findings from this study are expected to offer valuable insights into the evolving real estate market in Iran. By highlighting the growing influence of Gen Z, the study provides a basis for future market strategies and policies aimed at catering to the needs and preferences of this demographic group. Moreover, the use of an agent-based model allows for a nuanced analysis of the factors that drive real estate purchasing behavior, offering a detailed and sophisticated understanding of the market dynamics at play.

In conclusion, the real estate market in Iran is undergoing significant changes, driven by economic reforms and demographic shifts. Generation Z is emerging as a key player in this market, with their purchasing power and preferences reshaping the landscape. This study employs an agent-based model to investigate the real estate purchasing habits of Gen Z in Iran, providing valuable insights into their decision-making processes and the factors that influence their behavior. The findings from this study are expected to inform future market strategies and policies, ensuring that the real estate market in Iran continues to evolve in response to the needs and preferences of its diverse population.

Literature review

Residential location choice (RLC) is a multifaceted phenomenon influenced by a myriad of factors, including socio-economic conditions, urban infrastructure, and individual preferences. Understanding these dynamics is crucial for urban planners, policymakers, and real estate investors. In recent years, agent-based modeling has emerged as a robust methodological approach to simulate and analyze RLC behavior, particularly in the context of rapidly urbanizing regions like Iran. This literature review synthesizes findings from several key studies that explore the complexities of the Iranian housing market, focusing on the interplay between local and international factors, economic conditions, and innovative modeling techniques.(Tariq et al.,2024)

Agent-Based Modeling of Residential Location Choice

Agent-based modeling (ABM) has gained traction as an effective tool for simulating the behavior of individual agents—such as households—in their residential location decisions. Shirzadi Babakan and Alimohammadi (2016) conducted a pioneering study that employed ABM to simulate the residential location choices of tenants in Tehran. Their model conceptualizes tenants as autonomous agents who evaluate potential residential alternatives based on multiple criteria, including rent affordability, accessibility to essential services, environmental quality, and proximity to workplaces. By employing a constrained nondominated sorting genetic algorithm II (NSGA-II), the authors effectively limited the choice set of agents, allowing for a more realistic representation of decision-making processes.

The results of their simulation revealed that the model accurately predicted the residential choices of 59.3% of tenants at the traffic analysis zone level, underscoring the utility of ABM in capturing the spatial dynamics of urban housing markets. This study not only contributes to the theoretical understanding of RLC but also provides practical insights for urban planners aiming to address housing challenges in Tehran. (Khan et al.,2023)

In a related vein, Tajdin et al. (2016) explored the relationship between real estate investment and economic development in Tehran Province using an agent-based approach. Their findings indicated that real estate investment plays a significant role in stimulating economic growth and job creation. The model highlighted the importance of government policies, such as tax incentives and subsidies, in shaping real estate investment decisions. By illustrating the interconnectedness of real estate markets and broader economic indicators, this research emphasizes the need for integrated policy frameworks that consider both housing and economic development.(Pató et al.,2023)

Factors Influencing Residential Location Choice

The factors influencing RLC behavior are diverse and complex. Yarmohammadian (2019) conducted an extensive analysis of the business cycles of the urban housing market in Isfahan, Iran, from 1980 to 2014. The study identified several key determinants of housing demand and pricing, including inflation rates, interest rates, and government policies. The research highlighted the cyclical nature of the housing market, suggesting that external economic shocks could significantly impact housing prices and availability. Yarmohammadian's findings underscore the necessity for policymakers to adopt proactive measures to stabilize the housing market and mitigate the adverse effects of economic fluctuations.(Csiszárik,2021)

Khodabakhshian and Toosi (2021) contributed to the discourse on residential valuation by proposing a comprehensive framework based on life cycle cost (LCC) analysis using building information modeling (BIM). Their approach integrates various cost factors, including construction, operational, and maintenance costs, over the life cycle of a residential building. This holistic perspective allows for a more accurate assessment of property values, challenging traditional valuation methods that often overlook long-term costs. The authors argue that incorporating LCC into real estate valuation can lead to more sustainable investment decisions and better resource allocation in urban development.
International Influences on the Iranian Housing Market. The Iranian housing market is increasingly shaped by international dynamics, particularly in the context of migration and investment. Yildiz (2024) examined the transformation of the Turkish-Iranian migration corridor, focusing on the role of Iranians as real estate purchasers and international students in Turkey. The study found a marked increase in Iranian investment in Turkish real estate, driven by factors such as political instability and economic uncertainty in Iran. This influx of investment not only impacts the Turkish housing market but also reflects broader trends in migration and economic mobility among Iranians seeking better opportunities abroad.(Csiszárik et al.,2016)

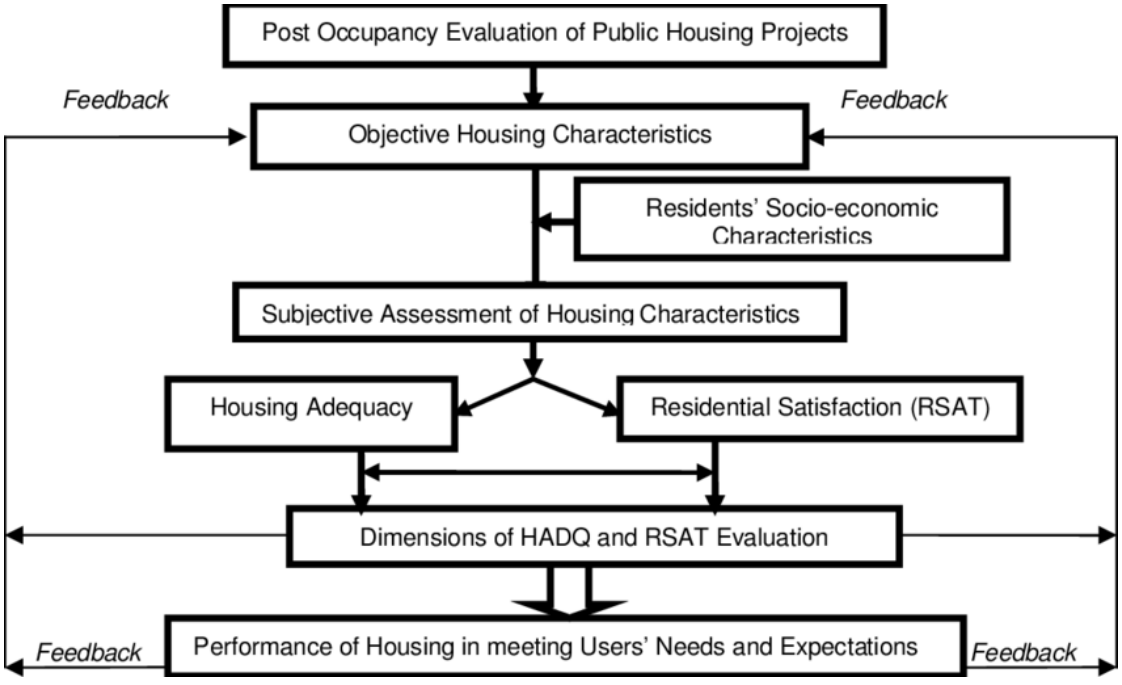
Varesi and Sedaghat Kish (2024) provided a localized perspective by investigating the price dynamics and housing market conditions in Abadeh, Iran. Their research revealed that the housing market in Abadeh is influenced by several factors, including population growth, economic development, and international migration trends. The authors emphasized the need for effective government policies to regulate the housing market and ensure that affordable housing options are available to all segments of the population. Their findings highlight the importance of understanding local market conditions while considering the broader context of international influences. Theoretical and Methodological Contributions.(Varga et al.,2024)

The studies reviewed here collectively contribute to the theoretical understanding of residential location choice and the dynamics of the Iranian housing market. The application of agent-based modeling provides a nuanced framework for capturing the complexity of individual decision-making processes and the interactions between various agents in the urban environment. By integrating multiple factors—ranging from economic indicators to individual preferences—these models offer valuable insights for urban planners and policymakers.(Garai-Fodor et al.,2023)

Moreover, the emphasis on life cycle cost analysis and the exploration of international investment trends enrich the discourse on sustainable urban development. As urbanization continues to accelerate in Iran, the need for innovative modeling approaches and comprehensive policy frameworks becomes increasingly critical.(Forgács et al.,2024)

The studies examined demonstrate the multifaceted nature of RLC behavior, influenced by local conditions, economic factors, and international trends. While significant progress has been made in modeling these dynamics, further research is necessary to explore additional influencing factors, such as social and cultural dimensions, and to enhance the predictive capabilities of agent-based models. Future studies should also consider cross-country comparisons to identify common patterns and unique challenges in the global housing market. By fostering a deeper understanding of these complexities, researchers and policymakers can work collaboratively to address the pressing housing challenges facing urban areas in Iran and beyond. (Csiszárik et al.,2024)

Figure 1.: Factors Influencing RLC: Economic Conditions, Government Policies, Individual Preferences, International Trends



Source: (Ibem, 2015)

Methodology

To investigate the real estate purchasing behavior of Generation Z (Gen Z) in Iran, we employ an Agent-Based Model (ABM). This model simulates the actions and interactions of autonomous agents, representing individuals from Gen Z, within a virtual environment. The ABM framework is designed to capture the complexity of decision-making processes and the emergent phenomena resulting from individual behaviors.

The model incorporates several key parameters that influence the decision-making process of Gen Z individuals, including age, income level, family status, education level, location preferences, and financial constraints.

The model incorporates several key parameters that influence the decision-making process of Gen Z individuals:

- Age ((A))
- Income Level ((I))
- Family Status ((F))
- Education Level ((E))
- Location Preferences ((L))
- Financial Constraints ((C))
- The utility function (U) for each agent is defined as:
- The utility function (U) for each agent is defined as:

$$U = \alpha 1A + \alpha 2I + \alpha 3F + \alpha 4E + \alpha 5L - \alpha 6C$$

where $(\alpha 1, .. \alpha 6)$ are weights assigned to each parameter based on their relative importance.

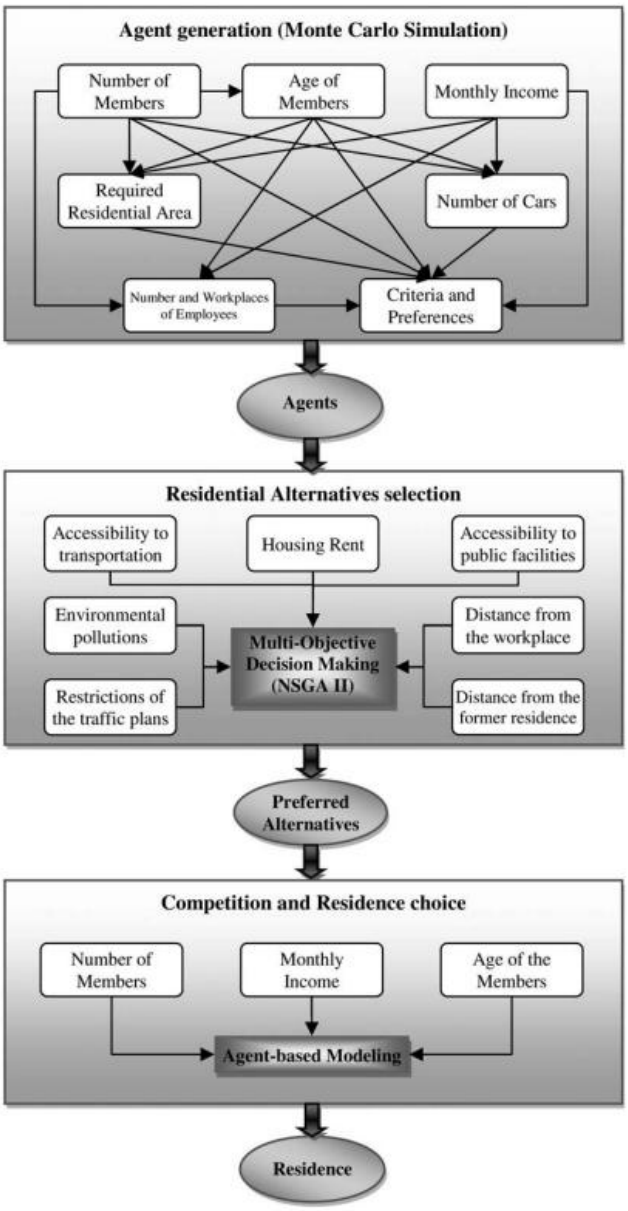
The algorithm for constructing and simulating the ABM begins with the initialization phase, where the population of agents ((N)) is defined, and initial values are assigned to parameters (A, I, F, E, L, C) for each agent based on survey data. Each agent's decision-making process involves calculating their utility (U_i) using the utility function and evaluating potential residential locations based on (U_i). Agents interact with each other and adapt their preferences based on social influence and market trends. The simulation runs for (T) time steps, recording the residential choices and utility values at each step. The emergent patterns and trends in residential location choices are then analyzed. The simulation results are summarized in the following table and figures, providing a comprehensive overview of the findings. The majority of Gen Z agents prefer urban locations due to better access to amenities and employment opportunities. Income level and financial constraints significantly influence residential choices, while social interactions and peer influence play a crucial role in shaping preferences.

Table 1.: Gen Z agents in our study.

Parameter	Mean Value	Standard Deviation
Age	25	3
Income Level	$30,000	$5,000
Family Status	Single	-
Education Level	Bachelor's	-
Location Pref.	Urban	-
Financial Const.	Medium	-

Source: Own compilation

Figure 2.: The operation of the Agent Based model



Source: (Shirzadi, 2015)

The correlation matrix heatmap provides a visual representation of the relationships between various parameters influencing residential location choices among Gen Z in Iran. Here are some key observations:

Age and Income Level: There is a moderate positive correlation between age and income level. This suggests that as Gen Z individuals get older, their income levels tend to increase, which is consistent with career progression and increased earning potential over time.

Family Status and Education Level: The correlation between family status and education level is relatively low. This indicates that marital status (single or married) does not significantly correlate with the level of education (Bachelor's or Master's) among the surveyed Gen Z individuals.

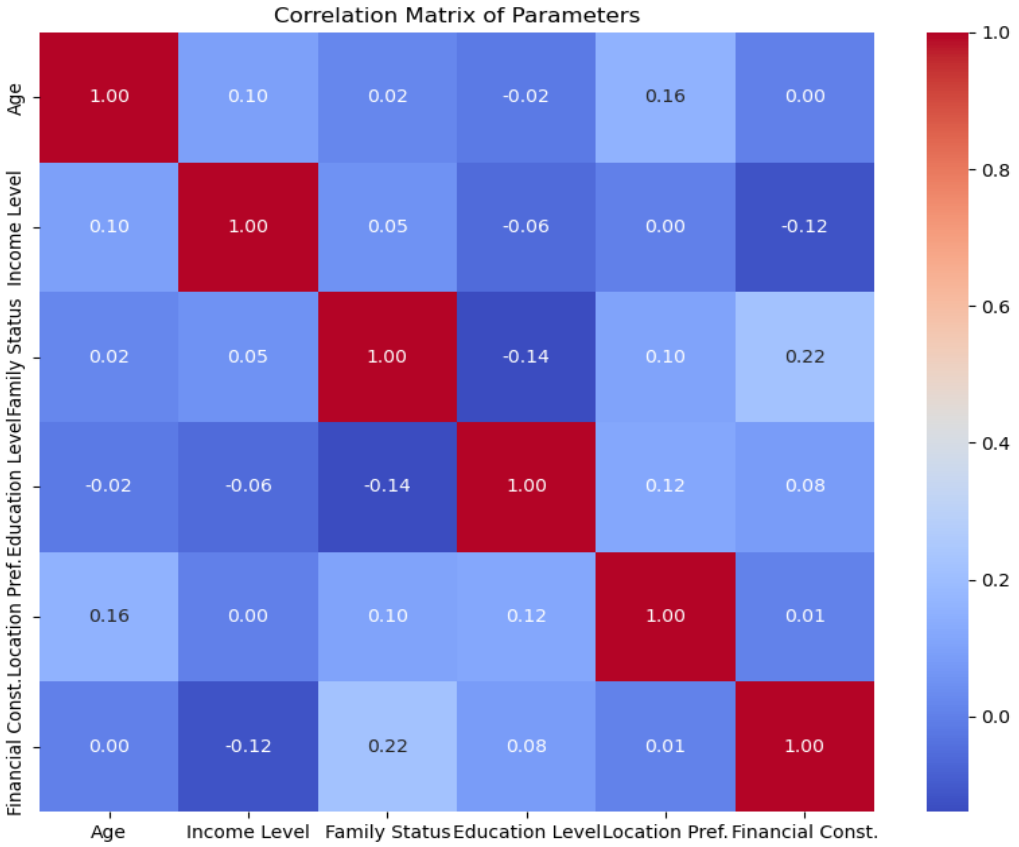
Location Preferences and Financial Constraints: There is a noticeable negative correlation between location preferences (urban vs. suburban) and financial constraints. This implies that those with higher

financial constraints are less likely to prefer urban locations, possibly due to higher living costs in urban areas.

Income Level and Financial Constraints: A strong negative correlation exists between income level and financial constraints. Higher income levels are associated with lower financial constraints, which is expected as increased income provides more financial flexibility.
Education Level and Income Level: There is a positive correlation between education level and income level, suggesting that higher educational attainment is associated with higher income levels. This aligns with the general trend that higher education often leads to better-paying job opportunities.

Family Status and Location Preferences: The correlation between family status and location preferences is minimal, indicating that being single or married does not significantly influence whether Gen Z individuals prefer urban or suburban locations

Figure 3.: Heat map.



Source: own research

Results

The agent-based model (ABM) simulation provided valuable insights into the residential location choices of Generation Z (Gen Z) in Iran. The model incorporated key parameters such as age, income level, family status, education level, location preferences, and financial constraints. The simulation results revealed several important trends and patterns.

Firstly, the majority of Gen Z agents exhibited a strong preference for urban locations. This preference is driven by better access to amenities, employment opportunities, and social networks in

urban areas. This finding aligns with the literature, where Yildiz (2024) noted the transformation of migration corridors and the increasing attractiveness of urban centers for young Iranians. Similarly, Varesi and Sedaghat Kish (2024) highlighted the significant role of urban amenities in shaping housing market dynamics in Abadeh.

Income level and financial constraints emerged as significant factors influencing residential choices. Higher income levels were associated with a greater likelihood of choosing urban locations, while higher financial constraints pushed agents towards more affordable suburban areas. This observation is consistent with the findings of Tajdin et al. (2016), who emphasized the impact of economic conditions on real estate investment decisions in Tehran Province. The correlation matrix further supports this, showing a strong negative correlation between income level and financial constraints, indicating that higher income levels reduce financial constraints and expand residential options.

Social interactions and peer influence played a crucial role in shaping residential preferences. Agents were more likely to choose locations where they had social connections, highlighting the importance of community and social networks in residential decision-making. This is in line with the work of Shirzadi Babakan and Alimohammadi (2016), who demonstrated the influence of social factors on residential location choices in Tehran. The correlation matrix also revealed a moderate positive correlation between age and income level, suggesting that as Gen Z individuals age, their income levels increase, further influencing their residential choices.

Education level and family status had a relatively lower impact on residential choices compared to income and financial constraints. However, higher education levels were positively correlated with higher income levels, indirectly influencing residential preferences. This finding resonates with the research by Khodabakhshian and Toosi (2021), who explored the relationship between education, income, and housing valuation in Iran.

The utility values calculated for each agent over time showed a general trend of increasing satisfaction with their residential choices, indicating that the model effectively captured the decision-making process and its outcomes. This aligns with the theoretical framework proposed by Alonso (1960) and further developed by Chang (2006), which emphasizes the role of utility maximization in residential location decisions.

Summary

This study employed an agent-based model to investigate the residential location choices of Generation Z in Iran, providing a nuanced understanding of the factors driving real estate purchasing behavior. The findings highlight the significant influence of economic factors, social interactions, and individual preferences on residential decisions.

The preference for urban locations among Gen Z is driven by the availability of amenities and job opportunities, underscoring the need for urban planners and policymakers to focus on enhancing urban infrastructure and services. The strong impact of income and financial constraints on residential choices suggests that economic policies aimed at increasing affordability and financial support for young homebuyers could be beneficial. This is particularly relevant in light of the findings by Yarmohammadian (2019), who identified economic cycles as critical determinants of housing demand and pricing in Isfahan.

Social networks and community ties play a vital role in residential decision-making, indicating that fostering strong community connections and social support systems can enhance residential satisfaction. While education and family status were less influential, their indirect effects through

income levels and social dynamics should not be overlooked. This is consistent with the broader literature on residential satisfaction and housing adequacy, as discussed by Ibem et al. (2015).

Overall, the agent-based model provided a sophisticated and detailed analysis of the residential location choices of Gen Z in Iran. The insights gained from this study can inform future market strategies and policies, ensuring that the real estate market evolves in response to the needs and preferences of this emerging demographic group. By understanding the complex interplay of factors influencing residential decisions, stakeholders can better address the challenges and opportunities in the evolving real estate landscape. The integration of findings from the literature review and the correlation matrix further enriches the analysis, providing a comprehensive understanding of the dynamics at play in the Iranian housing market.

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Perception of Fast Fashion among Generation Z in Hungary

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Abstract: The global growth of the fast fashion industry in recent years has significantly changed fashion consumption habits, especially among Generation Z. While the constant trend following and affordable prices are an advantage for young consumers, there is also a growing focus on the environmental and social impacts of the industry. This research aims to examine the fast fashion shopping habits of Generation Z and their responses to sustainability issues. A questionnaire survey will be used to explore the extent to which sustainability issues influence purchasing decisions. The results of the research will contribute to a better understanding of the Generation Z's commitment to sustainability and the future challenges of the fast fashion industry. The results show that Generation Z continues to prefer to buy fast fashion products, mainly due to their easy availability and wide choice. The research shows that sustainability in itself is not a key factor in Generation Z's purchasing decisions, but how brands address environmental issues in practice is important to them.

Keywords: fast fashion, generation Z, consumer behaviour, sustainability, sustainable fashion, greenwashing

Introduction

The fast fashion industry has revolutionised the fashion industry over the past decades, allowing the latest trends to reach the masses quickly and cost-effectively. This model has made fashion widely accessible, especially to younger generations, thanks to rapid production and distribution processes. However, alongside the industry's popularity, there have been growing concerns about sustainability. Fast fashion generates large amounts of waste and creates a significant environmental burden, which is counteracted by the rise in consumer awareness, especially among Generation Z (Simsa, 2020).

Born into the digital world, Generation Z has new shopping habits and expectations. While adapting quickly to changes in fashion and technology, they are also increasingly taking sustainability issues into account. This publication aims to show how the consumer behaviour of Generation Z is shaping the future of the fast fashion industry and how young consumers are responding to sustainability initiatives and greenwashing practices.

The research will use primary method data to explore Generation Z's purchasing habits, preferences and attitudes towards sustainability. The results of the questionnaire survey show that although fast fashion remains popular among young people, more and more of them are looking for environmentally friendly alternatives and are putting environmental responsibility at the forefront of their expectations of brands.

Literature review

a. Fast fashion

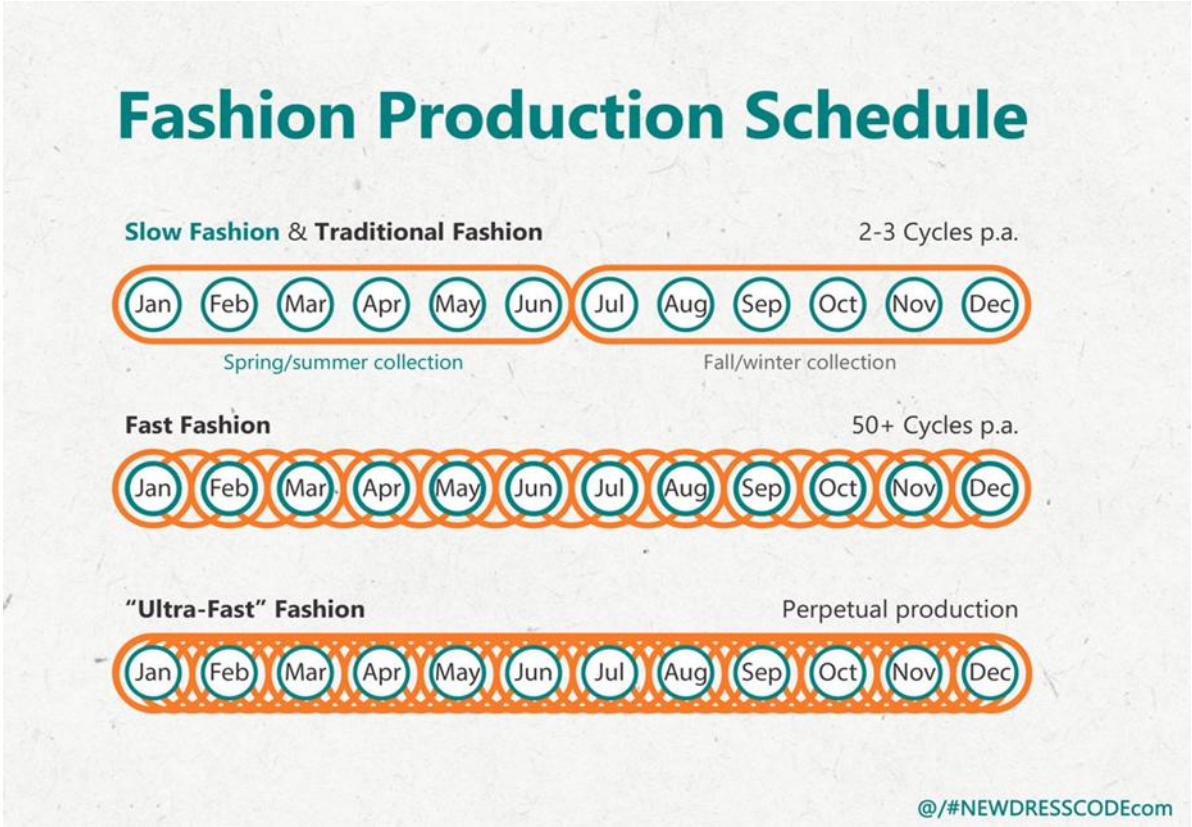
Fast fashion is a strategy used by retailers to quickly and efficiently express current and new trends in their in-store merchandise assortments. Fast fashion can also be applied to the latest fashion trends and refers to low-volume production that satisfies the needs of teenagers and young women (Choi et al., 2010).

According to Sull & Turconi's (2008) approach, fast fashion democratizes "couture" and makes trendy and affordable products available to the masses.

These definitions show that fast fashion not only represents a revolutionary change in the fashion industry but has also brought fundamental changes in consumer culture. Thanks to the rapid availability and affordability of fashion, fast fashion has become ubiquitous and stylish dressing has become not only a luxury item and a privilege of the rich, but an everyday reality for the masses.

Production times are shortening, while in the traditional fashion industry of the 1980s it took on average 65-70 weeks to sell products after design, companies with a fast fashion business model can offer newly popular products for sale in as little as 5 weeks. In contrast, ultra-fast fashion brands can create new collections and garments in a very short time, even within days (Simsa, 2020). The change in the production speed of the fashion industry is shown in Figure 1.

Figure 1.: Change in the production speed of the fashion industry



Source: Ladis, 2021

The fast fashion industry has become one of the largest employers in the world, employing 60-75 million people worldwide. Global apparel consumption is estimated to be around USD 1.8 billion, accounting for approximately 2.3% of global GDP. Global demand is expected to grow at 5% per year as China and other emerging markets expand (Raghuwanshi, 2020).

Fast fashion is a booming industry that is significantly influencing the fashion world and consumer behaviour. Inditex, H&M Group and LPP Group are some of the well-known names among fashion enthusiasts. In addition to their presence in the fashion industry, these companies have a significant influence on global trends and the purchasing decisions of young consumers.

b. Generation Z and their consumer behaviour

Generation Z was born in the Internet era and is therefore the main source of inspiration and socialisation. For them, fashion is not only about clothing choice, but also about creativity and personal expression. Current fashion trends are shaped by images, videos and fashion tips constantly shared online, a process often inextricably linked to fast fashion brands. That is why they actively use this potential of the internet in their activities. Fashion is now part of an interactive, ever-changing online community, which is actively shaped and influenced by Generation Z through their online presence (Merdzhanova, 2023; Garai-Fodor, et al., 2022; Garai-Fodor – Csiszárik-Kocsir, 2018).

Based on research by Tari (2011), the characteristics of Generation Z are basically divided into two groups: the first wave, born between 1995 and 2000, who have already experienced the beginning of increased internet and social media use, and the second wave, born between 2005 and 2010, who have grown up in a digital world.

Surveys show that Generation Z prefers instant consumption and experience. They are at home in the virtual world, so everything is easily and quickly available to them, and if they are not satisfied, they will click further. Consequently, they do not develop loyalty to a brand or product (Ruzsa, 2018).

They also have a strong sense of social responsibility and, thanks to the vast amount of information available, they are aware of the most important problems in our world, such as climate change and other environmental issues. Furthermore, Generation Z prefers and supports companies that share their values. They are more financially consciousness than the previous generations (Csiszárik-Kocsir et al, 2022; Csiszárik-Kocsir, 2023). They have no difficulty in stopping buying products from brands that do not share their views, especially if they disagree with the company's business, values or political orientation (Wang, 2021).

According to a study by Sheffield Hallam University, 17% of Generation Z participants shop weekly, 62% monthly and 11% annually at fast fashion stores, while only 10% said they never shop at such stores. However, the study found that less than half of respondents (43%) consider where and how the garment they are buying was made before making a purchase (Barker, 2022).

As Generation Z adapts quickly to new technologies, companies need to keep pace to effectively meet their needs. All these characteristics define the marketing and consumption habits of this generation in the modern world (Pál &Törőcsik, 2013).

Environment and sustainability

The fashion industry is currently the second most polluting industry in the world. The reason is relatively simple: clothing plays an important role in almost everyone's life. In addition to functionality, tailoring, colour, pattern, social trends and advertising have become important. The fashion industry is based on this constant change and demand, and its aim is to satisfy the existing needs of consumers as perfectly as possible, in addition to creating new needs (Vizi, 2022).

Around 80 billion new items of clothing are purchased worldwide every year. Statistics show that the average American produces 37 kilograms of textile waste per year. In the United States alone, nearly 14 million tonnes of textile waste were discarded in 2018 and only 2.5 million tonnes were recycled. Globally, 92 million tonnes of textile waste is generated annually, and this is expected to reach 134 million tonnes by the end of 2030 (Chen et al., 2021).

The situation is exacerbated by the fact that there is a lack of consensus within the industry on the meaning of sustainable fashion, and even among manufacturers committed to sustainability, there is no unified view on sustainability (Dobos & Éltető, 2022).

According to the literature, the concept of sustainable business practices refers to actions, initiatives and goals that aim to contribute to solving the environmental and social problems of the business while preserving economic profit (Edőcsény & Harangozó, 2021).

Several approaches address the relationship of the business sector with sustainability and sustainable development. Among them, corporate social responsibility (CSR) is the most common (Szennay, 2020).

CSR reports are published annually, typically on the websites of organisations. Here, companies publish their annual activities in terms of sustainability and other non-financial aspects. CSR typically consists of social, environmental and financial components. In fact, the supply chain of the fashion industry is extremely complex, with manufacturers sourcing raw materials from many parts of the world before the garment is finally made, so it is difficult to write a CSR report that covers the whole process, from the production of raw materials to the creation of retail outlets, from where the product reaches the consumer. As a result, companies often document only their own activities, ignoring suppliers. And therein lies the secret of greenwashing, because the actual pollution is not visible within the company's suppliers, but in the individuals who are contracted to do so, who have no connection to the company, only a contractual obligation. Greenwashing is when companies create the image that they are less polluting, even though their production methods are just as polluting as those of other organisations, but their communication suggests that they are more environmentally friendly (Vizi, 2022).

Another way of going green is the use of eco-labels in the fashion industry. Eco-labels and certifications help to gain the trust of customers and make them more willing to pay higher prices. This can signal higher quality and value, which in turn makes consumers more trusting of the brand, and therefore makes companies more willing to take the risk of greenwashing (Tesfay & Herrlin, 2023).

Research shows that financial difficulties are the biggest obstacle for companies in meeting their social commitments. The study also found that when companies implement sustainability and social responsibility practices in a coordinated way, the impact on sustainability indicators can be greater than when they are implemented individually (Choi & Li, 2015)

Some consumers, especially Generation Z, shop with sustainability in mind and are therefore willing to pay a premium and switch to more sustainable brands. However, only 7% of consumers say that sustainability is the main driver of their purchasing behaviour. Although consumers care about the environment, they often buy non-sustainable brands because they are more affordable. The gap between consumer concern for the environment and actual consumption is such that fast fashion continues to dominate the industry with its low prices (Tesfay & Herrlin, 2023).

The fast fashion industry therefore raises important issues not only in the world of fashion, but also in environmental and social responsibility. There is a growing demand for transparency and real sustainability efforts among consumers, especially members of Generation Z, who see environmental initiatives as a key aspect of their purchasing decisions.

Methodology

In primary research, information is collected from a specific segment about their opinions, intentions or behaviour and motivations. Thus, in survey research, we target those who have relevant information and are interested in the topic being researched (Lehota, 2001).

The aim of the research was to investigate the fast fashion shopping habits and attitudes towards sustainability of Generation Z. For this purpose, a questionnaire method was used, which provided an opportunity to collect quantitative data.

The questionnaire is structured around three main themes, covering shopping habits, brand choice and brand preference, and attitudes towards sustainability.

In terms of question types, a wide range of multiple-choice, multiple-choice and scaled question types were used.

A major advantage of closed questions is that the answers can be processed quickly and easily, and the results obtained are easier to generalise and provide a quick response. The multiple-choice question format, on the other hand, allows respondents to mark more than one response option at a time (Lehota, 2001).

The questionnaire included questions aimed at understanding satisfaction with fast fashion brands and brand image.

These characteristics are measured using scales, and consumers express their opinions based on their individual scale scores. For this type of questions, we used a Likert scale ranging from 1 to 5, where 1 means that the respondent is completely dissatisfied and 5 means that the respondent is completely satisfied (Gyulavári et al., 2017).

In addition, demographic questions were included at the beginning of the questionnaire, which allowed for the analysis of respondents' age, gender and type of residence.

The survey was conducted on a non-random (convenience sampling) sample of 100 respondents who are members of Generation Z (born between 1995 and 2010).

Non-random sampling is based on the personal judgement of the researcher, rather than random selection of sample items. Researchers may decide which items to include in the sample based on their own judgment or on certain beliefs. Non-random samples can provide good estimates of population characteristics. However, they do not allow for objective assessment of the accuracy of sample results (Naresh and Simon, 2017).

The questionnaire was shared on social media platforms, which provided the opportunity to reach a wider audience within Generation Z. In selecting the sample, efforts were made to ensure demographic diversity, including both urban and rural residents, as well as men and women, to gain a more comprehensive understanding of their shopping habits.

Descriptive statistical methods were employed to analyse the data collected. We examined frequency, mean, standard deviation, median, and mode values of the responses to each question.

The responses were also compared with demographic data to explore how factors such as age, gender, and place of residence influence shopping habits.

The results indicate that most respondents fall within the 22-25 age group (60%), while 19% are aged 18-21, and 21% are aged 26-29. This reveals that most respondents in the survey are young adults who are just beginning their independent lives.

In terms of gender ratio, most respondents are women (73%), compared to 27% men. This predominance of women may be attributed to several factors.

The results show that half of the respondents live in the capital, and 17% are from cities with county status, which is a relatively high proportion compared to other towns and municipalities.

Regarding age distribution, as mentioned earlier, the majority are between 22 and 25 years old. The responses regarding educational attainment indicated that most people in this age group have at least a high school diploma or higher education. The number of respondents with only 8 years of general education or vocational qualifications was small. Since consumers in this industry frequently buy in large quantities, we concluded that a certain level of education and financial standing is crucial, which we examined in the subsequent question.

A significant portion of respondents are full-time university students, suggesting that they are mostly still studying and have limited independent earnings. There is also a significant proportion of full-time employees. A quarter of respondents (26%) have a monthly income below HUF 100 000. It is also noteworthy that a large portion of respondents (26%) earn more than HUF 400 000 per month, indicating full-time employment. This income disparity may play an important role in analysing attitudes and spending habits towards fast fashion brands, as income level can influence consumer preferences and spending behaviour.

Results

Shopping habits of Generation Z

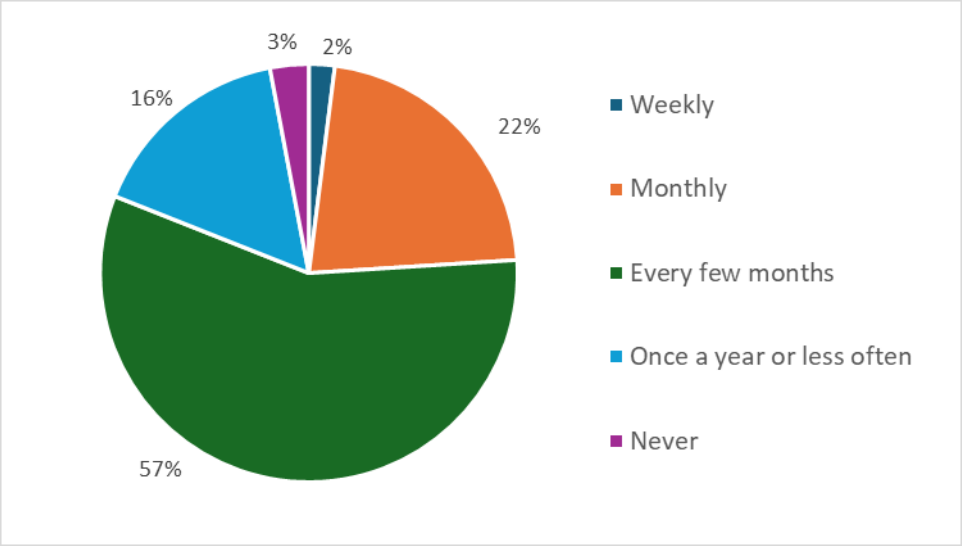
In the first phase of the research, we examined the fast fashion shopping habits of Generation Z, which included the motivation behind purchases, their frequency, average spending, and the method of shopping. Based on the question regarding motivation, most respondents indicated necessity (86%) and improving emotional well-being (58%) as their primary reasons for shopping. This was followed by impulse buying (34%) and fashion and trend following (31%).

The research showed that the average monthly spending on fast fashion items was around HUF 10 001-20 000, indicating that respondents are willing to spend significant amounts on fashion.

When comparing the way they shop, most respondents prefer to shop in several ways when buying clothes, online and in-store. This shows that the consumers surveyed are open to both online and offline shopping.

Figure 2 illustrates the shopping frequency of respondents, showing how often young people buy fast fashion products.

Figure 2.: Distribution of shopping frequency, % (n=100)



Source: Own research

Looking at the results, 57% of respondents indicated that they buy fast fashion products at least once every few months, while a proportion (22%) buy fast fashion products on a monthly basis.

Brand choice and brand preferences

In the questionnaire, we paid special attention to Generation Z's preferences and their views on fast fashion brands. The questions aimed at uncovering brand preferences sought to determine which brands are most popular among younger consumers and what factors influence their choices.

According to the survey results, the most popular fast fashion brand is H&M, with 41% of respondents choosing it as their top choice. Following closely behind, approximately 34% of respondents preferred Zara.

The next set of questions we examined focused on identifying the key factors influencing respondents' purchasing decisions and how satisfied they are with their favourite fast fashion brands. Factors influencing purchase were examined on a Likert scale of 1 to 5, where 1 – not at all important, 5 – completely important. The key statistics for the influencing factors are presented in Table 1.

Table 1.: Perception of factors influencing purchase (n=100)

Examined factors	Average	St. deviation	Median	Mode
Quality	4.27	0.76	4	5
Price	4.26	0.82	4	5
Previous experience	4.26	0.84	4	5
Brand	2.94	1.12	3	3
Refer friends/acquaintances	2.93	1.16	3	3
Current fashion	2.88	1.12	3	3
Eco-friendly product	2.67	0.98	3	3
Recommending influencers	1.90	1.07	1,5	1

Source: Own research

Quality was rated the highest in terms of importance (4.27), indicating that it is a key factor when selecting fast fashion brands. Most respondents emphasized that quality plays a decisive role in their purchasing decisions.

Price proved to be a crucial factor when selecting a fast fashion brand (4.26). The vast majority of respondents considered price very important, rating it highly on the given scale. This suggests that price strongly influences their brand choice decisions.

Personal experience was a factor with equal importance to price (4.26), which was still mentioned by respondents with an average score of over 4. The other influencing factors were significantly less important and did not reach a three-point average.

In contrast, brand loyalty appeared to be less significant (2.94) compared to the previously discussed factors. This implies that brand loyalty is not prevalent among these respondents, and other factors such as price and quality play a larger role in their purchasing decisions.

Based on the criteria we examined, it turns out that recommendations from friends/acquaintances were not a particularly important factor (2.93).

Current fashion is not prominent (2.88) but a factor for Generation Z and influences their decisions.

There were varied responses regarding the interest in eco-friendly products (2.67), which may indicate that Generation Z does not have a unified stance on the importance of sustainable fashion and environmental protection. This is further supported by the responses to subsequent questions.

According to the responses, influencers have the least influence on the buying decisions of Generation Z (1.90).

To assess satisfaction, we analysed several key factors related to fast fashion brands, including price, quality, assortment, availability, brand reputation, and sustainability (Table 2). Satisfaction with brands was examined on a Likert scale of 1 to 5, with 1 being not at all satisfied and 5 being fully satisfied.

Table 2.: Perception of satisfaction with the brand (n=100)

Examined factors	Average	St. deviation	Median	Mode
Availability	4.06	0.95	4	4
Assortment	3.92	0.87	4	4
Price	3.53	0.91	4	4
Brand reputation	3.47	0.82	3	3
Quality	3.14	0.74	3	3
Sustainability	2.63	0.95	3	3

Source: Own research

When examining satisfaction, availability (4.06) and assortment (3.92) emerged as the most decisive factors. Fast fashion brands are easily available, with many shops in major cities offering their products and a wide range of products available online. This could be explained by the fact that this generation values the ability to make immediate purchases and the range of options available.

Regarding price, we found that most respondents expressed moderate to high satisfaction (3.53), while for quality, the satisfaction level was only moderate (3.14). These results present a contradiction with the previous question. While price and quality were identified as crucial factors in decision-making, respondents are not entirely satisfied with these aspects. This suggests that, for Generation Z, price and quality are not the primary drivers of satisfaction; rather, assortment and availability play a more significant role.

Regarding satisfaction with brand reputation, one might expect brand loyalty to appear, but an earlier question contradicts this notion. Finally, sustainability had the lowest satisfaction scores (2.63), with most responses indicating moderate or low satisfaction levels. This implies that fast fashion brands still have progress to make in this area.

Attitudes towards sustainability

In the final section of the questionnaire, we focused on the topics of environmental protection and sustainability. Based on the responses, it can be concluded that for Generation Z, environmental considerations are of moderate or lesser importance when purchasing clothing.

Table 3 shows how Generation Z views environmental issues and the sustainability efforts of fast fashion brands, based on the responses to the questionnaire.

Table 3.: Environmental Awareness and Perception of Fast Fashion Sustainability Practices (n=100)

Examined questions	Average	St. deviation	Median	Mode
How important is it for you that fast fashion brands support social or environmental initiatives?	3.55	1.02	4	3
To what extent do you take environmental considerations into account when shopping?	2.51	0.88	3	3
How do you assess the environmental practices of current fast fashion brands?	1.83	1.12	2	2

Source: Own research

In response to the question "How important is it to you that fast fashion brands support social or environmental initiatives?", the average was 3.55. This shows that most respondents think it is important for brands to address sustainability, with many giving a score of 4 for this question.

The question, which asked to what extent they take environmental issues into account when making purchases, had an average score of 2.51, indicating that it is less of an important factor for respondents when making purchases. The majority held a neutral position based on median and mode scores.

"How do you assess the environmental practices of current fast fashion brands?" This question has the lowest average score of 1.83, suggesting that most respondents are dissatisfied with current sustainability efforts. The median and mode are both 2, confirming that most young people consider that fast fashion brands are not currently placing enough emphasis on the importance of environmental protection. Although it is evident from the previous question that it is important for this generation that companies support sustainability initiatives, the response below shows that their perceptions of the industry's sustainability practices show a lack of satisfaction.

Overall, the data in the table suggests that although sustainability is important to Generation Z, it is not necessarily the most important priority when shopping. Furthermore, many people believe that the environmental practices of fast fashion brands are not sufficient and expect improvements in this area.

Conclusion

The consumption behaviour and attitudes of Generation Z fundamentally shape their preferences and purchasing habits regarding fast fashion brands. Based on the data obtained from the study, it can be concluded that price and quality continue to be decisive factors in purchasing decisions, while brand reputation has a lesser influence on choice. At the same time, keeping up with current fashion trends is an important factor, although it is not necessarily the primary motivation for clothing purchases.

Although environmental protection may not be the primary consideration in their clothing purchases, there is a growing interest in sustainability among this generation, and respondents believe it is important for brands to support environmental initiatives.

This trend encourages fast fashion brands to adopt new approaches in developing sustainable products and manufacturing processes. Finding a balance between sustainability and commercial success will be crucial for the future. In the long term, brands that meet sustainability expectations are likely to achieve a better position in the market.

Overall, it can be said that Generation Z rates the current state of the fast fashion industry at a moderate level based on the results obtained. One reason for this is that price and quality are the most important criteria in choosing fast fashion brands, although when examining satisfaction, these factors were less decisive.

Brand loyalty and influencer activities are less dominant in their decision-making. While the importance of sustainability showed moderate to low levels during purchases, there is nonetheless a clear interest and expectation from this generation for social and environmental initiatives, with expectations that fashion companies will do more and act more transparently for the benefit of the environment.

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Dealing with mobbing at the workplace

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Abstract: Harassment at work has many negative consequences for individuals, companies and even society. In many developed countries, specific laws have been formulated to eliminate this type of problem, but in Hungary it is still an almost unknown phenomenon. The main subject of my research is a more intense and almost dangerous form of bullying, namely psycho-terror at work. The essay describes the differences between Hungary and other foreign countries in the studied topic, the meaning of mobbing, its causes and negative effects from several perspectives. In the final section, conclusions are drawn that employers in Hungary should pay more attention to the emotional behaviour and protection of employees. If changes are not made to combat workplace psycho-terrorism, it could grow into an even more serious social problem. Indeed, the ultimate response to untreated mobbing is to leave the workplace.

Keywords: psycho-terrorism, mobbing, workplace

1. Introduction

"Imagine a world where the words you say are written on your skin. Would you pay more attention to what you say?" - my own thought.

Nowadays, the phenomenon of workplace conflict is becoming increasingly visible in companies, but measures to prevent and manage it are still quite rudimentary. Although mobbing, i.e. protection against psychological terror in the workplace, is already included in the employment protection legislation of many European countries, there is still a high level of tolerance in Hungary, as is the case with domestic violence. I first encountered the subject of workplace bullying in the context of a course when I was confronted with the fact that a person very close to me had also been a victim of mobbing. These days, more of us have experienced bullying and teasing in the workplace, but this is not considered to be psycho-terrorism at work. Mobbing is a longer process, one of the main characteristics of which is that the person being bullied is subjected to some form of abuse, from colleagues or senior management, for at least six months, at least once a week. It is usually motivated by fear, because the leader of the psychoterror is afraid of the victim's chances of better performance, so he tries to reduce his performance, which isolates the victims from their colleagues, and eventually causes them to leave the team, i.e. to quit. Workplace bullying can occur in companies where the manager is disinterested in this type of behaviour and either ignores it or refuses to intervene.

It is now clear that workplace bullying is harmful to the individual, to the company and to society. An abused employee may experience constant anxiety, fear of further abusive behaviour, depression, and a range of negative health consequences, such as the risk of illness. From a business perspective, it is also known as the "dark side of HR", as it is one of the most demoralising tools in human resource management. This is evidenced by the fact that redundancies are not always transparent, and often the purpose is revealed in the form of covert mobbing.

The main aim of my research is to investigate the reasons, and the negative economic and psychological effects of workplace psychoterrorism, to assess the awareness of today's Hungarian employees of the concept and meaning of mobbing, and to find out what measures can be taken to prevent it. During my research, I did an online survey in order to get a more accurate overview of the respondents' experiences of mobbing.

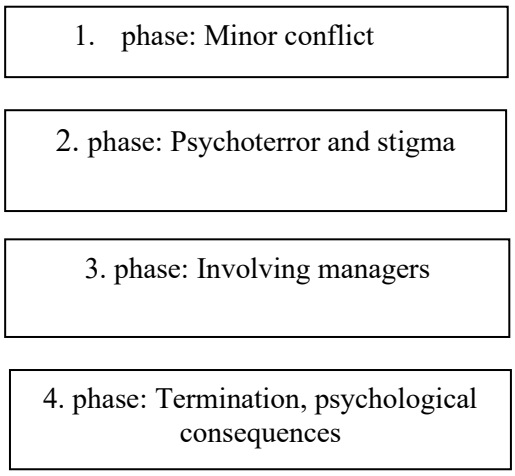
2. The meaning aud characteristics of mobbing

All workers have the right to be protected from harassment in the workplace, but employers must ensure that they have the necessary environment to do that. Unfortunately, not all employees can enjoy a calm and safe environment, as harassment is becoming more and more common in this area. To

start with, I would like to explain the concept and the main characteristics of the phenomenon of mobbing in order to give a better perspective. Mobbing comes from the Latin word "mobile vulgus", which means "moving crowd". It was formerly a term used in the animal world to describe the group aggressive behaviour of animals, as described by Konrad Lorenz in his scientific book published in 1968. Subsequently, the Swedish psychologist, called Heinz Leymann was one of the first to address the issue, pioneering the subject in his 1986 book named 'Mobbing: psycho-terror at work'. There is no standard definition for mobbing, but one of the best known is Leymann's formulation: 'Mobbing is a negative (unethical, hostile) act of communication in the workplace, systematically manifested by one or more persons towards an individual.' (Leymann, 1989) In addition, the terms bullying and harassment are also known to describe similar behaviours.

Although conflicts within company work teams are very common, they do not always lead to mobbing. Therefore, the boundary between such disagreements and workplace psycho-terror is difficult to define. As I mentioned in the Introduction, mobbing is a prolonged process whereby the victim is subjected to some form of abuse or harassment at least once a week (but in most cases more typically almost every day) for at least six months. In my opinion, this is one of its most important characteristics, as the problem of repetition makes it easier to distinguish from other forms of behaviour which are also unacceptable. One of its main characteristics is that it can be mutual, so the roles of abuser and victim can often be reversed, depending on the situation. It can occur not only between two employees, but also between a employee and a manager, but sometimes the worker can put his or her superior in a similar situation. It can be observed not only between certain groups of employees, but also at an organisational level, and can become part of the organisational culture of a company. The simplest form of this is when someone is actually in a superior-subordinate relationship (i.e. it is established between supervisor and subordinate), but it can also occur when the employee has some competences that the employer does not have, so that he or she may feel vulnerable towards the subordinate (Bányai et al, 2016).

Figure 1.: Phases of mobbing



Source: own ed. based on Leymann (1996)

3. Mobbing strategies

In the second stage, harassment incidents are one of the biggest problems for the victim. According to Leymann (1996), the types defined by mobbing behaviour are as follows:

Attack, against:

o communication (interrupting, shouting)
o personal contact (isolation)
o reputation (gossiping)

o work, professional quality and life situation (meaningless tasks, few tasks, too many tasks)
o a person's health (tasks involving physical hazards)

Although, it is true that minor conflicts do not always escalate into workplace bullying. Almost everyone has been subjected to some form of criticism or disagreement with colleagues or bosses, but this does not always lead to workplace psycho-terrorism if it is handled properly by senior management. Conflict is an essential factor in a work environment, as it occurs everywhere, but it is also an important part of organisational culture (Baranyi, 2016).

It is important to note that negligence by management plays a major role in this problem. If the employer does not intervene in time and find the right way to deal with the conflict, it can have serious consequences and the situation can become volatile. Inappropriate communication can lead to a lack of trust on the part of the manager, which can have negative consequences later on. Although there is no specific trait that can make a person a victim of psycho-terrorism in the workplace, I think it is important to mention the importance of the personality type of the victim. Stronger, more assertive people may be able to suppress bullying on their own, whereas those with weaker personality traits are more likely to be subjected to bullying (Zaph-Gross, 2001). Women, both younger and older, are particularly vulnerable to bullying. It is more common in companies where hierarchy plays a prominent role.

According to Leymann (1993), one of the best known researchers of the topic, the reasons and sources of harassment should not be found in the victim's personality, but in the environmental factors, which may include:

o lack of work planning and organisation
o deficiencies in management behaviour
o the victim's social situation (which increases the possibility of victimisation)
o low workplace morale

The participants of mobbing

Clearly, the victim is not responsible for this situation. The perpetrators of mobbing are called "mobbers", who can be of either gender, but in the majority of cases they are middle-aged men who have been in the organisation for a longer period of time or are in a managerial position. Only in rare situations (around 2%) does a subordinate mobbing his/her manager occur, but it is not excluded. The main features of a bully may include narcissism, jealousy or an excessive competitive drive. (www.jogkoveto.hu, downloaded 10.03.2023) One of the main forms of workplace psycho-terror is bullying in groups, called 'gangs'. The gang leader encourages the members to engage in destructive activities which give him or her satisfaction, and this is one of the traits of a psychopathic person. There are 2 types of gang leaders, extrovert and introvert. The introvert is more dangerous, because he manipulates members emotionally from the background, while the extrovert openly persuades his followers to follow her/him. As a result, the identity of the gang leader is usually hidden, because his tactical moves create a positive image of himself, which makes people disbelieve that he is capable of such a thing.

The person who is bullied is called the "target". The features of a target may include perseverance, determination, empathy, diligence and quickness. They may be harassed because of these characteristics, or their skills and competence, even because of a positive attitude. (www.informed.hu, downloaded 10.04.2023)

4. Effects of mobbing on the individual

In what I have described so far, I have broadly outlined the perceived negative effects of workplace psycho-terrorism in general, but the main problem is the psychological damage to the victim. Mobbing is a highly psychologically damaging phenomenon for the individual, and its extent is increasing all over the world. The victim of mobbing is left in a vulnerable position, entering the workplace every morning with a stomach ache, feeling anxious, losing motivation and not being able to perform their duties properly. They may also turn to alcohol to keep their peace of mind. Psychological

abuse can also often cause personality problems, including PTSD and MDD. "Post-traumatic stress disorder (PTSD) is a disorder that develops in some people who have experienced a shocking, frightening or dangerous event." (www.nimh.nih.gov, retrieved 23/03/2023) Most traumatized people experience short-term symptoms, but for some individuals the condition can become chronic. Common features include frightening thoughts, angry outbursts, sleep disturbances, but often bad dreams can also bother the patient. People with PTSD often engage in self-harm because they blame themselves for what happened to them. According to the International Classification of Diseases, PTSD can also lead to permanent personality changes. (Pálvölgyi, 2023)

Table 1.: Emissions from automotive end-product manufacturers

Appearance	Symptoms
1. Uncertain thoughts	- - memory problems - - depression, aggression
2. Psychosomatic reactions	- - diarrhoea, vomiting, abdominal pain - - loss of appetite
3. Stress hormones	- - sweating - - palpitations
4. Stressful condition	- - muscle aches - - tremor
5. Sleeping disorders	- - early wake-up - - interrupted sleep

Source: http://midra.uni-miskolc.hu/document/16955/9881.pdf, downloaded 25.07.2023.

In addition to the health effects, there can also be significant financial costs of workplace psychological terror for the individual. As the victim does not feel well, he or she may go on long-term sick leave. Then, they may can be fired, losing their monthly income, and if they are taken to court, it costs a lot of money to handle the case.

Besides the health effects, there can also be significant financial costs of workplace psychoterror for the individual. Since the victim does not feel well, he or she may go on a long-term illness break. Subsequently, the sufferer may be fired and lose his/her monthly income, moreover if the case is taken to court, it is expensive to handle the proccess.

5. Effects of mobbing on organisation and society

Until now, we have looked at mobbing from the perspective of the individual, but I think it is important to look at its negative effects on the organisation. Since employees who have experienced the longtime bullying, often have health problems, the company must take the cost of sick leave into calculation. In addition, compensation must be paid to victims of workplace harassment, and the cost of staff turnover can also be a serious problem. In my opinion, it is also essential to mention the loss of efficiency of the company or the damage to the reputation of the organisation. (Szarek-Ewelina, 2022) The deterioration of the workplace atmosphere leads to the destruction of the functioning of the flow of information, which in turn leads to a decrease in the proper performance and productivity of the organisation.

Table 2.: Costs and consequences of mobbing, from a business perspective

Costs	**Features and consequences**
The victim's decreased work performance	- - absences due to illness - - reduced work performance - - complaints
High fluctuation rate	- - training new entrants
Reduced workload	- - reduced tolerance (towards others)
Poor working environment	- loss of external image of the company - - loss of trust

source: http://midra.uni-miskolc.hu/document/16955/9881.pdf, downloaded 02.04.2023.

Workplace mobbing is also a serious problem for society. In 2004, mobbing generated €20 million in damages in the European Union and one in ten people were exposed to workplace harassment. In the UK, researchers have estimated 18 million lost working days per year (Barkóczi, 2011).

6. How to measure mobbing?

The measurement of psycho-terror at work is not yet widespread among companies in Hungary, because it requires a well-used measurement tool (Einarsen et al, 2010). For this purpose, 3 forms of questionnaires have been developed:

- Self-report questionnaires
- Behavioural experience questionnaires
- Combined questionnaires

Self-report questionnaires are also known as self-assessment questionnaires. In this type, respondents self-assess whether they have been bullied. In the case of the behavioural experience focus, respondents are given so-called behavioural inventories, which ask them to rate how often they have experienced the behaviours in the past six months. In the combined version, the behavioural inventory is also present, but additionally, the extent of the abuse the subject has experienced is also asked.

Among the best known instruments are the LIPT (Leymann Inventory of Psychological Terrorization) questionnaire and the NAQ (Negative Acts Questionnaire), which is a behavioural inventory and is used to measure exposure to abuse (Einarsen-Raknes-Matthiesen, 1994b).

7. The phenomenon of mobbing at national and foreign level

Mobbing in Hungary

In several European countries, the issue of harassment and mobbing at work started to be discussed in the early 2000s, but in Hungary the research on the issue started only a few years ago. The first data on psycho-terrorism in the workplace dates back to 1996, when Kaucsek and Simon's research showed that 8% of the total population was affected by the phenomenon.

The definition of harassment is contained in Act CXXV of the Fundamental Law of 2003, which states that "harassment is defined as conduct of a sexual, sexual or other nature that is offensive to human dignity, is related to a protected characteristic of the person concerned and has the purpose or effect of creating an intimidating, hostile, humiliating, degrading or offensive environment towards a person." (§ 10 (1)) The existence of a protected characteristic must be established, but if this is not possible or does not exist, no infringement can be declared. Unfortunately, the various cases of psycho-terrorism in the workplace are broader than this, as they can affect any employee. Although there is no specific regulation on mobbing in Hungary, the "stress law" came into force in January 2008, making mobbing

very difficult to control. Currently, stress cannot be included in the measurable categories, and in order to be fined for work-related offences, there must be tangible evidence that the physical safety, life or health of the worker is at danger. The fines can range from HUF 30 000 to HUF 20 million. The situation is made worse by the fact that most harassment cases do not go to court, because victims are afraid to come forward and litigate. In many cases, they do not know their rights and are afraid to stand up for themselves (Barkóczi, 2011).

Mobbing in an international context

To avoid mobbing, various regulations have been put in place in more developed countries. The Commission of the European Union has also recognised the seriousness of the problem and condemns harassment and the vulnerability of workers in the workplace, while promoting equal treatment and a working culture based on mutual respect. To achieve this, EU legislation on workplace harassment has begun to be developed, starting with the Charter of Fundamental Rights of the European Union, which states in Article 1 that "Human dignity is inviolable. It must be respected and protected", and Article 31 states that "Every worker has the right to working conditions which respect his or her health, safety and dignity". In addition to the Commission of the European Union, the Employment and Social Committee calls on Member States to recognise the existence of psycho-terrorism in the workplace and to seek to prevent and tackle it. Directive 2000/43/EC (Race Equality Directive) was established to establish equal treatment in employment and occupation. (Garami, 2023) It is important to mention the 2020 Framework Agreement between the social partners at EU level, which aims to raise awareness of workplace violence among employers and employees and to create an action-oriented framework to eliminate these problems (European Commission 2020).

In addition to European views, I would like to highlight the legislation on workplace bullying in the United States. Among these laws, I would like to mention the most important ones in relation to the issue under consideration:

- Title VII of the 1964 Act deals with the rights of citizens (Civil Rights Act),
- The Age Discrimination in Employment Act of 1967 (ADEA),
- The ADA (Americans with Disabilities Act) of 1990.

Research

Research plan

In my opinion, the "key" to identifying the causes and effects of mobbing we need a well-designed research plan. For this research, I used a quantitative method, including a standardised questionnaire, to gain a better understanding of the topic. I prepared an online questionnaire, the main aim was to get a general overview of mobbing in Hungary and to find out how aware people are of the fact that constant criticism or torment is psychological harassment.

Online questionnaire research

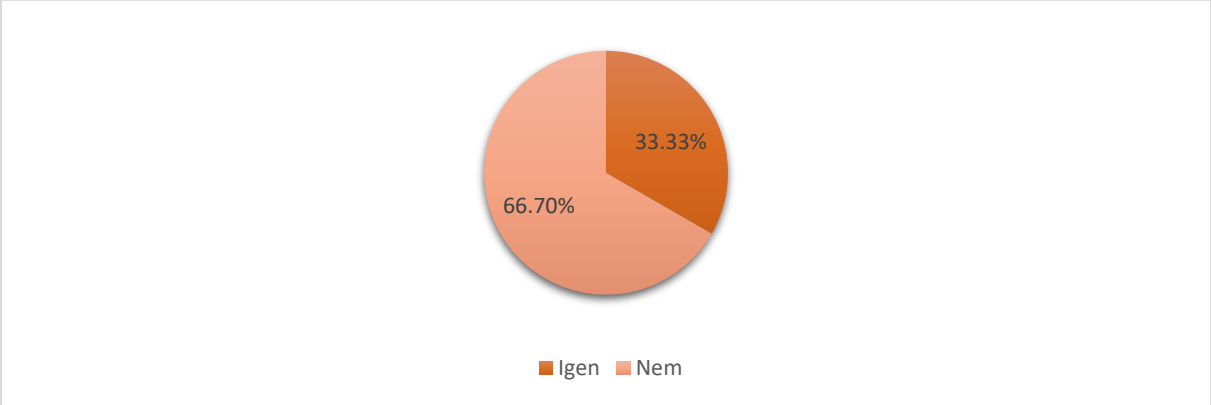
To further explore the topic, I conducted an online questionnaire survey. The internet platform was an advantage as I was able to gather the information I needed quickly and easily. When completing the survey, the respondents were also given the opportunity to take a mobbing test, which helped them to find out whether they were concerned by the topic. The main aim of my questionnaire research was to get a more accurate picture of the differences in the opinions of specific age groups in Hungary regarding the phenomenon of mobbing. In order to do this, I asked several age groups about the issue of psycho-terror at work. I also used my questionnaire to find out what extent the respondents were familiar with the concept of mobbing, whether they had been bullied in the past or at their current workplace, or they had any friends or acquaintances who had been bullied.

Sample details:

- 102 respondents: 60.8% female, 39.2% male
- 48% 18-25 years old
- 15.7% aged 26-35 years
- 17.6% aged 36-45
- 18.6% over 46
- 55% resident in the capital

In the first part of my questionnaire, I asked whether respondents had ever heard the term mobbing. The results were shocking, as only 33% of all respondents had heard of it. I also thought it worthwhile to look at this by age group, and found that 35% of the youngest age group, i.e. 18-25 year olds, 25% of 26-35 year olds, 39% of 36-45 year olds and finally 32% of 45+ year olds had heard the phrase mobbing.

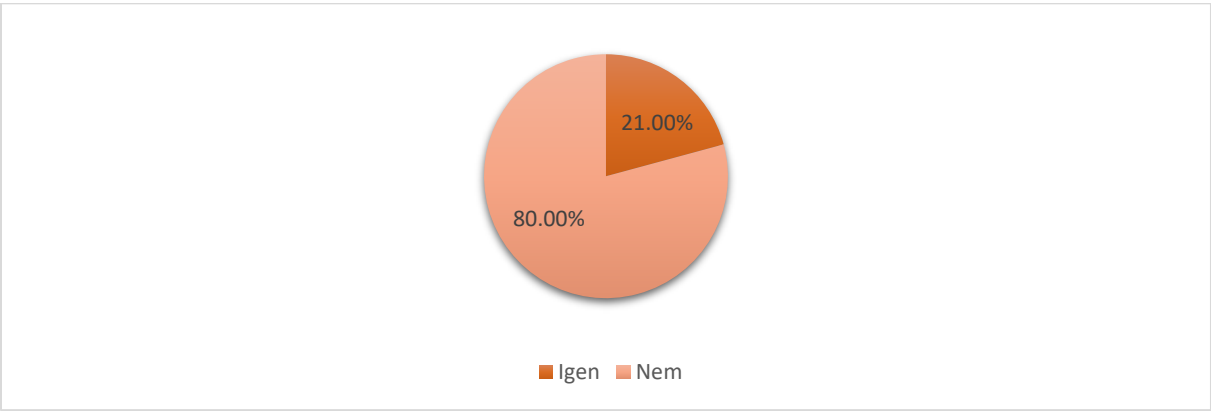
Figure 2.: Feedback from all respondents on whether they have heard of mobbing



Source: own editing, 2024

My second question was to find out how many of the respondents have been victims of harassment at work. From the responses received, it is clear that although many had never heard of mobbing as a term, a proportion of respondents had experienced this type of abuse. The survey found that 21% of respondents across all age groups had experienced harassment at work. And by age group, 27% of the youngest age group, 20% of 26-35 year olds, 21% of 36-45 year olds and 32% of the oldest age group have experienced this phenomenon.

Figure 3.: Rate of respondents who have experienced mobbing



Source: own editing, 2024

In the next question, I asked people who had experienced workplace psychotherror to describe their personal experiences of it. I was curious to know what happened to them, who was the abuser, how

the situation was resolved, etc. I read some extremely interesting stories, a few of them are presented in the following chart:

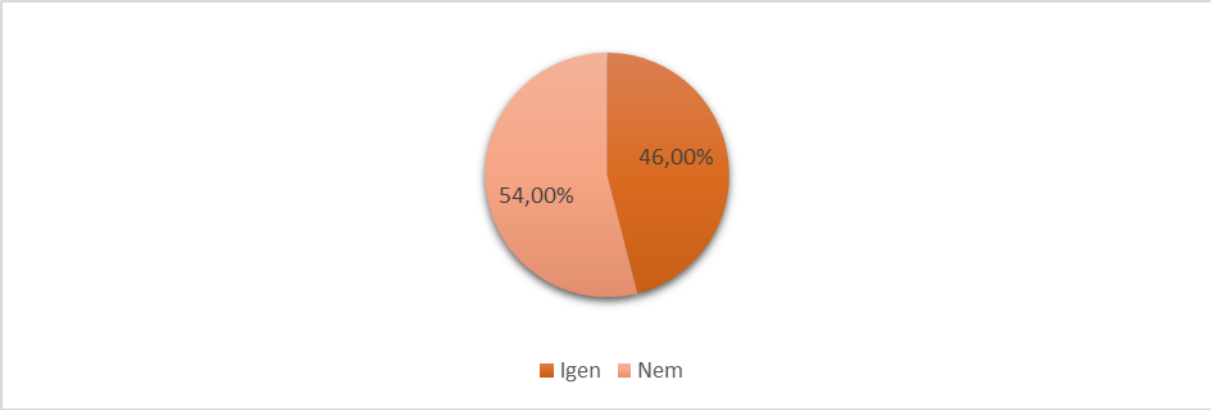
Table 3.: Respondents' mobbing stories and solutions

Problem	**Solution**
"At my first job, I started at a disadvantage because I was a few years younger than everyone else. My mentor constantly overstepped a bound (grabbing my thighs) and I often listened to criticisms about me as a person and not my work (e.g. "these are the young people of today")."	"I've managed to get another job, so I can put these terrible experiences behind me."
"The security guard touched me regularly, not only me but also my colleagues."	"We try not to meet him."
"I received a sexual offer in exchange for a pay rise."	"I quit immediately."
"My left ankle was inflamed and I opted for the 40-day treatment instead of surgery, so when I went back I was discharged straight away."	"I was immediately dismissed."
"I'm a student worker and my senior colleagues don't want to train me (because they don't have the capacity)."	"My supervisor sees this, but he doesn't have time to deal with me either, so it's all just hanging in the air. I haven't been able to find a new job yet."

Source: own editing, 2024

The next question asked whether any of the respondents' friends or acquaintances had ever been bullied at work, and the response rate was surprising, as almost half of the respondents (46%) to be accurate had someone they knew who had been bullied.

Figure 4.: Respondents' rate who know someone who experienced bullying



own editing, 2024

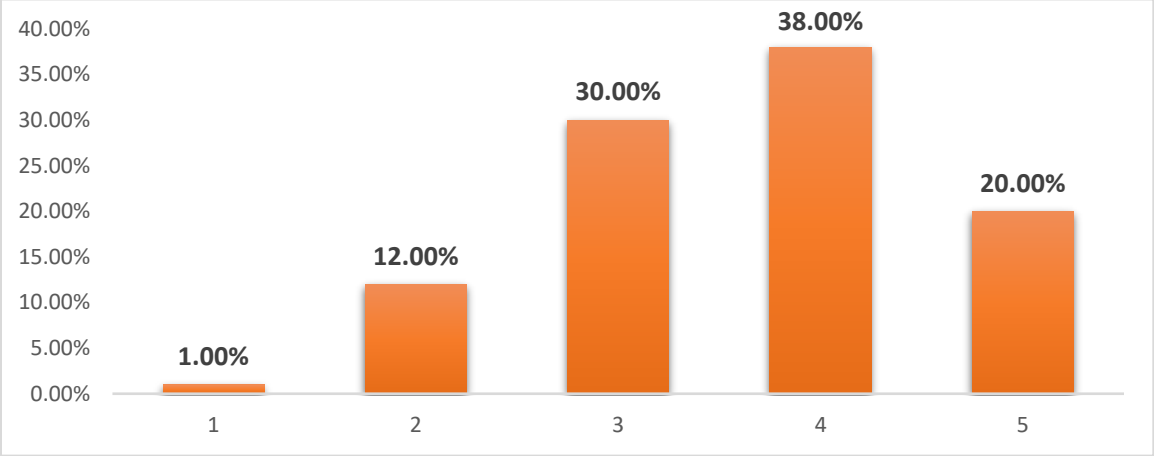
After that, I also asked respondents to describe any advice or suggestions they could give to solve the problem. Some of the answers to the question were the following:

- "Get out of the situation."
- "Be sure to ask for help and don't stay quiet."
- "I suggest you talk to your supervisor and find a solution together."
- "Leave that workplace immediately."

- "I think the best solution is to get the person out of that environment and change job."
- " Ask for help from an expert."

In the second part of the questionnaire, a mobbing test was completed. If the respondent considered most of the statements true for themselfs, they were most likely to be exposed to psychological harassment at work. We were interested in how employees perceived their relationship with their superiors. Respondents were asked to rate their relationship with their manager on a scale of 1 to 5, with the result that the majority, 38%, rated their relationship with their manager as good.

Figure 5.: Completers' relations with their supervisors



Source: own editing, 2024

Summary

Overall, workplace harassment has an impact on the individual, the company and society. My research has confirmed both my hypotheses. First of all, the majority of Hungarian workers are not familiar with the term mobbing. Secondly, the international companies put much more focus on protecting employees and avoiding bullying in the workplace. Consequently, I have drawn the following conclusions based on my research.

The majority of workers in Hungary have never experienced mobbing as a term. In this country, the problem of mobbing is not considered significant enough, although it is present, which may be because most people are victims but try to tolerate what happens to them in silence. Most foreign companies have more advanced solutions to avoid mobbing and have even developed specific laws to deal with it and protect employees. Of course, psycho-terrorism in the workplace can also occur internationally, but managers in foreign companies are much more aware of the psychological protection of their workforce. Hungarian legislation only partially addresses the phenomenon of psycho-terrorism in the workplace, and consequently European Union legislation provides a much more comprehensive framework for the definition of workplace harassment than the Hungarian legal system. In my opinion, the primary solution to avoid mobbing is to develop a more detailed legal regulation which clearly states the necessary steps to be taken in the area of the problem under consideration. I consider it essential to emphasise that it is also essential to make the phenomenon of mobbing accepted, as victims often blame themselves for the occurrence of harassment. Act CXXV of 2003 only protects people with protected qualities, and therefore not all victims of mobbing can be given evidence of protection.

As employers play a crucial role in the development of this issue, it is important to make them aware that this behaviour is not acceptable in any form. A good way for managers to prevent workplace mobbing from occurring is to provide anonymous questionnaires to employees at certain periods (e.g. quarterly) to allow them to write down any problems or complaints they may have. In many cases, victims are afraid to speak and stand up for themselves because they fear of the consequences.. A good practice in several Hungarian organisations is the biannual employee evaluation of managers. This can be used to assess how understanding and helpful supervisors are towards employees. As bullying often

comes from colleagues, setting up team-building programmes can also be a good initiative to bring employees together. In addition, the possibility of attending conflict management training sessions can help to break up workplace fights. This can not only result in a calmer working environment but also minimise the level of conflict in the organisation. Besides that, we must not forget the mental development of employees, which can also provide the opportunity to participate in self-development training, where employees can learn to deal with minor annoyances and defend themselves against possible atrocities. If a friendly and positive workplace atmosphere is created through the introduction of these methods, colleagues will also be more supportive of each other, which will allow for timely intervention and avoid psychological terror in the workplace. Another problem is often the lack of a supportive HR staff in companies where mobbing occurs. A good solution to this problem could be to have an occupational health and safety specialist to whom victims could turn.

Personally, I think that the idea of introducing harassment-prevention training for employees, as used in America, is a very good initiative. This will give everyone the knowledge of what to do to deal with this type of behaviour. In my opinion, this could be an easy strategy to apply in the life of any company in order to reduce the incidence of workplace bullying in the organisational culture. It would also be necessary to develop a corporate culture in the operation of domestic organisations in which the peace of mind and health of employees is the primary concern.

Although I believe that in most cases the prevention of the problem under investigation would be the most important, but changing jobs may be a good way of dealing with such cases. If the manager doesn't understand and see the situation, leaving the problematic job may be a better option.

All in all, the lack of adequate protection can have so many disadvantages, especially for health, performance, efficiency and the economy. Priority should be given to the protection of workers and the creation of a safe working environment by employers, and efforts should be made to develop a corporate culture that is safe for workers. It would be important to recognise the seriousness of workplace bullying and the huge negative consequences.

It is essential to set further research objectives in this topic. As I mentioned earlier, mobbing can also occur in other sectors, such as schools. Research in these fields could also be interesting in the future, as it is essential to create a safe environment for the next generations, whether at work or at school.

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Sustainable urban development – the views of Generation Z university students

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Abstract: In order to define the parameters of an adequate urban development plan for Generation Z, it is important to understand the impact of consumer trends that have a strong influence on the values, mindset and decisions of the young generation. Megatrends, such as health, time and the increasing value of knowledge, influence the individual's value system, consumer behaviour and purchasing decisions in a number of ways and with a number of spill-over effects. .In addition to megatrends, in this research we have focused on the consumer value changes that may be particularly dominant in the generation under study. In this light, one of these key consumer trends is the issue of sustainability and environmental awareness, which can also be a decisive factor in the development of a municipality. In our opinion, the young generation, which is fundamentally open to environmental issues, could have a unique advantage in a settlement development concept if it focuses on environmentally conscious campaigns involving young people and educational institutions, and involves young people in the project on an emotional basis, treating environmental protection as a social issue.

Employer branding and the job choice preferences of the younger generation can be a relevant criterion in the context of a settlement development project, as settlements that have attractive employers in the eyes of young people, with job opportunities where young people are willing to take up employment, can definitely gain a competitive advantage.

The main objective of the present research was to explore the attitudes of Generation Z students towards sustainable urban living... The primary data collection method was individual interviews. A total of 49 interviews were conducted with students of the Faculty of Foreign Trade of BGE and students of marketing at the Keleti Károly Faculty of Economics of Óbuda University. The survey asked young people how important it is for them that their municipality prioritises sustainability, what their expectations are, what changes they would like to see, whether they have other personal experiences with good practices in other municipalities or abroad, what role social media and digital technologies playin sustainable municipal development.

Keywords: Gen Z, health, megatrend, urban living, sustainability, environmental protection

Theoretical background

Generation Z, those born in the early 2000s, are paying particular attention to sustainability issues. Several sources point out that Generation Z cares about the health of themselves and the planet, which influences their consumer behaviour and spending. (termekmix.hu, 2024)

Many of them feel like "heroes" who can make a difference by following sustainability influencers and adopting an environmentally conscious lifestyle. Generation Z members feel that they will have to solve sustainability challenges and are committed to the environment and sustainable living. Research into Gen Z's attitudes and preferences towards sustainability and their choices suggests that they are particularly concerned about green issues: for example, when making a purchase, they will weigh the sustainability performance of a product or company more heavily than brand loyalty. They are increasingly applying for jobs in companies that communicate on sustainability issues. In fact, a third of young people surveyed have left or are planning to leave their jobs because they do not see changes towards sustainability. It is clear, therefore, that they are increasingly climate conscious and trust companies that are 'green'. Some analyses even show that sustainability issues are seen as equal in importance to factors such as work ethic and personal life. Many young people are already taking the first steps towards a more sustainable future, for example by adopting a zero waste lifestyle or by taking ESG (Environmental, Social, and Governance) considerations into account when making investment decisions. (Gonda, 2023; Csutora et al., 2022)

In 2021, SteinGen and UniCredit conducted a representative online survey of 1,000 people, as well as focus group discussions with different generations and places of residence, and in-depth individual interviews to investigate the attitudes of four different generations towards sustainability. Sustainability hangs like the sword of Damocles over the heads of Generation Z under 25. 57% of this age group feel they will have to tackle this issue themselves. They also have plenty of anxiety, and are the first to question whether they dare to bring a child into this world. Many would like to have a chemical-free, self-sufficient garden, to break with fast-fashion, with products tested on animals, with cars as status symbols, with PET bottles forever. Inspired by zero-waste groups, they clean with vinegar, citric acid, use canvas bags instead of bags. They believe in public transport, seek out packaging-free shops, carry their tap water in a can, while carrying the burden of "you'll manage". Generation Z, with their knowledge of sustainability from an early age, make sustainable choices easily, but do not yet have a lot of responsibility on their shoulders. Their actions and purchases are still mostly to meet their own needs. The key question is whether their positive habits will be maintained when they become independent, finish their studies or move away from their parents. (UniCredit &SteinGen, 2021) From the point of view of municipal marketing, it is of paramount importance to analyse the leisure preferences of the potential target audience.

Screen-based activities continue to dominate the leisure structure of young people, who still spend most of their time at home and with friends after their commitments. However, it is also a very important and striking finding that this young generation spends a significant amount of time playing sports, which we believe is linked to their value judgements: they are more health-conscious and more aware of their diet and regular exercise than the older generation (Mohammad & Szigeti, 2023).

Young people are not particularly inclined to visit elite culture venues, but they prefer pubs, pubs and cafés, which offer excellent opportunities for socialising and meeting friends. However, going to the mall, the so-called "shopping", has taken a back seat with this generation. While one of the favourite pastimes of young people used to be "hanging out" in malls, a 2017 survey shows that this has changed. Thirty percent less traffic in large shopping malls generated by high school students is forcing more and more malls to close, according to a 2017 survey of 7,500 teenagers by US-based Quartz. Young people prefer shopping online and chatting in cafés. Young people in the US say it's no longer cool to spend time in malls, and shopping is no longer a favourite pastime. Instead, they prefer to go to a restaurant, have a coffee, chat, spend so-called quality time with friends. The survey reveals that these young people tend to order online rather than shop traditionally, and that wandering around in shops is neither a typical nor an experience for them. Last year's surveys showed that online shops are attracting more and more new registered customers in their twenties. (László, 2017)

The decline of mall shopping among young people is also seen to be linked to the fact that this generation is more environmentally aware and sensitive to social issues than any previous generation.

Temu and Shein websops are having a significant impact on the shopping habits of Generation Z today, with their low prices and wide range of products. Emerging Chinese online stores have been an astonishing success so far, while offering fast delivery times and taking the knife to the air freight companies' throats. According to figures compiled by Cargo Facts Consulting, Temu, which also flows from the tap, dispatches around four thousand tonnes of goods a day, Shein, the fashion dictator, five thousand, Aliexpress, the versatile Aliexpress, one thousand, and TikTok, the e-commerce sweet tooth, eight hundred tonnes. (Kriván, 2024) Of course, they are also aware that ordering on Temu or Shein is not an environmentally friendly way of shopping. Price, as a target group with low incomes, is the determining factor.

Both international and domestic studies show that Generation Z is sensitive to social issues, which can be an important criterion in the design of an urban and regional development concept aimed at them. The members of Generation Z have a strong sense of social responsibility and, thanks to the vast amount of information available, are aware of the most important problems of our world, such as terrorism, the global economic crisis, climate change and other environmental problems (Grail Research, 2011).

A region, a municipality is successful and fulfils its mission if it is able to provide the right quality and experience of "being there" for the people who live there, work there, visit there and for business and non-profit, social and civil organisations. In this approach, 'well-being' is therefore a complex concept that is made up of several substantive aspects and factors, including, in addition to material and consumption needs, legal security, democratic settlement management, individual career development opportunities, training and further training institutions, public safety, cultural leisure facilities and an awareness of ecological sensitivity, which is at the forefront of development. (Piskóti, 2012)

According to surveys carried out by Sapientia Hungarian University of Transylvania in Cluj-Napoca, education plays a crucial role in environmental education. The young generation, which is basically open to environmental issues, can be taught environmentally conscious behaviour and the parameters of natural science knowledge relevant to them through appropriate tools, techniques, practical education and information (Bíró et al. 2015).

Summary of primary research results

49 student responses were analysed. 12 students live in Budapest, 37 students in rural areas. Of those living in rural areas, 11 live in small towns and 26 in smaller settlements and villages.

Young people expect municipalities to actively address sustainability. Community and environmental responsibility and a commitment to green initiatives have a significant impact on young people's sense of belonging in their localities (Dávid et al., 2012, Karácsony et al., 2023). This is so important during the crises and during the downturns (Molnár et al., 2023). A clean environment, the installation of solar panels, possibly wind turbines, selective waste collection and water collection systems are all standard practice according to the respondents. Many mentioned electric transport, the importance of cycle paths, tree planting to reduce the unbearable heat of summer. Several people who live in the city said that there is a lot of unjustified tree felling in their neighbourhoods, which they see as a matter of convenience (not having to collect fallen leaves). One student in the Beech Cross said that when he returns to the capital he feels suffocated for days. He suffers from the lack of his home environment, the mountains and the cool forest. Several people said that farmers' markets are disappearing, and that the only places to shop are newsagents. They believe there should be a greater demand among the population to buy from farmers' markets. The importance of composting bins was also mentioned, but young people said that there are currently few of them. Many of the female students mentioned sustainable fashion, saying they like to buy and exchange second-hand clothes.

Young people are open-minded and more willing to take part in activities such as living a plastic-free lifestyle, trying a meat-free diet, car sharing or using electric scooters. The point of these actions is to have a real, measurable impact, and these are the concrete things they are looking for in employers' activities. Thus, respondents are not receptive to misleading, vague claims about sustainability and environmental labels that are not substantiated. "The time for greenwashing and misinformation is over. They consider positive feedback and rewarding sustainable behaviour to be important, as they believe it is more motivating than penalising harmful behaviour.

They see education and the media as having a major role to play in the sustainability issue. Respondents would prefer to see innovation projects in education that deal with sustainability and circular economy (Varga – Csiszárik-Kocsir, 2023). These projects would aim to actively involve students in the development and implementation of sustainable solutions. Young people feel that environmental awareness should be integrated into as many subjects as possible, thus raising awareness and responsibility.

Many said government action in this area was lacking. Many young people feel that their individual actions cannot have a significant impact on sustainability in their communities. This frustration can lead to passivity, where young people wait for change from decision-makers rather than actively participating in solutions. Older generations are perceived to be more sceptical about

sustainability, which also affects young people's attitudes. If young people do not see commitment and action from adult society, this may also reduce their own activity.

Three students mentioned the Good Impact Fair, where NGOs and companies form partnerships to support sustainability initiatives. The event gives young people from Generation Z the opportunity to get involved in environmental awareness programmes and to interact directly with companies committed to sustainability.

Zero waste was also discussed, with one student mentioning the Humus Association as an active player in this field. However, it was also mentioned that achieving "zero waste" is still unthinkable for them today. He gave it a try, but soon gave up. The goal of zero waste is not a technological solution or service, but rather a new way of thinking and living. It is therefore not only the responsibility of waste managers to think about it. Collective thinking could involve many groups in society.

Social media and digital technologies are key tools for Generation Z to actively participate in sustainable urban development and to put pressure on decision-makers to act more responsibly. Almost all respondents highlighted the role of social media and digital technologies. Social media platforms can inform young people about local sustainability projects and events, join online communities that promote sustainability. While young people are well informed through social media, they said that the source of information is difficult to verify and they may encounter misleading or false information. This makes it difficult to identify real problems and solutions.

And digital technologies provide real-time data on environmental conditions and transport patterns, promote energy efficiency and renewable energy, and support sustainable lifestyles such as the sharing economy.

Summary

Based on the literature and our research findings, we provide a detailed summary of the sustainability-related consumption habits of Generation Z college students below:

- Generation Z members are concerned about the well-being of future generations and act accordingly.
- It is important for them to contribute to a sustainable future through their own lives and consumption habits.
- They are more aware of environmental issues than previous generations
- More attention paid to the use of environmentally friendly products and services
- Preference for organic and fair trade products, renewable energy and the sharing economy
- 75% of Generation Z say sustainability is more important than brand name when making a purchase.
- 54% of Generation Z are willing to pay up to 10% more for sustainable products, compared to 23% of Baby Boomers.
- Companies are expected to operate in a responsible, sustainable way
- 73% of Generation Z say companies and brands need to become more sustainable.
- Buying second-hand products (59%), recycled products (54%) and clothing swap schemes (29%) are popular among Generation Z.
- Generation Z members consider it important that the gifts they receive are sustainable (64%).
- They are also becoming more active in environmental movements and demonstrations. For them, sustainability is not just a fashionable trend, but a value that shapes their everyday choices and lifestyles.

- Avoid single-use products with plastic packaging.
- They are also conscious of the conditions under which products are transported and produced.
- Generation Z members are conscious of their energy use and prefer renewable energy sources.
- They take care to use energy efficient solutions in their homes.
- They favour environmentally friendly modes of transport such as cycling, scootering, walking or public transport.
- Efforts to reduce car use
- They strive to eat plant-based, local and seasonal foods.
- Avoid overpackaged, processed foods.
- Attention is paid to waste reduction, recycling and reuse.
- They actively share their knowledge about environmental lifestyles with their families, friends and communities.
- They also encourage their environment to adopt a sustainable lifestyle.
- They monitor companies' environmental, social and ethical practices.
- Generation Z members expect companies to operate in a responsible, sustainable way.
- Generation Z members actively share and support sustainability initiatives on social media.
- The sustainability content they see on social media encourages them to make more informed choices.

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The application of Markov Switching Dynamic regression models for identifying regime changes in the Hungarian economy

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Abstract: This paper applies the hidden Markov switching dynamic regression (MSDR) model to estimate transition probabilities of the Hungarian GDP between recessionary and expansionary periods. The transition probabilities are then compared to the OECD Hungarian binary business cycle indicator to assess the predictive power of the model. The paper proposes a linear model with a mean and a homoscedastic component. The level of symmetricity between the GDP and business cycles is explained by the panel data variables (Unemployment rate, IPI index, Inflation, BUX year-on-year change, and 10-3 Year sovereign bond yield spreads). It is assumed in this paper that by extending the model to encompass an exogenous variable listed in the panel data, essentially making the model bivariate, the maximum likelihood function would capture the business cycle more accurately. The results show that by plugging the unemployment rate as the exogenous variable in the regression, our model's accuracy is 70%.

Keywords: Markov switching dynamic regression model, hidden Markov models, business cycles, recession, economic crisis, forecasting, dynamic factor model, Hungary

1. Introduction

In their seminal work, Burns and Mitchel (1946) framed the features of a nation's aggregate economic activity into the theoretical concept of a business cycle consisting of expansions and contractions.

Changes in the macroeconomic environment in the form of rapid declines in output, hyperinflations and economic crises have been challenging to incorporate into a stationary linear model, due to the presence of structural breaks (Csiszárik-Kocsir et al., 2021; Garai-Fodor et al., 2022). When expanding the observed time horizon, it becomes evident that periods of growth and decline in the economy are recuring and cyclical. Therefore, the model in question has to incorporate a parameter that would take on different values depending on the discrete number of 'regimes' the system can theoretically be in.

This enables us to capture the structural breaks inherent to the system (Piger, 2009). In Hamilton's (1989) regime - switching hidden Markov model, the time series is controlled by a parameter vector that changes depending on an unobserved state variable that follows the evolution of a first-order Markov chain. The inherent property of a Markov chain is that the future value depends on its immediate value alone and not its previous values – this allows to perform accurate short-term out-of-sample forecasting and identifying 'turning points' of business cycles. There has been ample evidence on the successful implementation of univariate Markov regime-switching dynamic factor models for characterization of business cycle dynamics, particularly with datasets of developed economies. From the seminal work of Hamilton (1989), which was based on Goldfeld and Quandt (1973) and Neftçi's (1984) analysis of unemployment and business cycle asymmetry to Filardo's (1994, 1998) time-varying transition probabilities, augmented with Layton and Smith's (2000) signalling system – the Markov regime switching model and its extensions has generated many promising results for time series of developed countries. As of writing this research, there have been few studies of business cycle modelling for Eastern European countries and developing economies. Industrial business cycles were determined through a Markov-switch method for Romania, Poland and the Czech Republic by Spulbăr (2012). Bandholz (2005) applied the univariate Markov regime-switching model to the industrial production index of Poland and Hungary as well as the BUX composite stock index, while, more recently, Siničáková (2017) analyzed the level of business cycle synchronization of the Visegrad group countries with the Euro area through a Markov-switching autoregressive model (Molnár – Csiszárik-Kocsir, 2023). Leon et. al (2005), however, found that the regime switching models failed to characterize the

business cycle of newly industrialized South Korea and Taiwan. What is common in most of the research is that a univariate Markov switching model is applied to the economic time series. However, as it is pointed out by Blanchard and Quah (1989) and later reaffirmed in Kuan's (2002) work, a composite economic variable, such as the industrial production index, the GDP or the GNP is affected by multiple disturbances. Therefore, modelling the time series through a univariate autoregressive Markov regime switching process could yield inaccurate results. This research adopts a bivariate regression model to determine links between the Hungarian GDP growth rate and a set of key macro leading, coincident and lagging indicators, such as the unemployment rate, inflation, industrial production index, BUX composite stock market quarterly returns and 10-3-year yield spreads of Hungarian sovereign bonds. The estimation of the hidden Markov model will allow us to explain the changes in the GDP using the changes in the individual macro indicators. The model is built in Python IDE and in addition to the state probability matrix and the visualization of the probabilities of regimes, a state probability distribution is plotted and analyzed in Section 5 of the research.

The objectives of this research can be stated as follows: (1) to assess the usefulness of common recession macroeconomic indicators in predicting changes in the GDP for the Hungarian economy through implementing a hidden Markov switching dynamic regression model, extending the initial approach of Hamilton (1989) (2) to evaluate whether OECD recession indicators are correct in case of the Hungarian economy , and finally, (3) to identify challenges and propose measures to enhance macroeconomic stability using non-linear Markov-Switch models.

The rest of the research is structured as follows: section 2 presents a brief literature review of the application of Markov chains in econometrics, the methodology section dissects the Markov regime-switching model specifications. Section 4 provides a description and the reasoning for the choice of the macro indicators. Section 5 presents the results obtained from the model and interprets them. In section 6 the results are critically reviewed and explained in detail. Section 7 draws conclusions and possibilities of future research.

2. Literature Review

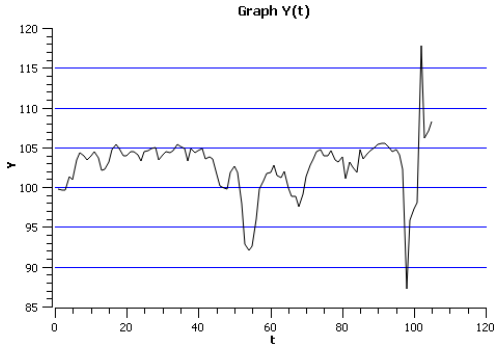
The most prominent literature on Markov regime switching models is usually found for developed countries. As of the publication of this paper, empirical literature on the application of Markov regime-switching dynamic factor models for Central and Eastern European countries is limited to the study of asynchronous behavior of individual business cycles with the Euro area, primarily inspired by a common aim of discrediting a uniform monetary policy and further expansion of the Euro area. While Bandholz (2005), Di Giorgio (2016), Siničáková (2017), applied the Markov switching model for panel data, Artis (2004) and Darvas and Szapáry (2008) used the Hodrick-Prescott filter to measure synchronization. For both methodologies the hypotheses of CEEC and Euro Area business cycle independence have been rejected. A useful extension noted by Di Giorgio (2016) would be considering other variables within the Markov switching vector autoregression model. For stock markets in the CEEC, Moore and Wang (2007), Linne (2002) and Krolzig's (1999) works feature the application of Markov switching for weekly stock index returns. The authors use high and low volatility states for regime switching. Recently, a Markov switches have been applied for the Turkish economy, in works of Balcilar et. al (2015) and Bilgili et. al (2020), where the relationships between globalization and environmental sustainability have been examined. Hoque et. al (2019), for instance analyzed the implementation of economic policy on stock market returns. economic However, it is determined that the level of correlation of an individual countries' endogenous variable with the greater Euro Area business cycle is not uniform across the set of panel data presented in literature. For instance, Moore and Wang (2007) determine that in case of Hungary, before the European Union integration, a low volatility regime persisted in the stock market, while in Poland, Slovenia, Slovakia and the Czech Republic, inflection points indicating a regime shift have been observed. This breaks the uniformity in business cycle characterization for other member states. Considering the various qualitative results obtained from the analysis of the aforementioned literature, this research estimates the model only for Hungary.

Further evidence of the application of Markov switching dynamic factor models to the time series of emerging economies is found in Petreski's (2011) work, where the inflation targeting policy effectiveness is analyzed through the scope of exchange rate pegging in Hungary and the Czech Republic.

3. Methodology

Let's illustrate how a Hidden Markov Model can be used to represent a real-world data set. Let we have some real-world economic data represented in Figure 1

Figure 1.: This graph represents data of Hungarian GDP corresponding to the same period of previous year in % - y(t), instead of dates in t I used just an arbitrary serial number.



Source: compiled by author

The above graph shows large scale regions of positive and negative growth together with abrupt deviations – crises. This positive and negative growth could be, for example, expansion and contraction of the economy, the ups and downs of the business cycle.

It is hypothesized that: (i) the unknown stochastic process changes the behavior of the indicator, so that the specific characteristics of the behavior are classified into regimes; (ii) there are two regimes in the Hungarian economy denoted as 1 and 2, which represent an expansion and a recession correspondingly; (iii) Every indicator can be represented in two-regime model through the maximum likelihood estimation function; (iv) the maximum likelihood function is more accurate if exogenous variables are added into the model; (v) the regime shifts of the Hungarian GDP in a multivariate model correspond to the business cycles determined by the OECD.

Finding the turning point in future effectively means we could find the starting point of the recession on the GDP time series. While modelling the panel data, we will consider a regression model that is a mixture of the following two random variables: the observable random variable *y(t)*, which would be used to represent the observable pattern (the observable economic variable itself), and a hidden random variable *m(t)* which is assumed to change its state or regime, and each time the regime changes, it affects the observed pattern of *y(t)*. In other words, a change in value of *m(t)* impacts the mean and variance of *y(t)*. This is the primary idea behind Hidden Markov Models. For the convenience of the reader, we present here the short summary of the relevant theory.

Let's assume that m(t) switches between two regimes 1 and 2. It means that we start to use the simplest Markov chain for variable m(t) – the two state Marko-v chain. It is obvious m(t) is a 'hidden' random variable – it is 'hidden' since we do not know what state the system is in (what regime is in effect), and it is random since we do not know when it would be changed. The two states simple Markov chain is simply a minor generalization of the scheme of independent trials or the so-called Bernoulli scheme.

$$P = \begin{bmatrix} p_{11} & p_{12} \\ p_{21} & p_{22} \end{bmatrix}, \quad (1)$$

where p_{11} – is the probability of transition from state 1 to the same state 1. In other words, p_{11} probability equals to the conditional probability that event $m(t+1) = 1$ will occur at t+1 moment if at the moment t event $m(t) = 1$ has occurred, and this probability does not depend on the events that occurred at earlier moments in time: $p_{11} = P(m(t+1) = 1 | m(t) = 1)$. Likewise for other probabilities: $p_{12} = P(m(t+1) = 1 | m(t) = 2), p\_21 = P(m(t+1) = 2 | m(t) = 1)$, $p_{22} = P(m(t+1) = 2 | m(t) = 2)$. Since the Markov process needs to be in some state at each time step, it follows that: $p_{11} + p_{12} = 1, and\ p_{21} + p_{22} = 1$. Therefore, we can rewrite the probability matrix as follows:

$$P = \begin{bmatrix} p_{11} & 1 - p_{11} \\ 1 - p_{22} & p_{22} \end{bmatrix}, \quad (2)$$

So, for the definition of our scheme we need only two values: p_{11} and p_{22}. Now for our two state Markov chain random variable $m(t)$, which gains values from set {1,2} we can write down the probability distribution function at time t, that is the unconditional probability of the system being at a certain state. It must be a two-component vector $D(t)$ with components: $d_1(t)$ – the unconditional probability that at the moment of time t the system is in the state 1, and $d_2(t)$ – the unconditional probability that at the moment of time t the system is in the state 2.

$$D(t) = \begin{bmatrix} d_1(t) \\ d_2(t) \end{bmatrix} = \begin{bmatrix} P(m(t) = 1) \\ P(m(t) = 2) \end{bmatrix}. \quad (3)$$

A Well-known result is that if we start with some prior (initial) probability distribution for $m(0)$, D(0) then D(t) can be computed by simply matrix multiplying P with itself t number of times and multiplying D(0) by the matrix product P^t:

$$D(t) = D(0) \cdot P^t. \quad (4)$$

So far, we have the useful formulae of two-state Markov chain model, although one must admit, we do not know the exact time steps at which $m(t)$ makes the transition from one state to another, and we also do not know the transition probabilities *P* for the model.

Now we describe shortly the Markov Switching Dynamic Regression used in the current investigation. Let $y(t)$ be an observable time dependent economic indicator being explained and $x_i(t), i = 1,2, \dots n,$ is some observable economic indicator which explains y(t). We restrict ourselves here with general linear regression model:

$$Y = X\theta + \varepsilon, \quad (5)$$

Where $Y = \begin{bmatrix} y_1 \\ \vdots \\ y_p \end{bmatrix}$ is a vector of sequence of y(t) values at different time moments such that $y_1=y(t_1),\ldots,y_p=y(t_p)$, $X = \begin{bmatrix} 1\ x_{11} \ldots x_{1n} \\ 1\ x_{21} \ldots x_{2n} \\ \ldots\ \ldots\ \ldots\ \ldots \\ 1\ x_{p1} \ldots x_{pn} \end{bmatrix}$ is matrix containing the explanatory variables data with the first column filled with ones, for x_{ij} value index i means the number of the point, while index j means the number of the explanatory variable ($x_{11}=x_1(t_1),\ x_{21}=x_1(t_2),\ldots,x_{pn}=x_n(t_p)$), $\theta = \begin{bmatrix} \theta_0 \\ \vdots \\ \theta_n \end{bmatrix}$ is a the vector θ contains the coefficients of the linear model. The aim of the regression model is to determine θ. As usual $\varepsilon = \begin{bmatrix} \varepsilon_0 \\ \vdots \\ \varepsilon_p \end{bmatrix}$. is the vector of residual error which supposed to be a normally distributed random variable with zero mean:$\varepsilon \sim N(0, \sigma^2)$

Now let we see how one can mix the simple regression model with two state Markov process. Depending what Markov state is in effect the linear regression coefficients set θ_i which describes data depends on what Markov state is in effect at the moment t

$$[1\ x_{i1} \ldots x_{in}\ ] \cdot \begin{bmatrix} \theta_0^1 & \theta_0^2 \\ \vdots & \vdots \\ \theta_n^1 & \theta_n^2 \end{bmatrix} = [y_i^1\ y_i^2] \tag{7}$$

$\overline{y_i} = y_i^1 \cdot P(m=1) + y_i^2 \cdot P(m=2)$ or $\overline{y_i} = [y_i^1\ y_i^2] \cdot D(t_i)$,where $D(t_i) = \begin{bmatrix} P(m(t_i)=1) \\ P(m(t_i)=2) \end{bmatrix}$.

Now we have to estimate somehow the $\hat{\theta} = \begin{bmatrix} \theta_0^1 & \theta_0^2 \\ \vdots & \vdots \\ \theta_n^1 & \theta_n^2 \end{bmatrix}$matrix of regression coefficients and the probability matrix for

Markov chain P, and eventually the variance σ² of the dependent variable y. We will use the Maximum Likelihood Estimation (MLE) method (for proper estimation of the results we will compare it with the Expectation Maximization method). MLE, which finds the values of P, θˆ and σ², would maximize the joint probability density of observing the entire data set y. In other words, we have to maximize the following product

$$L = \prod_{i=1}^{p} f\big(y(t_i)\big). \tag{8}$$

Since $\varepsilon_m \sim N(0, \sigma_m^2)$ it is obvious and convenient to assume that

$$f\big(y(t_i)\big) = \frac{1}{\sigma\sqrt{2\pi}} \cdot e^{-\frac{1}{2}\left(\frac{y_i - \overline{y_i}}{\sigma}\right)^2}.$$

So, we obtain formulae for calculations:

$$L\left(\sigma, \theta_l^k, P(m=1), P(m=2)\right) = \prod_{i=1}^{p} \frac{1}{\sigma\sqrt{2\pi}} \cdot e^{-\frac{1}{2}\left(\frac{y_i - \overline{y_i}}{\sigma}\right)^2}, \tag{9}$$

$$\overline{y_i} = y_i^1 \cdot P(m=1) + y_i^2 \cdot P(m=2) \tag{10}$$

$$y_i^1 = [1\ x_{i1} \dots x_{in}\ ] \cdot \begin{bmatrix} {\theta_0}^1 \\ \vdots \\ {\theta_n}^1 \end{bmatrix}, y_i^2 = [1\ x_{i1} \dots x_{in}\ ] \cdot \begin{bmatrix} {\theta_0}^2 \\ \vdots \\ {\theta_n}^2 \end{bmatrix} \tag{11}$$

Providing the standard maximization procedure and solving the following system of equations we obtain the estimated parameters we were looking for:

$$\left\{ \begin{array}{c} \dfrac{\partial L}{\partial \sigma} = 0 \\ \dfrac{\partial L}{\partial \theta_l^1} = 0, l = 1, \dots, n \\ \dfrac{\partial L}{\partial \theta_l^2} = 0, l = 1, \dots, n \\ \dfrac{\partial L}{\partial P(m=1)} = 0 \\ \dfrac{\partial L}{\partial P(m=2)} = 0 \end{array} \right\} \tag{12}$$

To obtain numerical results from observed data we created a python program, since it has a huge functional library, although there are a lot of other options including highly developed mathematical programs like Matlab™ or Mathematica™.

4. Selection of economic variables and descriptive statistics

To satisfy the objective of the research of estimating the business cycle, the research employs. The data were collected from the OECD quarterly national accounts, the IMF International Financial statistics database, the central statistical office of Hungary (KSH) as well as the Budapest stock exchange (BÉT) data warehouse of. The binary Hungarian recession indicator is based on the OECD recession indicator retrieved from the Federal Reserve Bank of St. Louis database. 1 is assigned to recessionary periods and 0 is assigned for recovery/expansionary periods. Estrella and Mishkin (1998) propose a set of 6 indicators of economic activity, however, due to low complexity of Hungarian financial markets, this research instead focuses on classical indicators such as the unemployment rate, industrial production index, the inflation rate and the BUX composite stock market index returns. Only one of the proposed indicators is considered in this research – the 10 year and 3 year government bond yield spreads. Table 1 provides some descriptive statistics of the selected variables**.**

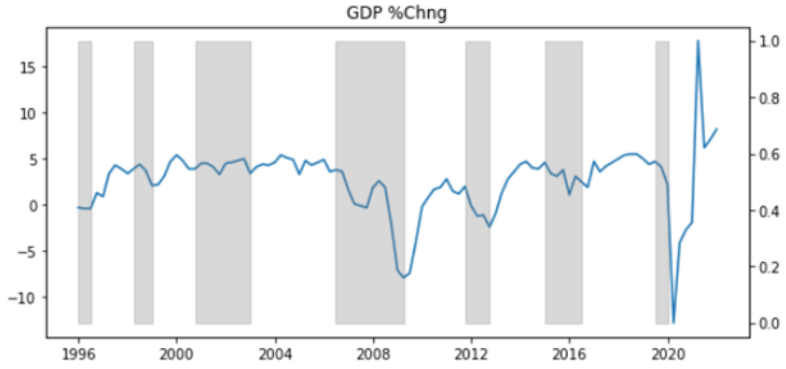
Table 1. Descriptive statistics of selected Hungarian economic time series.

	GDP %	Unemployment rate	Industrial production index	Inflation rate	BUX	Bux % change QoQ	10Y-3M yield
obs	105	105	105	105	105	105	93
mean	2.60	7.02	5.10	6.21	20575.3	0.03	0.10
std	3.58	2.33	7.71	5.50	12523.2	0.07	1.42
min	-12.8	3.3	-22.9	-1	2635.0	-0.28	-3.6
max	17.8	11.1	21.1	27.9	54197.7	0.32	2.3

Source: Own calculation

The data sample covers the period between Q1-1996 to Q1-2022, with a quarterly frequency totaling 105 observations. The 10-year and 3-year yield time series samples cover a slightly smaller timespan of Q1-1999 to Q1-2022. The seasonally adjusted time series are represented in a quarterly frequency. The choice of the unemployment rate as a lagging indicator in the scope of a Markovian model is inspired by its analysis in a large number of empirical works on the US economy. In a recent study, McGrane (2022) proved that there's an asymmetry between business cycles and unemployment, whereby the unemployment rate rises faster in recessions than it falls during expansions, supporting the New Keynesian model. Nevertheless, for sake of obtaining the regime-switching probabilities of the unemployment rate, this research follows the standard notion of the business cycle and unemployment correlation and relaxes assumptions of wage stickiness. The choice for the industrial production index as an indicator of business cycle dynamics is supported by Krolzig et. al's (2000) findings of a common cycle independent of the industrial sector, and by Madhioub's (2015) three-state regime model, as an example of a developing economy. Inflation signifies a change in the price of consumer goods – this happens as a result of an increase in money supply, due to monetary policy enacted to combat exogenous or endogenous shocks and to keep credit available in the economy. High inflation rates signal greater probabilities of recessions, hence a direct link to business cycles. The stock market is by far the most popular leading indicator. Since the current price of a stock doesn't only reflect future earnings expectations but also consumer sentiment, it is highly correlated with business cycles. The BUX composite share price index is used in Bandholz's (2005) univariate model. However, thanks to a wider timeframe and greater availability of observations in this research, the statistical inferences that can be drawn from the model become more reliable. The difference between the 10-year and 3-year Hungarian sovereign bond yields indicates the investors' outlook on future economic conditions. The wider the spread, the steeper the yield curve is, and the more positive the outlook on the economy. Conversely, the tighter the spread, the less confident investors are in the economy. Negative 10-year and 2-year yield spreads are notorious for predicting every single recession in the US. As a result, the research. The reference series the cyclical dynamics of which the research aims to predict is the quarterly GDP growth rate.

Figure 1. Quarterly growth rate superimposed on OECD recession periods.



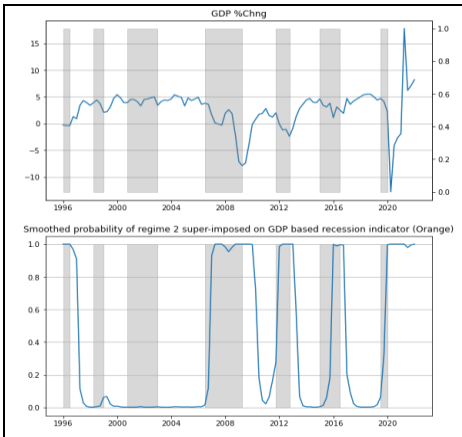
Source: Own calculations (OECD)

To better understand the reference series, it is appropriate to provide a brief description of the recession periods graphed in Figure 2. The grey areas represent peak-to-through recession periods in the Hungarian economy following the OECD recession indicator. Overall, seven recessionary periods are identified in the dataset. As a result of the fiscal stabilization policy in 1995 the GDP growth rate decelerated, causing a mild recession. The 1998 recession was caused by a sharp decline in demand as a result of the Russian financial crisis. Following the burst of the dot com bubble in 2001, foreign demand decreased yet again causing a recession. The inflation rate of the Forint sharply dropped during this period. The 2008 global financial crisis caused by subprime lending, risky financial products, and the housing market collapse in the US resulted in a significant drop in the Hungarian GDP. Being on the brink of default, Hungary was bailed out by the IMF and the European Union. In 2012 the eurozone sank into a debt crisis that resulted in an unfavorable economic environment and low domestic demand. The mild decline in 2016 was partly due to a reduction in European Union financing and partly due to a weaker automobile industry. In 2020 the economy witnessed the sharpest decline in GDP growth in its history because of nationwide lockdowns caused by the COVID-19 pandemic. Altogether, the selected indicators form a strong base for testing the methodology for the Hungarian economy. The data can be retrieved in the following repository: https://github.com/albertmolnar/Markov-chain

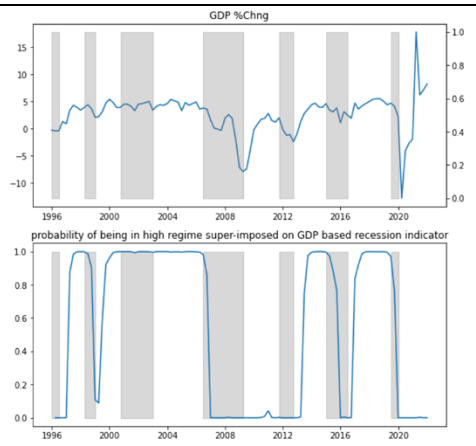
5. Validation and summary of the models

Figure 3 shows the smoothed state probabilities D(t) at time t, where t = 1 quarter, and the state is equal to 2 (a recession) are plotted below. Illustrated side by side are the smoothed probabilities of recessions compared to actual recessions and The GDP %change,

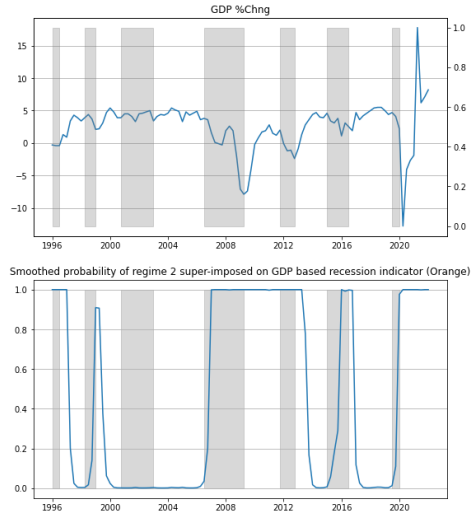
(A) Smoothed probabilities of being in a recession superimposed on actual recessions determined by the OECD composite indicator obtained from FRED. Source: Own calculations	(B) Smoothed probabilities of a recession, with lagged unemployment variable as the exogenous variable superimposed on actual recessions determined by the OECD composite indicator obtained from FRED. Source: Own calculations



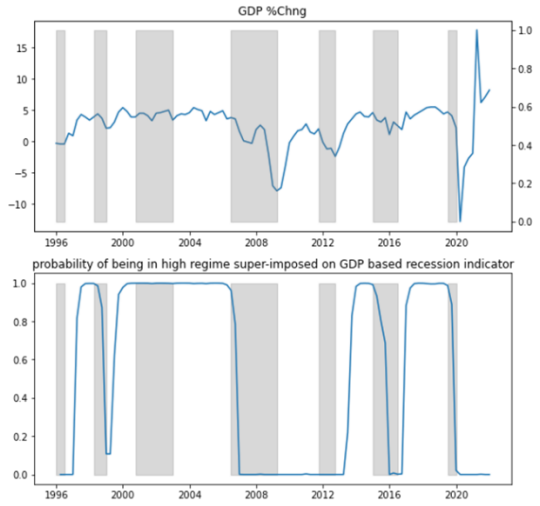
(A) Smoothed probabilities of a recession, with inflation rate as the exogenous variable superimposed on actual recessions determined by the OECD composite indicator obtained from FRED. Source: Own calculations



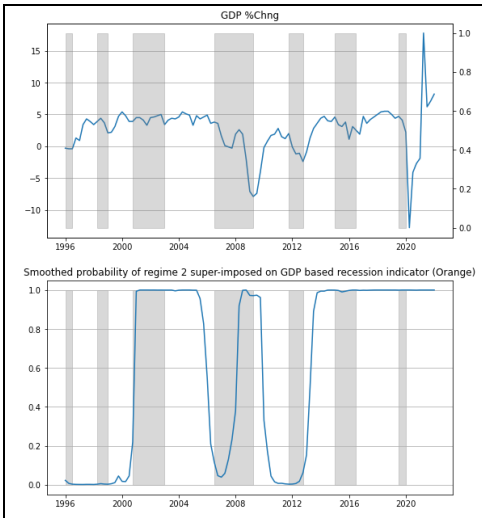
(B) Smoothed probabilities of a recession, with lagged inflation rate as the exogenous variable superimposed on actual recessions determined by the OECD composite indicator obtained from FRED. Source: Own calculations



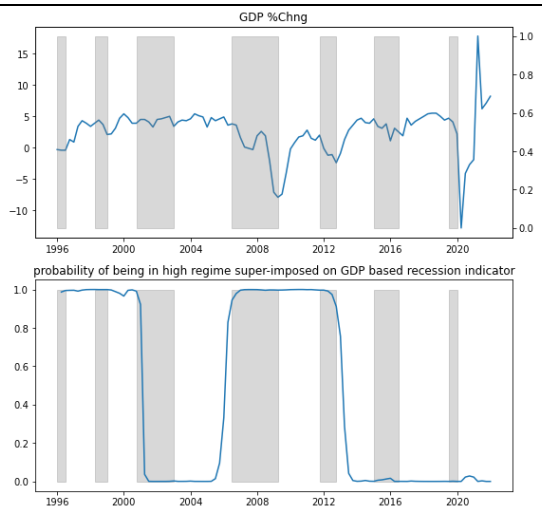
(C) Smoothed probabilities of a recession, with Industrial production index (IPI) as the exogenous variable superimposed on actual recessions determined by the OECD composite indicator obtained from FRED. Source: Own calculations



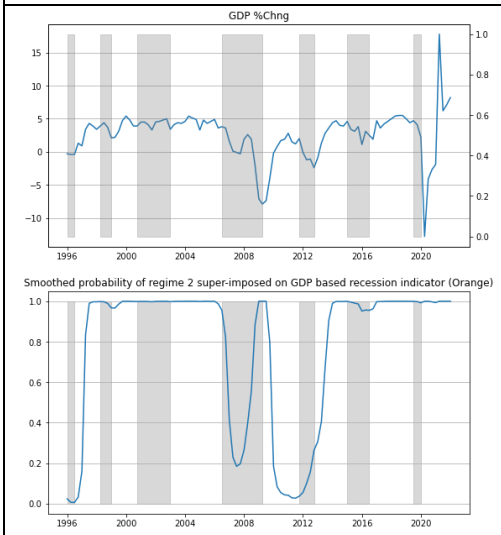
(D) Smoothed probabilities of a recession, with lagged Industrial production index (IPI) as the exogenous variable superimposed on actual recessions determined by the OECD composite indicator obtained from FRED. Source: Own calculations



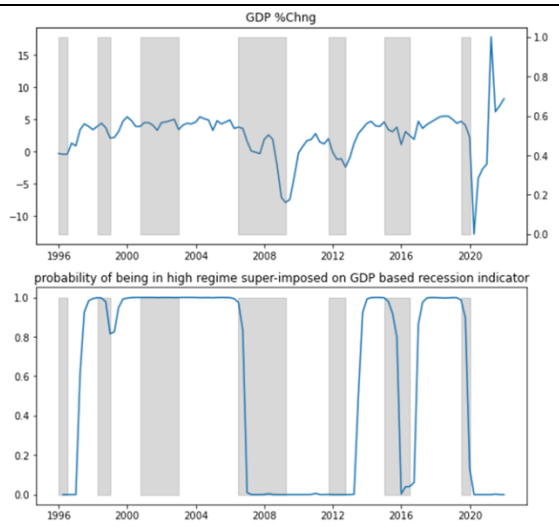
(A) Smoothed probabilities of a recession, with BUX YoY% as the exogenous variable superimposed on actual recessions determined by the OECD composite indicator obtained from FRED. Source: Own calculations



(B) Smoothed probabilities of a recession, with Lagged BUX YoY% as the exogenous variable superimposed on actual recessions determined by the OECD composite indicator obtained from FRED. Source: Own calculations



(C) Smoothed probabilities of a recession, with YSpread as the exogenous variable superimposed on actual recessions determined by the OECD composite indicator obtained from FRED. Source: Own calculations



(D) Smoothed probabilities of a recession, with Lagged YSpread as the exogenous variable superimposed on actual recessions determined by the OECD composite indicator obtained from FRED. Source: Own calculations

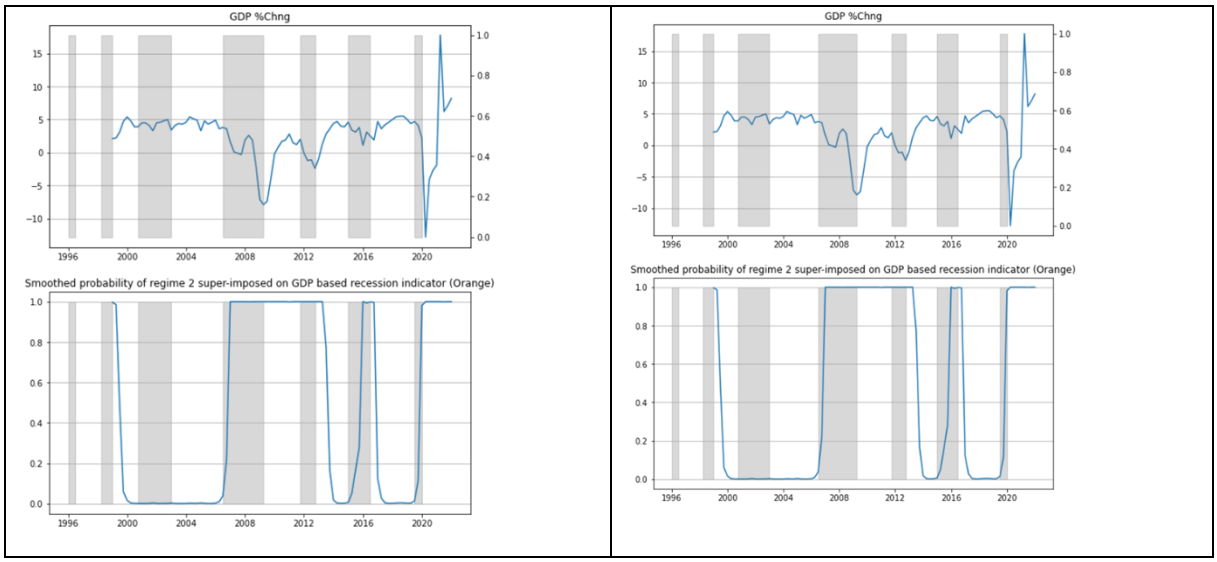


Figure 2. Smoothed Probabilities of a recession. Amalgamation of the models. Source: Own compilation

Table 2 presents the values of the θ parameter throughout the model.

Table 2. Estimation of the Markov regime switching model. y(t) is the GDP variable, while m(t) is the individual macroeconomic indicators.

(A) Estimation of the Markov regime switching model. y(t) is the GDP variable, while m(t) is the unemployment rate. Source: Own calculations based on FRED and OECD data

Unemployment	θ_0	θ_1	σ^2	P>|z|θ_0	P>|z|θ_1	P>|z| σ^2	p_{11}	p_{21}	AIC
Regime 1	6.24	-0.33	0.58	0.00	0.00	0.00	0.926	0.098	441
Regime 2	5.33	-0.67	20.49	0.017	0.019	0.00			

(B) Estimation of the Markov regime switching model. y(t) is the GDP variable, while m(t) is the 1 quarter lagged unemployment rate time series. Source: Own calculations based on FRED and OECD data

Lagged Unem-nt	θ_0	θ_1	σ^2	P>|z|θ_0	P>|z|θ_1	P>|z| σ^2	p_{11}	p_{21}	AIC
Regime 1	5.44	-0.18	0.34	0.00	0.00	0.00	0.921	0.078	433
Regime 2	3.56	-0.37	19.35	0.089	0.013	0.00			

(C) Estimation of the Markov regime switching model. y(t) is the GDP variable, while m(t) is the inflation rate time series. Source: Own calculations based on FRED and OECD data

Inflation	θ_0	θ_1	σ^2	P>|z|θ_0	P>|z|θ_1	P>|z| σ^2	p_{11}	p_{21}	AIC
Regime 1	4.41	-0.017	0.407	0.00	0.35	0.00	0.921	0.074	453.4

Regime 2	0.40	0.031	19.60	0.67	0.767	0.00			

(D) Estimation of the Markov regime switching model. y(t) is the GDP variable, while m(t) is the inflation rate time series. Source: Own calculations based on FRED and OECD data

Lagged Infl-n	θ_0	θ_1	σ^2	P>|z|θ_0	P>|z|θ_1	P>|z| σ^2	p_{11}	p_{21}	AIC
Regime 1	4.42	-0.018	0.407	0.00	0.29	0.00	0.921	0.076	448.23
Regime 2	0.67	-0.004	20.03	0.494	0.967	0.00			

(E) Estimation of the Markov regime switching model. y(t) is the GDP variable, while m(t) is the Industrial Production Index (IPI) time series. Source: Own calculations based on FRED and OECD data

IPI	θ_0	θ_1	σ^2	P>|z|θ_0	P>|z|θ_1	P>|z| σ^2	p_{11}	p_{21}	AIC
Regime 1	-0.44	0.286	1.159	0.309	0.00	0.00	0.936	0.042	495
Regime 2	1.90	0.356	9.81	0.00	0.00	0.00			

(F) Estimation of the Markov regime switching model. y(t) is the GDP variable, while m(t) is the Lagged Industrial Production Index (IPI) time series. Source: Own calculations based on FRED and OECD data

Lagged IPI	θ_0	θ_1	σ^2	P>|z|θ_0	P>|z|θ_1	P>|z| σ^2	p_{11}	p_{21}	AIC
Regime 1	-0.46	0.29	1.7	0.04	0.0	0.00	0.965	0.03	473
Regime 2	2.04	0.39	7.84	0.00	0.00	0.00			

(G) Estimation of the Markov regime switching model. y(t) is the GDP variable, while m(t) is the BUX year-on-year percentage change time series. Source: Own calculations based on FRED and OECD data

BUX YoY%	θ_0	θ_1	σ^2	P>|z|θ_0	P>|z|θ_1	P>|z| σ^2	p_{11}	p_{21}	AIC
Regime 1	0.79	-0.42	1.99	0.097	0.55	0.07	0.894	0.035	567
Regime 2	2.732	2.415	13.744	0.00	0.10	0.00			

(H) Estimation of the Markov regime switching model. y(t) is the GDP variable, while m(t) is the Lagged BUX year-on-year percentage change time series. Source: Own calculations based on FRED and OECD data

Lagged BYoY	θ_0	θ_1	σ^2	P>|z|θ_0	P>|z|θ_1	P>|z| σ^2	p_{11}	p_{21}	AIC
Regime 1	4.17	0.253	0.539	0.00	0.45	0.00	0.936	0.063	445
Regime 2	0.0014	2.769	19.22	0.99	0.45	0.00			

(I) Estimation of the Markov regime switching model. y(t) is the GDP variable, while m(t) is the 10Year and 3Year yield spread time series. Source: Own calculations based on FRED and OECD data

YSpread	θ_0	θ_1	σ^2	P>|z|θ_0	P>|z|θ_1	P>|z| σ^2	p_{11}	p_{21}	AIC
Regime 1	4.37	0.00	0.40	0.00	0.97	0.00	0.929	0.061	406
Regime 2	0.62	0.07	21.80	0.38	0.89	0.00			

(J) Estimation of the Markov regime switching model. y(t) is the GDP variable, while m(t) is the Lagged 10Year and 3Year yield spread time series. Source: Own calculations based on FRED and OECD

LaggedYSpread	θ_0	θ_1	σ^2	P>|z|θ_0	P>|z|θ_1	P>|z| σ^2	p_{11}	p_{21}	AIC
Regime 1	4.33	0.06	0.48	0.00	0.30	0.00	0.948	0.061	394
Regime 2	-0.33	1.98	19.41	0.66	0.01	0.00			

We will now discuss the results in table 3. In case of (A), Regime 1 and 2 models of the GDP as y(t) and the Unemployment rate m(t):

Regime 1: GDP %Change $= 6.24 - 0.33 Unemployment\ rate + 0.58$;

Regime 2: GDP %Change $= 5.33 - 0.67 Unemployment\ rate + 20.49$

The transition probability matrix is defined as: $P = \begin{bmatrix} 0.9267 & 0.0733 \\ 0.0983 & 0.9017 \end{bmatrix}$, where the expected duration for regime 1 is 13.63 quarters, while the expected duration of regime 2 is 10.17 quarters. For additional reference on the Markov switching model result, Appendix A-E provide the model summaries and the state space probability distributions.

Given the 50% chance of regimes 1 and 50% chance of regime 2, after 100 iterations, the state probability of switching to state 2 from state one reaches 0.427156. the calculated probability of remaining in a low state while being in one is 0.57284.

(B). Regime 1 and 2 models of the GDP as y(t) and the Lagged unemployment rate m(t) are as follows:

Regime 1: GDP %Change $= 5.44 - 0.18 \text{Lagged} Unemployment\ rate + 0.34$;

Regime 2: GDP %Change $= 3.56 - 0.37 \text{Lagged} Unemployment\ rate + 19.35$

The transition probability matrix is defined as: $P = \begin{bmatrix} 0.9206 & 0.0794 \\ 0.9214 & 0.0786 \end{bmatrix}$. Using the "msdr_model_results.expected_durations" function, we determine that the expected duration of regime 1 is 12.60 quarters, while the expected duration of regime 2 is 12.73 quarters.

(C) Regime 1: GDP %Change $= 4.41 - 0.017 Inflation\ rate + 0.407$;

Regime 2: GDP %Change $= 0.40 + 0.031 Inflation\ rate + 19.60$

The probability matrix is defined as: $P = \begin{bmatrix} 0.9206 & 0.0794 \\ 0.0748 & 0.9252 \end{bmatrix}$, the expected duration for regime 1 is 12.60 quarters, the expected duration of regime 2 is 13.36 quarters.

The initial D(t) is set to 0.5 and 0.5 for both regimes. Following the same 100 iterations steady state for the 1-2 regime switch is attained at 0.48508, the probability remaining in state 1 is 0.514915.

(D) Regime 1: GDP %Change $= 4.42 - 0.018 \text{Lagged} Inflation\ rate + 0.407$;

Regime 2: GDP %Change $= 0.6702 - 0.0047\text{Lagged}Inflation\ rate + 20.03$

Probability matrix is defined as: $P = \begin{bmatrix} 0.9207 & 0.0793 \\ 0.0761 & 0.9252 \end{bmatrix}$, the expected duration for regime 1 is 12.60 quarters, while the expected duration of regime 2 is 13.36 quarters.

(E) Regime 1 and 2 models of the GDP as y(t) and the Industrial production index m(t):

Regime 1: GDP %Change $= -0.44 + 0.286IPI + 1.159$;

Regime 2: GDP %Change $= 1.90 + 0.356IPI + 9.81$

The probability matrix is defined as: $P = \begin{bmatrix} 0.9359 & 0.0641 \\ 0.0421 & 0.9579 \end{bmatrix}$, the expected duration for regime 1 is 15.61 quarters, regime 2 is 23.73 quarters.

The 1-2 transition probability steady state is, 0.6035769, while the 1-1 transition probability is 0.396423given the 0.5 initial conditions of D(t).

(F) Regime 1 and 2 models of the GDP as y(t) and the Lagged Industrial production index m(t):

Regime 1: GDP %Change $= -0.4657 + 0.2907\text{Lagged}IPI + 1.7076$;

Regime 2: GDP %Change $= 2.0451 + 0.0398\text{Lagged}IPI + 7.8434$

The probability matrix is defined as: $P = \begin{bmatrix} 0.9659 & 0.0341 \\ 0.0302 & 0.9698 \end{bmatrix}$, the expected duration for regime 1 is 29.30 quarters, while the expected duration of regime 2 is 33.15 quarters.

(G) Regime 1: GDP %Change $= 0.79 - 0.42BUXYoY + 1.99$;

Regime 2: GDP %Change $= 2.732 + 2.415BUXYoY + 13.74$

The probability matrix is defined as: $P = \begin{bmatrix} 0.8945 & 0.1055 \\ 0.0351 & 0.9649 \end{bmatrix}$, the expected duration for regime 1 is 9.48 quarters, while the expected duration of regime 2 is 28.51 quarters.

Given the 50% chance of regimes 1 and 50% chance of regime 2, following 100 iterations, the state probability reaches the steady state: 0.2496 of probability of going to state 2 after state 1 and 0.750355 probability of remaining in state 1 after state 1.

(H) Regime 1 and 2 models of the GDP as y(t) and the lagged BUX year-on-year change m(t):

Regime 1: GDP %Change $= 4.17 + 0.253\text{Lagged}BYoY + 0.539$;

Regime 2: GDP %Change $= 0.0014 + 2.769\text{LaggedB}YoY + 19.22$

The probability matrix is defined as: $P = \begin{bmatrix} 0.9363 & 0.0637 \\ 0.0639 & 0.9361 \end{bmatrix}$, the expected duration for regime 1 is 15.70 quarters, while the expected duration of regime 2 is 15.65 quarters.

(I)Regime 1: GDP %Change $= 4.37 + 0.00241YSpread + 0.40$;

Regime 2: GDP %Change $= 0.6287 + 0.07YSpread + 21.80$

The probability matrix is defined as: $P = \begin{bmatrix} 0.9294 & 0.0716 \\ 0.0616 & 0.9384 \end{bmatrix}$, the expected duration for regime 1 is 14.16 quarters, while the expected duration of regime 2 is 16.22 quarters.

Given the 50% chance of regimes 1 and 50% chance of regime 2, following 100 iterations, the state probability reaches the steady state: 0.4683258 of probability of going to state 2 after state 1 and 0.531674719 probability of remaining in state 1 after state 1.

(J) Regime 1 and 2 models of the GDP as y(t) and the Lagged Yspread yields m(t):

Regime 1: GDP %Change = $4.33 + 0.0638\text{Lagged}YSpread + 0.48$;

Regime 2: GDP %Change = $-0.3363 + 1.9894\text{LLagged}YSpread + 19.41$

The probability matrix is defined as: $P = \begin{bmatrix} 0.9481 & 0.0529 \\ 0.0614 & 0.9386 \end{bmatrix}$, the expected duration for regime 1 is 19.27 quarters, while the expected duration of regime 2 is 16.28 quarters.

6. Discussion

The parameter estimates of the linear MSDR model are presented in Tables 3. The selection of the exogenous variables is justified in section 4 of the research. The estimation period for the time series is 105 quarters or 26 years and 3 months. Figure 3 plota the smoothed recession probabilities compared to actual recession represented by grey bars on the plot. Let us examine the results obtained for each of the exogenous variables - m(t):

Unemployment:

Firstly, the θ_1 value for regime 1 is negative, this shows that during an expansion the unemployment rate tends to drop. This follows the conventional laws of Keynesian economics, whereby, as a result of the wide availability of credit, companies can increase the labor force, decreasing the unemployment rate. However, θ_1 for regime 2 is also negative, moreover, its slope is steeper than that of regime 1. Following the previous reasoning, this means that during a recession unemployment decreases at a faster rate than during an expansion. Secondly, the variance of the error term is significantly higher during a recession – this points to stronger propagation of the shocks. The graph of the smoothed recession probabilities captures 5 out of the 7 recessionary periods of the economy – a 71% predictive power, which is by far the best result out of the panel data. The fallbacks of the smoothed probability results are that the graph doesn't capture the early 2000's recession and the 1999 recession, and for some reason, the regime remains at state 2 up till now. Could this mean that since the COVID-19 crisis the dynamics of the Unemployment rate remained in regime 1?

Inflation:

We start with the regression coefficients for regime 2: we obtain θ_1 and assert that it is positive. Indeed, this matches with theory – higher inflation leads to poor credit conditions in an economy, resulting in a decrease in the output rate. In the expansionary regime 1, θ_1 has a negative slope, indicating that inflation steadily decreases. Alternatively, when the inflation rate is lagged back 1 quarter, both of the regimes feature a negative θ_1 variable. The variance of regime 2 is high compared to regime 1. At the same time, rising inflation is not to be associated with the certainty of a recessionary state. For instance, a radical example would be that according to modern monetary theory, if the overall growth rate of the economy remains higher than that of inflation, it is possible to sustain the model indefinitely – attaining an endless period of expansion. It is important to note that the measure of expansion (regime 1) is not a low, zero, or even, negative inflation rate. Deflation is just as harmful, if not even more harmful in an economy as inflation. The inflation variable captures 6 of the 7 recessionary periods in Hungary, which at first glance, may be an even better result than a model with the unemployment rate as the exogenous variable. However, examining the plot in detail, we can see that the recession probability remained high throughout the 2008-2012 business cycle encompassing two recessions and one expansionary period. The model, therefore, failed to predict the expansion between 2009 and 2012. We conclude that the inflation model is on par with the unemployment model in the overall signal to noise ratio.

Industrial Production Index:

The estimates provided by the MSDR training results summary indicate that notwithstanding the state of the business cycle, whether the exogenous variable is lagged or not, the slope of the regime equations remains positive. This leads to another questionable conclusion that according to our model, while the negative GDP growth slows down the growth of the IPI, it does not make it negative. The IPI

showed the recession between 2001 and 2003, corresponding to the GDP decline, it also switched to the high regime in the second half of the 2008 recession, missed the 2012 European credit crisis, and, if such an interpretation can be made, predicted the 2016 GDP decline at least 6 quarters ahead. From that moment, it remained in state 2 – missing the expansionary periods between 2016 and 2020. The lagged IPI performed even worse, with only capturing 4 of the recessions along the examined time horizon.

BUX YoY% change

The regime 1 coefficient for the BUX growth rate exogenous variable is -0.42 with a statistical significance of 0.55, which is far more than the 5% threshold indicating statistical insignificance in favor of the null hypothesis. For the lagged BUX YoY variable, the p-value is also not statistically significant. According to the results in Appendix D, the duration of regime 2 is 3 times longer on average than of regime 1. The smoothed recession probability graph indicates that the model captures 5 of the 7 recessions in the examined timeframe, but at the same time misses 3 expansionary periods. It assumed in this research that the stock market is a strong leading indicator. One explanation as to why regime 2 occurs so often is related to the effect of volatility. The problem could be with the data: if the quarterly period ending values of the BUX were represented in a weekly or daily frequency, it would have been possible to smooth the data, eliminate short-term volatility and filter for a quarterly frequency. In this case, however, it is complicated to say what part of the quarterly BUX value is 'noise' and what part of it is actual trend. Therefore, as a possibility of further extending this work, following the data manipulation procedure mentioned before, the test should be repeated and compared with the results obtained in this research.

10-Year and 3-Year Hungarian sovereign bond yield spreads.

The MSDR training model produced one of the most interesting outputs for the yield spread exogenous variable. To reiterate, yield curve inversions detected from spreads of long and short maturity bonds have a capability of predicting recessions. Therefore, the theoretical specifications of regimes 1 and 2 couldn't have been clearer: regime 1 for positive spreads and regime 2 for negative spreads. The θ_1 value for the yield spread time series in both regimes 1 and 2 was extremely close to 0. This can be interpreted as: yield spreads have a negligible influence on GDP growth. When the economy is in an expansion, the yield spread is very small, when the economy is in a recession, the spread grows, but according to our model, only slightly. The probability of the persistence of a low regime is nearly 95%, while the persistence of a high regime is 94%. The smoothed recession probabilities capture 5 of the 6 recessions but miss 2 expansionary periods. As a possible extension to the dataset and the approach, it might be worth to do the same procedure with the 15 year and 3 month spreads, the 15 year and 3 year spreads, and the 10 year and 3 month spreads. By expanding the maturities of the sovereign bonds, it may be possible to better ascertain how investor sentiment correlates with Hungarian business cycles.

From the methodological standpoint, there are a few remarks to be made:

We set the initial D(t) probability to 0.5 on both regimes, indicating that our model has an equal chance of being in a recession and an expansion at time t_0. We follow this approach only for purposes of obtaining the state probability distribution. It can be argued, however, that the initial probability on the regimes is not 50%. For example, we can look back at recessionary periods for a given country's economy and count the average duration of a recession against the average duration of an expansion and adjust the initial probabilities by that value. In this aspect this research needs further extensions.

Homoscedasticity has a normal distribution – this is a questionable assumption within the model. What is the concrete factor in the economy m(t) that is referred to as the 'hidden variable' – what is the economic significance of the regime switch particularly for the Hungarian economy?

A key characteristic of the applied Markov regime switching dynamic factor model is the assumption that within the transition matrix the transition probabilities are assumed to be constant. Filardo (1994) addresses this issue by allowing the probabilities to vary over time. For example, p_22 in time t does not equal p_22 in t+n steps, where n is the time-step. Exploring regime switching within the time varying transition probability (TVTP) framework can yield some interesting results for analyzing the regime switches of yield curves and GDP or GNP time series.

Conclusions

This paper reevaluates the idea that the state of the business cycle can be determined based on the co-movements of macroeconomic indicators. By applying the Markov regime-switching dynamic model, it is possible to isolate the hidden variable and the one which is directly observed by the econometrician. The hidden variable is modeled through a two-state Markov chain, while the observed variable is modeled through a regression. We build a linear regression model with a mean, intercept and error term, where the mean is replaced by the product of some explanatory variable and a coefficient. The transition matrix for the time series is estimated through the MLE and the smoothed recession probabilities are graphed against actual recession periods given by the OECD for visual inspection and conclusions. The Empirical estimation shows that the panel data have different statistical parameters depending on the growth or recessionary state of the system, which in our case is the Hungarian economy. The hidden part of the Markov switching dynamic regression model explained most of the variance in the GDP % change, that a simple regression with panel data variables wouldn't be able to. We have determined the expected durations of the recessions by plugging in the panel data variables as the exogenous term of our model. The GDP corresponds to the business cycles the most. when the exogenous variable is the unemployment rate. To determine possible long-term correlations of the GDP with the business cycle, the exogenous variables were lagged by 1 quarter. Generally, this extension did not result in a higher predictive capability, than by not lagging the variable.

The further development of the Markov chain method is important because this allows us to analyze the unobservable variable in greater detail. The lagged maximum likelihood function of the 10 and 3 year spreads indicates that the Hungarian economy is in a recession, which at the time of writing this paper it is in a recession. However, the unemployment rate has been determined to be the most accurate indicator, which is accurate for 8 out of the 13 cycles. From a legislative standpoint, it is worth to integrate a constantly updating maximum likelihood function that would switch if a recessionary or expansionary period is being detected. Also, it Is worth considering more frequent time series. Within the scope of this research, we have worked with quarterly time series, if for instance, we were to take the jobless claims instead of the quarterly unemployment rate, which is a monthly indicator and eliminate the noise and smooth it, we believe that it would be a much better 'live' version of whether the economy is bound for a recession. Further methodological developments in the case of Hungarian business cycle estimation could be in applying Filardo's TVTP framework for the panel data.

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The complexities of applying and understanding the Agile Coach as an agile element and the examination of their underlying causes

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Abstract: This research exinnoplores the complexities of understanding and applying the Agile Coach role among professionals working in various IT-related job positions and across different levels of professional experience. The aim of the study is to identify the factors contributing to the challenges in understanding the Agile Coach role and to examine whether there are differences in the perceived causes of these challenges between employees and managers, as well as across different levels of experience. Quantitative analysis methods, including cross-tabulation analysis and Chi-square tests, were used to examine the relationship between position (employee or manager) or experience level (junior, mid-level, senior) and the perceived complexity of the Agile Coach role. The results revealed differences between managers and employees: managers were significantly more likely to cite poor training as one of the main causes of the complexity, while employees tended to believe that the role was either abandoned or not properly utilized. The definition, roles, and responsibilities of the Agile Coach are presented through a literature review, highlighting the competencies and challenges essential for successfully fulfilling this role.

Keywords: – agile, roles, agile coach, application

Introduction

Agile is an increasingly popular approach, particularly in software development, that allows for continuous evaluation of a project's direction throughout the development lifecycle. It facilitates the introduction and implementation of change requests from the client at any stage of the project, aiming for iterative development and ongoing customer satisfaction. This approach enables close collaboration between the client and the project team during adaptive and evolutionary development (Aziz Butt et al., 2022; O'Regan, 2022).

Agile project management methodology provides adaptability for projects in dynamic environments, enabling rapid and effective responses to changing requirements (Dobos et al., 2022). Through iterative development cycles and continuous client feedback, the product can be refined throughout the development process, enhancing customer satisfaction. High levels of transparency and regular communication contribute to the successful execution of the project and the achievement of organizational goals (Pinto, 2023). Due to Agile methods, software is developed faster, more flexibly, and better suited to changing needs, allowing companies to respond more quickly to market changes (Varga et al, 2023). This leads to greater customer satisfaction and, consequently, a competitive advantage. However, implementing these practices requires proper training, cultural shifts, and continuous development to ensure sustainable competitiveness (Kotler, 2023).

Agile project management reduces costs and time while increasing efficiency and adaptability in an ever-changing business environment (Jabri et al., 2023; Tóth – Csiszárik-Kocsir, 2022; 2023). The introduction of an Agile mindset or philosophy can also present challenges, including resistance to change among project participants, insufficient support from stakeholders, and the difficulties of integrating Agile with traditional project management approaches. These issues can still lead to conflicts when people return to the organization's old structures after working on Agile projects (Pinto, 2023; Artelt, 2021). Interestingly, the Agile mindset and methodology have not only emerged in software development but can also be applied as a collaborative method in any other sector (Naik et al., 2019). The Agile approach and mindset help overcome the behavioral flaws of traditional project management and can lead to higher performance (Lieberum et al., 2022).

With the advent of Agile methodologies, the role of project managers has undergone significant transformation. While planning and control were previously the main focus, today, facilitation, team development, and continuous adaptation are among the most important tasks (Gelencsér et al, 2020).

Project managers are no longer solely responsible for traditional project management activities (e.g., budgeting, scheduling), but they also assist the team in achieving its goals, create the right environment for implementing Agile values, and perform tasks such as tracking project progress, preparing status reports, managing budgets, and handling personnel matters (Shastri et al., 2020).

Various Agile approaches define roles such as the development team, product owner, scrum master, and Agile coach (Shastri et al., 2020). In the Scrum framework, for example, the role of the scrum master is particularly important. As a leading figure, the scrum master helps the team with self-organization and ensures adherence to the processes outlined in the Scrum guide (Sutherland et al., 2007; Sutherland et al., 2014). As Agile frameworks have become more widespread, the demand for professionals and consultants who assist teams in mastering and applying new work methods aligned with Agile thinking has increased. This is reflected in the growing number of scrum masters and Agile leaders (Davies & Pullicino, 2009; Davies & Sedley, 2008).

Programmers and team leaders play a central role in self-organization and self-management, especially in an Agile development environment. However, this can be challenging if developers are unwilling or unable to take on these responsibilities, expectations, and approaches (Licorish & Macdonell, 2021). In Agile methodology, roles are dynamic and evolve based on the needs of the team, in contrast to rigid, predefined positions. Roles emerge and can change through collaboration among team members, making it essential for everyone to clearly understand their own and others' responsibilities. Agile coaches help team members grasp and accept these continuously evolving roles, as well as support them in fostering effective collaboration (Barke & Prechelt, 2019).

A good coach must possess a wide range of essential soft skills. Emotional intelligence is indispensable for a coach. Through self-awareness, empathy, and the ability to manage emotions, a coach can establish deeper connections with team members and fully tap into their potential. According to Chan and Mallett (2011), emotional intelligence is key to the effectiveness of coaching. Successful coaching requires several key abilities, including effective communication, teamwork, initiative, leadership skills, personal effectiveness, planning and organizational skills, and presentation skills. These abilities enable the coach to collaborate efficiently with team members, optimize performance, and facilitate development (Ngang et al., 2013; Tang et al., 2013).

Throughout the coaching process, a coach must excel in various areas. Cultural sensitivity, mentoring, critical thinking, and problem-solving skills help the coach understand and support individuals from different backgrounds. Interpersonal skills and emotional intelligence allow for effective communication, motivation, and team development. Leadership skills help the coach guide the coaching process and achieve the set goals . Other important soft skills include creativity, time management, and flexibility (Aldulaimi, 2018; Tyschenko, 2023).

Agile Coaches must be capable of empathy, active listening, and employing diplomatic skills to understand team members' needs and provide support during agile transformations. Additionally, transformational leadership qualities such as empowerment, trust-building, and openness are essential to inspire and motivate teams. Agile Coaches need not only technical knowledge but also exceptional soft skills. Compassion, communication, and conflict resolution abilities help them collaborate effectively with team members and support them in mastering agile practices (Tkalich et al., 2020; Konrad-Maerk et al., 2022; Clason et al., 2021).

As experts, Agile Coaches assist organizations in implementing agile methodologies and fostering continuous improvement. Their responsibilities include training teams, providing coaching, and supporting the integration of agile principles and practices into the organizational culture. Agile Coaches act as agile catalysts, helping organizations fully leverage the benefits of agile methodologies. With their strategic perspective and experience, they connect various agile roles and work with multiple agile teams and projects, supporting the organization through all stages of the agile transformation (Stray et al., 2020; Belling, 2020).

The Agile Coach is a versatile professional who aids teams in effectively using agile tools and methods to create the highest quality software possible (Davies & Pullicino, 2009; Davies & Sedley, 2008).

Currently, the Agile Coach role lacks a clear, industry-wide definition. While existing reference models are widely known, they are not built on solid scientific foundations, and the methods used to describe competencies are not always consistent. Efforts to develop competency models often result from activities performed by consultants without strict methodological rigor. Therefore, it is crucial to develop a theoretically grounded competency model that accurately defines the Agile Coach role and its associated competencies (Griffin & Hinek, 2023). The role of an Agile Coach typically becomes essential when an organization decides to introduce or expand agile methodologies. The Agile Coach helps the organization navigate the complexities of agile transitions, especially when agile practices affect multiple teams and a more unified approach is required (Belling, 2020).

An Agile Coach assists organizations in ensuring that agile methodologies are not just viewed as a project management tool, but rather become part of a broader culture where flexibility, adaptability, and customer focus are the core values. Simply applying agile methods does not automatically create an agile organization. The key to success lies in embedding agile principles and values into the mindset and work practices of all members of the organization (Klünder et al., 2022).

Overall, Agile Coaches can play a value-creating role in various businesses by supporting the implementation, adoption, and sustainability of agile methods, helping teams develop, and guiding them through the challenges of the agile transition (Stray et al., 2020). Research shows that while the Agile Coach is not a mandatory element in agile methodologies, it can nonetheless add significant value during an agile transformation. Employing an Agile Coach can lead to financial benefits for organizations, as it can result in faster return on investment (ROI) during the agile transformation, further demonstrating their value within the organization (O'Connor & Duchonova, 2014).

Agile methodologies do not explicitly require the presence or necessity of an Agile Coach role. This role has developed alongside the rise of agile methodologies and has become increasingly widespread in practice. Despite the growing focus on the role of Agile Coaches, project managers do not become obsolete in an agile environment. Research supports that project managers, product owners, and team members continue to actively engage in project management tasks. Agile Coaches serve more as a complementary role, supporting organizations during the agile transition and helping teams leverage the advantages of agile methodologies (Miller, 2019; Miller, 2020).

The role of the Agile Coach is indeed a leadership one, though not in the traditional sense. Agile Coaches act more as facilitators and mentors rather than direct supervisors or managers. Their role does not necessarily entail holding a formal leadership position. Instead, they function as advisors with specialized expertise, assisting the organization in agile transformation—a role that may seem at odds with traditional leadership roles (Belling, 2020; O'Connor & Duchonova, 2014). However, leadership skills are still required, such as project management abilities, technical knowledge, and proficiency in various agile techniques and frameworks (Stray et al., 2020; Davies & Pullicino, 2009).

Agile Coaches extend their influence beyond development teams, having an impact at the organizational and executive levels. They influence the strategies, efforts, knowledge, and skills of development teams (Tkalich et al., 2020). However, one study also indicates that agile methods may reduce the prominence of the traditional project manager role (Sadeh et al., 2022). Agile Coaches bring a strategic, long-term perspective, which is particularly beneficial for companies looking to broadly implement or expand agile methodologies, techniques, and frameworks across their projects, operations, or corporate culture (Belling, 2020).

At the same time, it is important to note that in many organizations, the Agile Coach role is not treated as a dedicated position, which can pose risks. Some organizations assign the Scrum Master role as an additional responsibility to an existing team member, such as a developer or project manager, which can lead to challenges. This highlights the importance of the Agile Coach in supporting and developing the Scrum Master (Ereiz & Music, 2019).

The Agile Coach also supports the Product Owner in shaping and managing the backlog to ensure it always reflects business goals, customer needs, and the future direction of the product. They help the Product Owner understand how to transform the backlog into a dynamic tool that continuously adapts to changing conditions (Winter, 2015). Although Agile methodologies are often associated with redefining traditional project management roles, the roles of the Agile Coach and project manager do not necessarily conflict. In fact, several studies suggest that the Agile Coach serves as a complementary role, supporting both the Product Owner and the project manager. The Agile Coach helps the Product Owner develop the necessary skills for agile methodologies, improve communication with team members and stakeholders, and facilitate effective decision-making (Miller, 2019; Miller, 2020).

Material and method

For the quantitative research, an online standardized questionnaire was developed in the second quarter of 2022, from which information was extracted through the analysis of the collected responses. The questionnaire was entirely anonymous, with no personal information being provided or stored about the respondents. Thus, alongside data collection using the snowball sampling method, the process complied with data privacy regulations, including GDPR, and did not require separate GDPR consent from participants. The primary reason for choosing an online, anonymous questionnaire was the ease of distribution, allowing for the collection of a large amount of structured data in a short period. This data was easily processed for further analysis.

The goal in designing the questionnaire was to make it as easy as possible for respondents to complete, which is why primarily closed-ended questions were used. Respondents were asked to choose from predefined options or indicate their opinion on a scale, minimizing the need for open-ended responses and simplifying the later analysis of the data.

The questionnaire was created using Google Forms and distributed through IT companies and specific IT, software development forums, and social media platforms such as Facebook and LinkedIn groups, including: "Nők az IT-ban" (Women in IT), "Programozók" (Programmers), "Web Developers and Software Programmers," "Software Engineers, Programmers and Software Developers," and "Software Development Projects Worldwide."

The following software was used for creating the questionnaire, collecting data, and conducting statistical analyses: Google Forms and Google Sheets, Microsoft Excel, and IBM SPSS. The statistical tests applied in the analysis included descriptive statistics, histograms, distribution curves, cross-tabulation analyses, one-way ANOVA, the related Tukey HSD post-hoc test, independent samples t-test, Levene's test for equality of variances, and Cohen’s d effect size calculation.

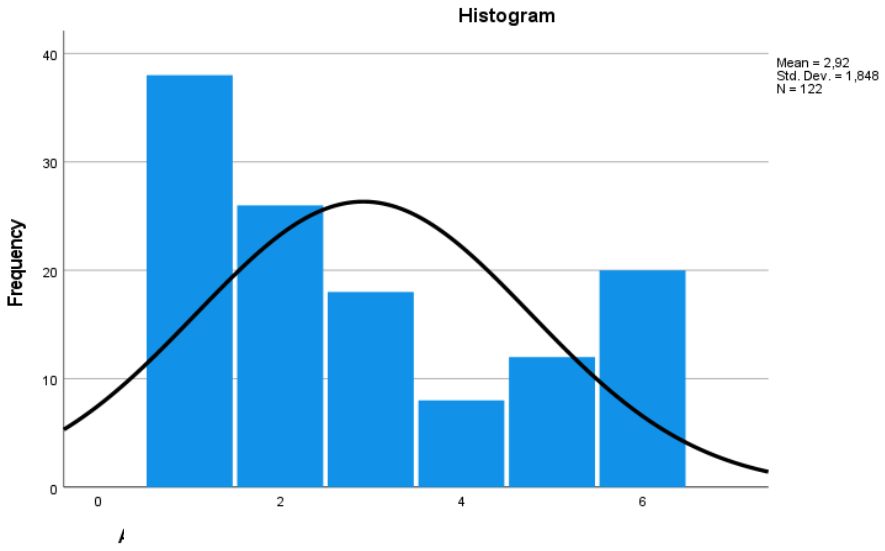
Research

In the research survey, data collection was conducted using the snowball sampling method, and a total of 224 respondents provided answers. The questionnaire allowed both IT and non-IT professionals to participate due to the built-in response pathways in the questions. However, questions specifically related to the Agile Coach role were only presented to those working in the IT sector. The next step in data cleaning involved filtering based on familiarity with Agile methodologies, as those who were unfamiliar with or had not worked in an Agile environment were not relevant to the examination of understanding and applying the Agile Coach role. By the end of the data cleaning process, 122 relevant responses from IT professionals who had experience working in an Agile environment were analyzed.

Respondents could rate the complexity of understanding and applying the Agile Coach role on a scale of 1 to 6, where 1 indicated "not at all" and 6 indicated "completely." The average rating was 2.92, suggesting that most respondents perceived the complexity of the Agile Coach role as low to moderate. The standard deviation was 1.848, which is relatively high, indicating significant variability in the respondents' assessments.

The histogram shows the perceived complexity of understanding and applying the Agile Coach role, represented on a scale from 1 to 6. The curve illustrates the normal distribution fit to the data.

Figure 1. Histogram and normal distribution curve: the complexity of the Agile Coach role



Source: IBM SPSS, 2022Q2, N=122

In the first part of the research, the level of perceived complexity in understanding the Agile Coach role was examined across various independent variables. The results were as follows:

- Value 1 (Not complex at all): 31.1% of respondents found that understanding the Agile Coach role was not complex at all.
- Value 2: 21.3% of respondents rated it a 2, indicating they felt the role was only slightly complex.
- Value 3: 14.8% of respondents held a more neutral opinion, suggesting a moderate level of complexity.
- Value 4: 7.4% rated it a 4, implying they found it somewhat complex.
- Value 5 and 6 (Very complex): 16.4% of respondents gave these ratings, indicating they experienced significant difficulties in understanding the role.

These results indicate that while a large proportion of respondents did not find the Agile Coach role particularly difficult to understand, a notable minority experienced moderate to high levels of complexity.

The first analysis tested whether there was a significant difference across different job roles (developer, IT professional, IT business specialist, manager) in terms of how complex they found the understanding and application of the Agile Coach role. Based on averages, developers found the Agile Coach role the most complex to understand (mean = 3.20, SD = 1.822, N=54), while IT professionals found it the least complex (mean = 2.43, SD = 1.451, N=20). IT managers (N=32) had an average score of 2.88 with a standard deviation of 1.975. The results of the ANOVA test showed no statistically significant difference between job roles regarding the perceived complexity of understanding and applying the Agile Coach role, with a significance value of 0.099, which is close to but does not reach the 0.05 threshold. The Tukey HSD post hoc test confirmed this finding.

After examining job roles, the next analysis explored whether there were significant differences among different experience levels (junior, mid-level, senior) in terms of how complex they found the Agile Coach role. Based on average values, juniors, as the least experienced, found the Agile Coach role the most complex to understand (mean = 3.25, SD = 1.581, N=8), while mid-level professionals found it the least complex (mean = 2.61, SD = 1.757, N=46). Seniors (N=68) had an average score of 3.09,

with a standard deviation of 1.930. The ANOVA (Sig = 0.349) and Tukey HSD tests revealed no statistically significant differences in this case either.

Participants were also divided into two age groups: those under 32 years old and those over 32. On average, younger respondents (under 32) found the Agile Coach role slightly more complex to understand (mean = 2.96, SD = 1.791, N=54) than older respondents (mean = 2.88, SD = 1.905, N=68), but the difference was minimal, and there was no statistically significant difference.

Finally, differences between employees and managers were examined. Based on the average values, managers found the Agile Coach role slightly more complex to understand and apply (mean = 3.17, SD = 1.928, N=48) than employees (mean = 2.76, SD = 1.789, N=74). However, the difference was not statistically significant. Interestingly, managers gave higher complexity ratings, even though the Agile Coach is typically a "top-down" role introduced by organizational leadership.

In contrast to agile methodologies, traditional project management-based projects often use the waterfall model. Assuming that individuals with more experience in waterfall-based projects would find it more challenging to understand a role grounded in a different mindset, the perceived complexity of the Agile Coach role was tested alongside waterfall project experience. Respondents were grouped into four categories based on their experience: no experience, 0-2 years, 2-4 years, and more than 4 years.

Based on average values, both those without experience (mean = 3.00, SD = 2.051, N=40) and those with 0-2 years of experience (mean = 3.00, SD = 1.680, N=24) found the Agile Coach role similarly complex (mean = 3.00). Those with 2-4 years of experience found it the least complex (mean = 2.75, SD = 1.844, N=16), while those with more than 4 years of experience rated it slightly more complex (mean = 2.92, SD = 1.989, N=42). However, according to the ANOVA test results, there was no statistically significant difference between these waterfall project experience groups in terms of how complex they found the understanding and application of the Agile Coach role, as the significance value (Sig = 0.851) was well above the 0.05 threshold.

Similar to the waterfall project experience analysis, respondents were also analyzed based on their experience with agile methodologies. All respondents had some agile experience, so only three categories were considered. Based on the averages, those with only 0-2 years of agile experience rated the complexity higher (mean = 3.45, SD = 2.064, N=22), while those with more than 4 years of experience found it the least complex (mean = 2.63, SD = 1.741, N=54).

In the second part of the research, the possible reasons for the perceived complexity were examined. The first analysis aimed to determine whether there were significant differences between the various contributing factors ("poor education," "used individually, not by the rules," "abandoned or not used," and "applied to an unsuitable project") in terms of how much complexity they contributed to the understanding and application of the Agile Coach role. Respondents primarily identified "poor education" and "application to an unsuitable project" as the most significant contributors to the complexity of understanding and applying the Agile Coach role.

Table 1.: Descriptive statistics: causes of complexity and their level of complexity

	N	Mean	Std. Deviation
Not complex	38	1,84	1,551
Poor education	14	3,86	1,875
Used individually, not by the rules	18	2,00	0,970
Not used	44	3,73	1,809
Applied to an unsuitable project	8	4,00	1,309

Source: own research, N=122, 2022Q2

Based on crosstab analysis, the distribution of job roles and the causes of complexity appears as follows:

Table 2.: crosstab analysis: job roles and the causes of complexity

			Why might the understanding and application of the following agile elements have been complex? [Agile Coach role]					Total
			Not complex	Poor education	Used individually, not by the rules	Not used	Applied to an unsuitable project	
What is your current job role?	Developer	Count	16	0	8	26	4	54
		Adjusted Residual	-0,3	-3,5	0,0	2,5	0,3	
	IT professional	Count	8	4	2	4	2	20
		Adjusted Residual	0,9	1,3	-0,7	-1,6	0,7	
	IT business professional	Count	4	0	4	8	0	16
		Adjusted Residual	-0,6	-1,5	1,2	1,2	-1,1	
	IT leader	Count	10	10	4	6	2	32
		Adjusted Residual	0,0	4,1	-0,4	-2,4	-0,1	
Total		Count	38	14	18	44	8	122

Source: own research, N=122, 2022Q2

The significance value of the Pearson Chi-square test is 0.002, which is below the 0.05 threshold. This indicates a statistically significant relationship between the job role and the perceived reasons for the complexity in understanding the Agile Coach role. Developers and IT professionals were more likely to believe that the Agile Coach role was abandoned or not properly used. Among IT professionals, poor education also emerged as an important factor. In contrast, a larger proportion of managers felt that understanding the role was not particularly difficult, though many of them also cited poor education as a challenge.

In the cross-tabulation analysis of age groups, among those under 32 years old, 18 out of 54 respondents did not experience any problems, while 8 felt that the Agile Coach role was not used properly. Only 2 people in this group mentioned poor education as an issue. In the over-32 group, 20 out of 68 respondents reported no issues, but a larger portion (22 people) felt that the Agile Coach role was either abandoned or not properly used. In this group, 12 respondents cited poor education as a problem. According to the Chi-square test results, there is no statistically significant difference between age groups.

Regarding experience levels, only 8 respondents were classified as juniors, and none of them reported significant issues related to poor education. Among the 46 mid-level respondents, 10 mentioned that the methodology was applied in a non-standard way, while 20 felt that it was abandoned or not used. In the senior group, 24 out of 68 respondents said that understanding the Agile Coach role was not overly complex, while 12 mentioned poor education. The Chi-square test results indicated no statistically significant differences between experience levels.

In summary, while there is a statistically significant relationship between job role and perceived challenges in understanding the Agile Coach role, no significant differences were found across age groups or experience levels.

Conclusion

The analysis results suggest that deficiencies in education play a significant role in accurately understanding and effectively applying the Agile Coach role. Therefore, it is essential to launch high-quality, targeted educational programs, particularly focusing on ensuring that theoretical knowledge can be practically applied. Targeted training is especially important for IT professionals and developers, as improper application of the Agile method in these groups can lead to serious issues.

Additionally, individuals at different levels of experience perceive the challenges of the role differently, making it advisable to create tailored training programs based on experience levels. For less experienced employees, more practical training and support are needed, while those with several years of experience could benefit from mentoring opportunities to assist less experienced colleagues.

Leaders should be provided with tools and knowledge to more effectively support their teams in applying Agile methodologies. Although leaders tend to perceive fewer difficulties in understanding the methodology, they also recognize gaps in education. Special attention should be given to ensuring that developers and IT professionals properly apply Agile methods in practice, as neglecting them can lead to frustration and a sense of complexity regarding the methodologies.

The analysis shows that Agile experience is a key factor in the challenges of understanding and applying the methods, which should be considered when developing training programs. Increasing organizational support is also crucial, as the successful introduction and application of the Agile Coach role require backing from all levels of the organization. Proper application of the methods not only increases acceptance but also reduces the perceived complexity.

Finally, since the ANOVA and independent samples t-test results did not reveal significant differences, it would be worth repeating the study with a larger sample to confirm these conclusions.

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Artifical intelligence adoption among baby boom generation

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Abstract: The Baby Boom generation, born between 1946 and 1964, has experienced sig- nificant technological advancements throughout their lifetime, including the rise of artificial intelligence (AI). Understanding the attitudes of this generation to- wards AI is crucial, as their perspectives can influence its adoption and inte- gration into various aspects of society. This study aims to explore the Baby Boom generation's attitudes towards artificial intelligence using the Technology Acceptance Model (TAM). The TAM is a widely used theoretical framework that examines users' acceptance and adoption of technology. It consists of two primary constructs: perceived usefulness and perceived ease of use. Perceived usefulness refers to users' beliefs about the benefits and advantages of using a particular technology, while perceived ease of use pertains to their perceptions of how effortless and user-friendly the technology is. To investigate the attitudes of the Baby Boom generation towards AI, a mixed-method research approach is employed. Data is collected through surveys and interviews with individuals from the Baby Boom generation. The surveys assess participants' perceived use- fulness of AI and their perceptions of its ease of use, while the interviews delve deeper into their attitudes and beliefs about AI. The findings from the TAM analysis reveal interesting insights into the attitudes of the Baby Boom gener- ation towards AI. Participants generally perceive AI as a beneficial technology that has the potential to enhance efficiency and productivity in various fields. They acknowledge its usefulness in automating repetitive tasks, aiding decision-making processes, and providing personalized experiences in various industries. However, concerns about the complexity and potential risks of AI are also ex- pressed by some participants. They worry about the ethical implications of AI, its impact on job security, and the potential loss of human touch and empathy in various services. Moreover, the study identifies factors that influence the Baby Boom generation's acceptance of AI. Familiarity with technology, previous ex- periences with AI applications, and the perceived reliability and accuracy of AI systems are significant factors that shape their attitudes towards AI adoption. The implications of this research are significant for various stakeholders, includ- ing policymakers, businesses, and technology developers. By utilizing the TAM model, policymakers can gain insights into the factors that influence the Baby Boom generation's acceptance of AI, and design targeted strategies to address their concerns and encourage AI adoption. Businesses and technology develop- ers can use the findings to design AI applications that are user-friendly and meet the needs and preferences of the Baby Boom generation. Addressing their con- cerns about the ethical implications and potential job displacement can lead to a more positive reception of AI technologies. In conclusion, understanding the attitudes of the Baby Boom generation towards artificial intelligence using the TAM model provides valuable insights into their perceptions of AI's usefulness and ease of use. By addressing their concerns and designing user-friendly AI applications, stakeholders can foster a more positive acceptance and integration of AI technologies among this generation.

Keywords: Baby Boom generation, Attitudes towards AI, Technology Ac- ceptance Model, AI adoption, Perceived usefulness of AI.

1. Introduction

The Baby Boom generation, born between 1946 and 1964, has witnessed significant technological advancements over the course of their lifetime. From the early days of television and the advent of the personal computer to the rise of the internet and, more recently, artificial intelligence (AI), this generation has experienced numerous technological shifts (Smith, 2019). AI, in particular, has gained significant attention due to its potential to transform industries and redefine human-computer interactions (Russell & Norvig, 2019; Floridi, 2018). The adoption of AI technologies across various domains, such as healthcare, finance, and entertainment, has the potential to improve the quality of life for individuals in this age group, offering benefits such as personalized healthcare and enhanced decision-making tools (Vincent, 2021; Lupton, 2020). Despite the growing relevance of AI, the Baby Boom generation's adoption of this technology has not been as rapid as that of younger cohorts (Smith, 2021; Vang, 2020). This gap raises important questions regarding the factors influencing their perceptions and acceptance of AI.Understanding the attitudes of the Baby Boom generation toward AI is crucial, as this group continues to hold considerable economic and social influence (Phang, 2018). Their acceptance or resistance to AI could significantly shape the future of its adoption and integration into society. Factors such as digital literacy, trust in AI systems, and concerns regarding privacy and

ethical implications have been identified as potential barriers to AI adoption among older adults (Koene, 2020; Ngai, 2019).

The Technology Acceptance Model (TAM), a widely used theoretical frame- work, offers a valuable lens through which to study the Baby Boom generation's attitudes towards AI. TAM suggests that perceived usefulness (PU) and perceived ease of use (PEOU) are the two key determinants of an individual's acceptance of technology (Davis, 1989; Venkatesh & Davis, 2000). PU refers to the extent to which a user believes that a particular technology will enhance their job performance or daily tasks, while PEOU relates to how user-friendly they perceive the technology to be. This model has been extensively applied to understand technology adoption in various contexts, including healthcare, education, and business (Holden & Karsh, 2010; King & He, 2006). This study aims to explore the Baby Boom generation's attitudes towards AI through the lens of the TAM model. Specifically, it seeks to understand the factors that influence their perceptions of AI's usefulness and ease of use, and to identify any barriers or concerns that might hinder its adoption. By gaining insights into these factors, stakeholders—including policymakers, technology developers, and businesses—can better tailor AI systems to meet the needs and preferences of this demographic (Campbell, 2019). Moreover, addressing their concerns about AI's ethical implications and potential job displacement can lead to a more positive reception of these technologies.

2. Literature

Technological Exposure and Baby Boomers

The Baby Boom generation has lived through several technological revolutions, from the advent of personal computers to the widespread adoption of the internet and mobile devices (Smith, 2019). Studies suggest that although Baby Boomers have adapted to various technologies over time, their adoption rates tend to be slower than younger generations when it comes to newer technologies such as artificial intelligence (AI) (Vang, 2020; Smith, 2021). This generational gap in technology adoption raises questions about the factors that influence their attitudes toward AI, which may differ from those of younger users. Previous research highlights that Baby Boomers value technology that enhances their daily lives and improves convenience, particularly in the areas of health, finance, and communication (Vincent, 2021). However, challenges such as digital literacy and unfamiliarity with certain technologies may hinder their ability to fully adopt and engage with newer systems like AI (Campbell, 2019). Understanding these challenges is crucial for promoting AI adoption among this generation, as their acceptance will likely impact the extent to which AI is integrated into broader societal functions.(Tariq et al.,2024)

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), first introduced by Davis (Davis, 1989), offers a valuable framework for understanding the adoption of new technologies. TAM posits that two main factors influence a user's decision to adopt a technology: perceived usefulness (PU) and perceived ease of use (PEOU). PU refers to the degree to which a user believes a technology will enhance their performance or daily activities, while PEOU concerns how user-friendly and accessible the technology is perceived to be (Venkatesh & Davis, 2000). These two constructs are critical in evaluating how Baby Boomers approach AI, as their technology adoption patterns may be shaped by perceptions of complexity and the tangible benefits AI offers. Several studies have employed TAM to explore technology adoption in older adults. For instance, Holden and Karsh (Holden & Karsh, 2010) applied TAM to healthcare technologies, finding that perceived ease of use played a critical role in the adoption of new systems by older populations. Similarly, a meta- analysis by King and He (King & He, 2006) showed that TAM remains one of the most reliable frameworks for understanding technology adoption across various age groups, including older adults. This study aims to build on these findings by applying TAM specifically to Baby Boomers' attitudes towards AI.(Khan et al.,2023)

Artificial Intelligence and Older Adults

AI has the potential to revolutionize various industries, from healthcare to fi- nance, offering personalized services and automating repetitive tasks (Floridi, 2018). However, despite its potential, older adults, including Baby Boomers, often express hesitation about adopting AI technologies. This reluctance stems from several factors, including concerns about privacy, ethical implications, and a lack of trust in AI systems (Koene, 2020). Baby Boomers, in particular, may be wary of AI's complexity and the implications of relying on automated systems for decision-making (Ngai, 2019). Research suggests that trust plays a vital role in the acceptance of AI among older adults. Koene (Koene, 2020) highlights that for AI to be widely adopted by Baby Boomers, systems need to be transparent and reliable, with a strong emphasis on user control. Moreover, studies show that Baby Boomers may harbor concerns about AI's impact on employment and the potential displacement of jobs (Vang, 2020). Addressing these concerns is essential for fostering positive attitudes toward AI among this demographic. (Csiszárik,2016)

Digital Literacy and AI Adoption

One of the significant barriers to AI adoption among Baby Boomers is digital literacy. Research indicates that older adults with higher levels of digital lit- eracy are more likely to adopt new technologies, including AI (Smith, 2021). Conversely, those with limited digital skills may perceive AI as overly complex and difficult to use (Campbell, 2019). Ngai (Ngai, 2019) argues that digital literacy programs aimed at older adults could bridge this gap, making AI more accessible to the Baby Boom generation. (Garai-Fodor & Jackel,2023) In addition, familiarity with AI applications, such as virtual assistants or healthcare AI, can positively influence attitudes toward these technologies. For example, Vincent (Vincent, 2021) discusses how AI-driven healthcare solutions have the potential to enhance patient care for older adults, provided that the systems are user-friendly and cater to their specific needs. This highlights the importance of designing AI technologies that are not only functional but also intuitive for older users.(csiszárik,2021)(Csiszárik et al.,2024) The existing literature reveals that while Baby Boomers have gradually adopted certain technologies, AI adoption remains a challenge due to concerns about ease of use, trust, and digital literacy.(Garai-Fodor et al.,2023) The TAM model offers a useful framework for understanding these barriers, with perceived usefulness and ease of use playing central roles in the acceptance of AI. Additionally, research points to the im- portance of addressing ethical concerns and enhancing digital literacy to foster greater acceptance of AI among Baby Boomers. This study aims to build on these findings by investigating the specific factors influencing Baby Boomers' attitudes towards AI and identifying strategies for overcoming the barriers to adoption. (Csiszárik et al.,2024)

3. Methodology

Research Design

This study employs a mixed-methods research design, combining quantitative and qualitative approaches to gain a comprehensive understanding of the Baby Boom generation's attitudes towards artificial intelligence (AI). The quantitative component consists of a structured survey aimed at measuring the participants' perceived usefulness (PU) and perceived ease of use (PEOU) of AI, based on the Technology Acceptance Model (TAM) framework (Davis, 1989; Venkatesh & Davis, 2000). The qualitative component comprises semi-structured interviews that provide deeper insights into the personal experiences, concerns, and perceptions of AI among Baby Boomers.(Forgács et al.,2024)

Participants and Sampling

The target population for this study is individuals from the Baby Boom generation, born between 1946 and 1964. A sample of 200 participants was selected using a stratified sampling method to ensure diversity in terms of socioeconomic background, education level, and prior experience with digital technologies. Participants were recruited through online platforms and community outreach pro- grams aimed at engaging older adults with technology.(Pató et al.,2023)

Data Collection

Quantitative Data

Quantitative data was collected using an online survey, consisting of 20 questions, designed to assess the participants' perceptions of AI. The survey was divided into two sections. The first section gathered demographic information, including age, education, and previous experience with technology. The second section focused on measuring PU and PEOU, utilizing a 5-point Likert scale (ranging from strongly disagree to strongly agree) to rate statements adapted from previous TAM studies (Holden & Karsh, 2010; King & He, 2006). Sample statements include, "I believe AI can improve my daily tasks," and "I find AI applications easy to use."

Qualitative Data

Qualitative data was gathered through semi-structured interviews with a subset of 30 participants from the survey group. The interviews were conducted via video conferencing and lasted between 30 and 45 minutes. Interview questions were designed to explore participants' attitudes towards AI in greater depth, addressing topics such as trust, ethical concerns, and perceived risks or benefits of AI. The interviews were transcribed and analyzed using thematic analysis to identify common themes and concerns (?, ?).

Data Analysis

Quantitative Analysis

The quantitative data was analyzed using descriptive statistics to provide an overview of the participants' demographic characteristics and their responses to the survey questions. Additionally, a multiple regression analysis was con- ducted to examine the relationship between demographic factors (e.g., age, ed- ucation, prior experience with technology) and participants' perceptions of PU and PEOU (?, ?). Statistical analysis was performed using SPSS software 24.11 version.

Qualitative Analysis

The qualitative data from the interviews was analyzed using a thematic analysis approach, as outlined by Braun and Clarke (?, ?). The interview transcripts were coded to identify recurring themes and patterns in the participants' responses. Common themes such as trust in AI, concerns about complexity, and ethical considerations were highlighted. The thematic analysis aimed to complement the quantitative findings by providing richer context and personal insights into Baby Boomers' attitudes toward AI.

Ethical Considerations

This study adhered to ethical guidelines for research involving human partici- pants. Prior to participating, all individuals were provided with an informed consent form detailing the purpose of the research, their role in the study, and the measures taken to ensure their privacy and confidentiality. Participation was voluntary, and participants had the option to withdraw from the study at any time without penalty. All collected data was anonymized to protect the identi- ties of the participants, and the study received approval from the Institutional Review Board (IRB) at the research institution.

Limitations

While the mixed-methods design provides comprehensive insights into Baby Boomers' attitudes toward AI, certain limitations should be noted. First, the sample size, while sufficient for analysis, may limit the generalizability of the findings to the broader Baby Boomer population. Additionally, the use of on- line surveys may have excluded participants who are less familiar with digital technology, thus potentially skewing the results. Future studies should consider a larger and more geographically diverse sample to enhance the external validity of the findings.

4. Results

This section presents the findings from both the quantitative survey and qual- itative interviews conducted as part of the study. The results are structured to address the key research questions regarding the Baby Boom generation's attitudes toward artificial intelligence (AI) through the lens of the Technol-

ogy Acceptance Model (TAM). The findings are organized by perceived useful- ness (PU), perceived ease of use (PEOU), and other emerging themes identified through thematic analysis.

Quantitative Results

Demographic Overview

A total of 200 participants from the Baby Boom generation completed the on- line survey. The demographic characteristics of the sample are summarized in Table 1. The majority of participants were aged between 60 and 74, with 55% identifying as male and 45% as female. A significant portion of participants (65%) reported having a college degree or higher, and 70% indicated prior experience with digital technologies, though fewer (30%) had direct experience with AI applications.

Table 1: Demographic Overview of Survey Participants

Characteristic	Percentage
Age (60–74)	80%
Gender (Male/Female)	55%/45%
Education (College Degree or Higher)	65%
Prior Experience with Technology	70%
Experience with AI Applications	30%

Source: own research

Perceived Usefulness (PU)

Survey results showed that the Baby Boom generation generally views AI as a useful technology. On a 5-point Likert scale, the average rating for perceived usefulness was 3.8 (SD = 0.7), indicating a moderately positive attitude towards the benefits of AI. Participants agreed with statements such as ”AI can improve my productivity” (mean = 4.0, SD = 0.6) and ”AI can assist in decision-making tasks” (mean = 3.9, SD = 0.8). However, the level of perceived usefulness varied depending on the participants’ previous experience with digital technology and education level. A regression analysis showed that prior experience with technology (p ¡ 0.01) and higher education levels (p ¡ 0.05) were positively correlated with higher PU scores.

Perceived Ease of Use (PEOU)

Perceived ease of use of AI received a slightly lower average rating of 3.4 (SD = 0.9), indicating a neutral to somewhat positive perception of AI’s user- friendliness. Participants expressed concerns about the complexity of AI systems, with statements such as ”AI is difficult to understand” (mean = 3.2, SD = 0.9) receiving mixed responses. In contrast, more specific AI applications like voice assistants were seen as easier to use, with a mean rating of 4.1 (SD = 0.5). Further analysis revealed that age and previous experience with AI significantly impacted PEOU scores. Participants aged 70 and older reported lower PEOU scores (mean = 3.1, SD = 0.9) compared to those aged 60-69 (mean = 3.6, SD = 0.7). Additionally, those with previous experience using AI applications reported higher ease of use scores (mean = 4.0, SD = 0.6) than those without (mean = 3.0, SD = 0.9).

Qualitative Results

Trust and Ethical Concerns

Thematic analysis of the interview data revealed several recurring themes. A common concern among participants was the issue of trust in AI. Many participants expressed skepticism about AI’s ability to make ethical decisions, particularly in critical areas like healthcare and finance. For example, one participant stated, ”AI might be efficient, but I don’t trust it to make decisions where human judgment is necessary.” This concern was more prevalent among participants who had little to no experience with AI technologies.

Job Displacement and Automation

Another dominant theme was the fear of job displacement due to AI-driven automation. Participants voiced concerns about AI replacing jobs traditionally held by humans, particularly in the service and manufacturing sectors. One interviewee commented, ”I worry that AI will take away jobs from people who need them, especially older workers who can’t easily adapt to new roles.” However, a subset of participants, especially those with prior experience in technology fields, saw AI as an opportunity for efficiency. These participants expressed a more positive outlook, with one stating, ”AI can take over the repetitive tasks, leaving us to focus on more important work.”

AI as a Tool for Daily Life

Despite concerns, many participants recognized the potential of AI to enhance daily life, particularly in healthcare and home automation. Participants fre- quently mentioned the benefits of AI-powered personal assistants, with one in- terviewee sharing, ”I love using my voice assistant to set reminders and control things in my home—it makes life easier.” This sentiment was reflected in the survey responses, where voice assistants were rated highly for perceived ease of use.

Barriers to Adoption

The qualitative data also highlighted several barriers to AI adoption among Baby Boomers. These include a lack of familiarity with AI, concerns about data privacy, and fears of being left behind in an increasingly digital world. One participant remarked, ”I feel like AI is something younger people are comfortable with, but I don’t know how to even start using it.” Others expressed concerns over the collection and use of personal data by AI systems, with privacy being a recurring concern. The results of this study indicate that while the Baby Boom generation generally perceives AI as useful, there are significant concerns about its ease of use, ethical implications, and potential impact on job security. Familiarity with technology and prior experience with AI were found to be key factors influencing both perceived usefulness and ease of use. Qualitative insights further underscored the importance of addressing trust and privacy concerns to foster greater acceptance of AI among this demographic.

5. Discussion

The findings of this study provide valuable insights into the Baby Boom generation’s attitudes towards artificial intelligence (AI), particularly in relation to the Technology Acceptance Model (TAM). This section interprets the results, explores their implications, and offers recommendations for future research and practice. The discussion is organized around the key themes of perceived use- fulness (PU), perceived ease of use (PEOU), trust, and ethical concerns, as well as barriers to AI adoption. The quantitative findings revealed that the Baby Boom generation generally perceives AI as useful, particularly in areas where it can improve productivity and aid in decision-making. This supports the TAM framework, which posits that perceived usefulness is a critical factor in the adoption of new technologies (Davis, 1989). The positive association between prior experience with technology and higher PU scores aligns with previous studies, which have shown that familiarity with technology enhances perceptions of its benefits (Holden & Karsh, 2010; King & He, 2006). The qualitative data further supports this finding, with participants expressing appreciation for AI’s ability to enhance daily life, particularly through voice assistants and personalized healthcare applications. However, despite the over- all positive perception of AI’s usefulness, the data suggests that AI’s benefits are not uniformly recognized across all sectors. For instance, while participants saw clear advantages in healthcare and home automation, there was less enthusiasm for AI’s role in decision-making in more complex, human-centered areas like finance and law.

Although AI was generally seen as useful, perceived ease of use (PEOU) presented more challenges. The lower PEOU scores reflect concerns about AI’s complexity, particularly among older participants and those with limited prior experience with AI technologies. These findings are consistent with the literature, which highlights that ease of use is a significant factor in technology adoption, especially among older adults (Venkatesh & Davis, 2000). As prior studies suggest, perceived complexity can act as a barrier to adoption, even when the potential benefits of the technology are recognized (Holden & Karsh, 2010). The qualitative findings underscore this issue, with many

participants ex- pressing confusion about how to use AI technologies or a fear of" getting it wrong." These concerns were particularly pronounced among participants aged 70 and older. This suggests that while younger Baby Boomers (aged 60-69) may find AI relatively easy to use, older participants may require more targeted support, such as user-friendly designs or comprehensive training programs to help them become more comfortable with AI systems. One of the most significant themes that emerged from the qualitative data was trust in AI systems. While the majority of participants acknowledged AI's potential usefulness, many expressed concerns about trusting AI to make ethical decisions. This finding echoes earlier research, which has shown that trust is a critical factor in the adoption of AI, particularly in sensitive domains such as healthcare and finance (Koene, 2020). Participants raised concerns about AI's decision-making processes, question- ing whether AI systems can truly replace human judgment, particularly in situ- ations requiring empathy or ethical reasoning. This finding aligns with previous studies that suggest AI's lack of transparency and perceived "black box" nature may hinder its widespread acceptance, particularly among older adults who may be more skeptical of emerging technologies (Ngai, 2019). Moreover, ethical concerns were not limited to decision-making. Many par- ticipants also voiced fears about AI's potential to displace jobs, especially in sectors traditionally reliant on human labor. These concerns are consistent with existing literature, which highlights that AI-induced automation is a source of anxiety, particularly among older workers who may feel less able to adapt to new roles (Vang, 2020). The results also identified several barriers to AI adoption among the Baby Boom generation. Lack of familiarity with AI, concerns about data privacy, and fears of exclusion from the digital world were all frequently mentioned by participants. The quantitative findings indicate that prior experience with AI significantly affects both PU and PEOU scores, which suggests that familiarity with the technology can mitigate some of these barriers. This is consistent with the TAM model's emphasis on prior experience as a factor influencing ease of use and perceived usefulness (Davis, 1989). Additionally, concerns about data privacy emerged as a key barrier to AI adoption. Many participants were worried about how their personal data would be used by AI systems, a finding that aligns with the broader literature on privacy concerns in the context of AI and other digital technologies (Floridi, 2018). Addressing these concerns through clearer privacy policies and transparent data handling processes could help alleviate some of these fears and foster greater trust in AI systems.

Practical Implications

The findings of this study have several practical implications for policymakers, technology developers, and businesses aiming to promote AI adoption among the Baby Boom generation. First, efforts should be made to enhance the user- friendliness of AI technologies. Simplified interfaces, clear instructions, and targeted training programs could help mitigate the perceived complexity of AI, especially for older Baby Boomers. Second, addressing trust and ethical concerns is crucial. AI developers should focus on creating transparent systems that allow users to understand how decisions are made. Additionally, addressing concerns about job displacement and emphasizing the ways in which AI can complement rather than replace human labor could help alleviate fears about automation. Finally, improving digital literacy among the Baby Boom generation is key to increasing AI adoption. Programs aimed at enhancing digital skills could help older adults become more comfortable with AI technologies, thereby improving both PU and PEOU scores. While this study provides valuable insights into the Baby Boom generation's attitudes towards AI, several limitations should be acknowledged. The sample size, while sufficient for the purposes of this study, may limit the generalizability of the findings. Future research could expand the sample to include a more diverse group of participants across different regions and socioeconomic back- grounds. Additionally, this study focused primarily on general AI applications; future studies could explore attitudes toward specific AI applications in greater depth. Furthermore, the cross-sectional design of this study limits the ability to draw conclusions about changes in attitudes over time. Longitudinal studies could provide insights into how attitudes towards AI may evolve as the technology becomes more integrated into daily life.

6. Conclusion

This study aimed to explore the Baby Boom generation's attitudes toward artificial intelligence (AI) using the Technology Acceptance Model (TAM) frame- work. The findings provide valuable insights into how Baby Boomers perceive the usefulness and ease of use of AI, as well as the barriers

and concerns that impact their adoption of this technology. The results indicate that the Baby Boom generation generally views AI as a useful technology, particularly in areas such as healthcare, home automation, and productivity. Participants with higher levels of digital literacy and prior experience with AI applications were more likely to perceive AI as beneficial, supporting the TAM's assertion that perceived usefulness (PU) plays a critical role in technology acceptance. However, perceived ease of use (PEOU) emerged as a more significant challenge, with older participants expressing concerns about the complexity of AI systems and a lack of understanding regarding how to effectively interact with AI technologies. Trust in AI systems was identified as a major factor influencing adoption. Participants raised concerns about the ethical implications of AI, particularly in decision-making roles that require human judgment and empathy. Additionally, fears of job displacement due to AI-driven automation were common among participants, reflecting broader societal concerns about the future of work in an AI-dominated world. Addressing these trust and ethical issues will be critical in fostering a positive attitude toward AI among Baby Boomers. Several barriers to AI adoption were identified, including concerns about data privacy, limited familiarity with AI, and fears of exclusion from an increasingly digital world. These barriers suggest that AI developers, businesses, and policymakers must prioritize accessibility and transparency when designing AI systems for this demographic. Simplified user interfaces, enhanced privacy protections, and targeted digital literacy programs could help alleviate these concerns and encourage wider adoption of AI technologies among Baby Boomers. In conclusion, while the Baby Boom generation recognizes the potential benefits of AI, significant barriers remain that could hinder its widespread adoption. By addressing concerns about ease of use, trust, and privacy, and by improving digital literacy, stakeholders can create a more favorable environment for AI adoption among this generation. Future research should continue to investigate the evolving relationship between Baby Boomers and AI, particularly as these technologies become more integrated into everyday life. Additionally, longitudinal studies could provide deeper insights into how Baby Boomers' attitudes toward AI may change over time as they gain more experience with these technologies.

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A comprehensive analysis of the operating and financing environment for domestic enterprises

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Abstract: The research aims to analyse the financing habits and borrowing culture of small and medium-sized enterprises in Hungary. SMEs are a key player in the Hungarian economy, accounting for more than 99% of businesses and employing two-thirds of the workforce. The research investigated the extent to which SMEs are aware of their credit availability, their attitudes towards borrowing and the factors that influence their borrowing decisions. The questionnaires and interviews with bank managers revealed that, although businesses are reluctant to borrow, they have a high level of credit and see credit as a tool for growth and development. Several of the hypotheses tested in the research were disproved, such as the lack of awareness of credit availability and the fear of borrowing among SMEs. The results show that SMEs have a positive attitude towards borrowing but follow strict risk management principles.

Keywords: small and medium-sized enterprises, SME finance, borrowing culture, Hungarian banking system, economic growth, corporate lending, credit risk management

Introduction

I examine the borrowing patterns of the SME sector. Small and medium-sized enterprises play a key role in Hungary as they account for more than 99% of the total number of entrepreneurs and provide employment for almost two-thirds of the workforce. This is why I find this topic interesting, as the success of our country depends to a large extent on small and medium-sized enterprises. I have researched the SME sector before and I decided at that time that I would like to continue my research, as I have obtained very useful and interesting results. I decided to continue my research by looking at their financing environment. The life of SMEs used to be really difficult in terms of access to external finance and SMEs are much more dependent on external sources of finance. Banks mainly turned to large companies a few decades ago, but now there are a number of favourable credit facilities available for SMEs. Corporate lending is becoming increasingly important in Hungary, where companies have access to external financing mainly in the form of bank loans. In my research I examine the borrowing patterns and financial culture of SMEs. Furthermore, I will examine whether credit is an opportunity for growth and development for SMEs, and how they perceive not only credit but also banks themselves, and to what extent they perceive the banking sector as business-friendly. In the literature part of my thesis, I will introduce the concept of the banking sector, its role, its operation and the risks it entails, and then I will present the concept of SMEs, their economic role and their external financing options, drawing on national and international literature. In the following section I present the results of my primary research, which consisted of two parts. Firstly, I present the results of a questionnaire for SMEs, followed by an in-depth interview with banking sector executives. In this research I examine the financing habits of the SME sector, their attitudes towards credit and their financial culture. In order to achieve the research objective, I formulated the following hypotheses:

- H1: SME sector actors are not aware of their credit options.
- H2: The SME sector is afraid of taking credit.
- H3: Two thirds of the SME sector only take out operating loans.
- H4: SME managers and owners are not sufficiently informed about the process of borrowing.

Finally, based on the conclusions drawn from the results of the questionnaire and the in-depth interviews with experts, I will examine the validity of the above hypotheses.

Literature Review

The emergence of banks is inseparable from the emergence of money. If we look back in history, different commodities were already being used as money before we could even talk about banking activities and banks. Nevertheless, the early life of money is inextricably linked to banking (Katona et al., 2018). The most significant event in the history of banking is considered to be the founding of the Bank of England, which was established in 1964 as a body of state creditors. The Bank of England had the power to issue banknotes and conduct banking transactions. The development of modern central banks can be dated from this time. In 1844, the rules of banking and currency circulation were laid down

by law. Then, with the outbreak of World War II, a new banking law came into force in 1939. The activities of banks other than those issuing banknotes also developed and specialised considerably in the second half of the 19th century. Thus, different types of banks emerged, such as clearing banks, mortgage banks, lombard banks, etc. Today, the largest banks have become internationalised and are part of and operators in the globalised movement of capital and money and operate worldwide (Katona et al., 2018). The banking system is an organism that is protected by high barriers to entry, surrounded by a dense regulatory network, and whose development and evolution reflects the economic policy direction and values of the government of the day (Király, 2016). The banking system creates credit money, i.e. the banking system provides the money supply. The bank has both a claim and a liability when it creates money and provides credit. With this money created, it makes itself a debtor, as it is obliged to use it to make payments to the holder of the money according to its terms or to redeem it for cash. In the money-creating operation, an obligation arises for the the money holder, since he must repay the loan. The essence of money today is therefore the claim of economic agents on the banking system (Vigvári, 2008).

The essence of money creation is that financial institutions are able to create a new money supply, i.e. they multiply the value of the account money and the cash issued by the central bank. However, only the central bank has a monopoly on cash issuance, so banks can only create money on account, which can be done by lending or buying foreign currency. The banking system provides the money needed by the economy alongside the central bank (Vértesy, 2020). The functioning, efficiency, stability and resilience of banking systems are affected by the structural characteristics of the sector. There is no banking system structure that is ideal in all respects. There are a number of requirements that banks are expected to meet, but these requirements are mutually reinforcing, for example, the bank should be competitive, growing, safe, profitable, low mark-up, efficient (Király, 2016) In modern market economies, money is the creator and main intermediary of the relationships between economic agents. The market financial system is the set of markets, individuals, institutions, laws, rules and techniques that enable the exchange of money and capital in the economy under competitive conditions (Wágner, 2005). Savings generated by economic agents in the economy are transmitted by the financial system from the saver to the final users of the savings through financial instruments. Financial markets may involve both direct and indirect flows of money and capital. In the case of direct capital flows, the saver makes his savings directly available to the user of his choice. In the case of indirect capital flows, the saver is in contact with market intermediaries (Wágner, 2005). The most important sector of financial markets is the banking system. The financial sector itself comprises four sub-markets: banking sector, money market sector, insurance sector and securities market. These submarkets form an organically interconnected system. The bank is a financial intermediary in its macroeconomic role, which coordinates the different saving and financing needs, performs maturity volume transformations, reduces the transaction costs of financing, settles part of the payment flows and creates claims on itself, which in turn can function as money (Vértesy, 2020). Hungary had a single-tier banking system from 1947 to 1986, i.e. there was only a central bank. Since 1 January 1987, Hungary has again had a two-tier banking system, i.e. there are several commercial banks, also known as business banks, capable of secondary money creation, in addition to the central bank. In the case of a two-tier banking system, the central bank only deals with these banks (Wágner, 2005). A two-tier banking system is a structure where the central bank, the central bank, the monetary authority of the state, which does not normally have direct contact with the public and companies, is separated from the banks and has special powers (e.g. to issue cash). At the other level are commercial banks, which are in contact with economic agents and provide them with financial services." (Walter, 2016, p. 14) The banking system is of great importance, as banks not only connect the sectors that make up the economy as a whole, but can also be seen as a fundamental pillar of the economy in their own right. They play an important role in the intermediation of money, money creation, financing, lending and resource allocation (Gyárfás, 2013). From the perspective of households, people want to own a bigger home and have more and better household goods, and they want them as soon as possible. And from the perspective of companies, the goal is to reach new customers, markets, products and projects with as much profit as possible. Credit institutions are also profit maximising businesses (Zsolnai, 2011). Globalisation, which is taking place in the world economy, means the intertwining of economic and financial relations between national economies and the intensification of interdependence between national economies in the world economy. This process

of is also manifested in an increase in international capital flows, not only in the flow of goods and services across national borders. National economies are able to mobilise capital in excess of their own savings, which can facilitate the development of the world economy through the most efficient allocation of savings, which can be seen as a positive financial effect of globalisation. Globalisation is taking place in the real and financial spheres, at both macro and micro levels. Globalisation at the micro level is associated with transnational corporations, and in the financial sphere with international financial conglomerates (Tóth, 2012).

Liquidity and reliability of banks

Banks primarily manage other people's money, so a bank is a business in its own right. Customer confidence, i.e. trust, is the most important condition for banks to operate. Credit institutions must manage the own and borrowed funds entrusted to them in accordance with prudent conduct requirements, and must do so in such a way as to maintain their liquidity, i.e. their immediate solvency, and their solvency, i.e. their solvency at all times. Thus, if a bank cannot always be solvent, it loses the trust of its customers, which has enabled it to conduct money intermediation and which has partly prevented it from going bankrupt (Szemán, 2015). In economics literature, the concept of liquidity refers to the ability of an economic agent to exchange its existing assets for goods and services or other assets. Liquidity can be understood as a flow (as opposed to equity), in other words it is a flow concept. Liquidity refers to the unimpeded flows between the actors in the financial system, in particular between the central bank, commercial banks and markets. Liquidity refers to the 'ability' to realise these flows. Its absence would make the financial system illiquid (Nikolaou, 2009). The liquidity-liquidity-capital adequacy triangle, or the 'critical triangle', is often discussed in the context of the banking system, even in non-crisis periods. Within certain limits, the bank is able to decide for itself how to determine the relative weight of each factor within the triangle. However, the decision options narrow in times of crisis, due to tensions in financial markets and the real economy (Fischer-Homolya, 2009).

In order to protect the solvency of banks, various analytical methods and procedures have been developed to provide insight into the performance of the bank's operations. One such procedure is the US CAMELS bank assessment procedure, which rates the financial condition and operations of a financial institution on the basis of six factors. CAMELS stands for Capital Adequacy, Assets, Management Capability, Earnings, Liquidity, Sensitivity to market risk. In the case of CAMELS, the results are not made public, as a bank's downgrade could cause panic among the bank's customers (Szemán, 2015).There are several indicators of bank soundness, such as the NPL ratio, which is the ratio of non-performing loans to total loans, the capital adequacy ratio (CAR) and the return on average equity (ROE). The NPL ratio is the ratio of the face value of non-performing loans to total loans. A non-performing loan is defined by the European Union as a loan for which the repayments have not been made for more than 90 days. The NPL ratio shows the deterioration in the quality of the loans granted by banks. The higher the ratio, the worse the quality of the assets, and from this we can infer that the greater the expected loss. The capital adequacy ratio measures the solvency of banks by comparing regulatory capital, i.e. the value of capital assets accepted by bank regulators, to risk-weighted assets. In other words, it shows the loss-absorbing capacity of the bank. The higher the ratio, the more banks can absorb losses without compromising their solvency. The ROE ratio compares banks' profit after tax, i.e. net income, to total capital. It shows the overall profitability of banks. A high value indicates that the banks are in a good position and that, in the near future, they will use retained earnings to increase their In 2016, the NPL ratio in Hungary was 8.1%, which is relatively good, as it has decreased compared to previous years and was higher in several Member States. Greece was in the worst situation with 39%, with more than a third of total loans not being repaid regularly. The CAR ratio was 16.3% for Hungary in 2016. On the positive side, it exceeds 8 % minimum regulatory requirement, on the negative side, it was the 4th worst rate in the EU. The best rate was in Estonia with 34.4%. The ROE ratio in 2016 was 12.1% in Hungary, with only one country ahead of Latvia with 14.3%. Italy was the worst performer in the EU, with 7.7% (European Semester 2017). In relation to the financial sector, the Fundamental Law only names the MNB, the Hungarian National Bank. The law preserves the two-tier banking system, the separation of monetary and fiscal policy and the responsibility to Parliament. The MNB is the central bank of our country (Vértesy, 2020). There are three main categories of banks and credit institutions based on their primary activities: central bank, commercial bank, investment bank (Vértesy, 2020)

Commercial and investment banks

From a macroeconomic point of view, we consider the commercial bank as a monetary financial intermediary, due to its ability to combine the needs of savers and financing. Commercial banks collect deposits as a source of funds, which they can lend to investors. Borrowing is a passive banking operation and lending is an active banking operation. A commercial bank is involved in the payment process by maintaining a payment account and providing payment services to economic agents. Thus, deposits credited to its customers' current accounts are able to function as money as a result of lending or purchasing foreign currency (Vigvári, 2008).Commercial banks essentially cover the main customer segments, as they serve large corporations, small and medium enterprises, and the general public (Barna et al., 2018)

Commercial banks earn most of their income and profits by lending to individuals and businesses. However, banks are more cautious about lending, especially to small start-ups, because of the risk of repayment uncertainty. The least risky for banks is the provision of account management and related services to businesses. Examples include cash operations, services linked to business cards and mobile phones, and internet banking. These are essential services that banks can offer to attract businesses. They make it easier for businesses to get credit from their account-holding bank, because the account-holding bank already has an overview of the business's life and operations. In addition, the entrepreneur himself can find out about the different loan schemes, the different types of loans with different interest rates and subsidies. In the case of businesses, a personal relationship between the bank administrator and the entrepreneur is usually established, which can have a positive impact on the credit assessment (Vecsenyi, 2018).

Commercial banking products fall into the following main categories:

- Credit-type products with credit risk:
- § standard and structured (corporate and retail loan products)
- § credit-type products for documentary transactions (factoring, guarantees, sureties)
- § leasing
- Savings, investment-type products and services:
- § deposit taking, deposit collection
- § sale, brokerage, custody of various securities
- Money transmission services:
- § domestic and foreign transfers
- § cash deposits and withdrawals
- § payment products for documentary transactions (cheque cashing, collection, letter of credit)
- Treasury services (e.g. currency exchange)
- Other services (e.g. safe deposit, custody, cash processing) (Walter, 2016)

Investment banks provide only investment services. Investment banks cannot collect deposits and cannot lend. These banks do not invest their own assets in businesses, but they do invest their clients' capital. These investments are usually long-term, with investment banks mostly issuing and selling shares and bonds (Barna et al., 2018) Investment banks are therefore institutions that specialise in conducting securities issues and investments in the capital markets. They invest investors' savings in riskier financial instruments with higher returns than bank deposits. There are not only functional differences between commercial and investment banks, but also cultural differences. Commercial banks are concentrated in the national market and have an extensive branch network, their customers are mainly middle class of the middle classes. Investment banks are focused on the international, global market, have few branches, open in large financial centres, employ a few 10,000 people, and their staff are not employees of the corporate system but rather partners (Gál, 2010). There is a correlation between the purpose and maturity of loans, as bridging, liquidity and working capital loans are short-term, operating and smaller investment loans are medium-term, while investment and development loans are long-term loans (Vecsenyi, 2018)

Banking risks

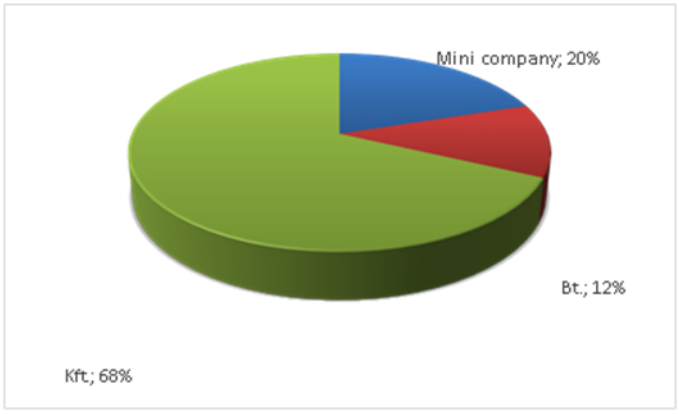
Banks may face different risks in their life, which can be grouped as follows: credit risks, market risks, operational risks and other risks. Credit risk arises from the non-performance or non-fulfilment by the contracting parties of their contractual obligations, i.e. failure to meet outstanding obligations, which may be partial or total, and these together give rise to the risk of losses affecting the bank's profitability and capital position (Vértesy, 2020). That is, the probability that a debtor will default or not meet its obligations in the time and manner required. The risk itself is uncertainty, the volatility of the expected loss. Credit risk is the most significant of all bank liabilities (Horváth, 2001). Within credit risk, we can distinguish four groups: risks related to the person of the customer, the counterparty, risks related to the lending activity, risks related to payment and risks related to other services. When assessing credit risk, the bank assesses whether it should enter into a contract with the prospective debtor, how much credit, money and collateral the customer has, whether the investment is feasible, and the risk involved in entering into a contract with the customer. Operational risk arises when internal processes and systems are inadequate or poorly functioning, or inadequate performance by individuals or external events. Operational risk includes legal risk, including business risk, reputational risk and information and communication technology risk (Vértesy, 2020). Operational risk includes, for example, harm by employees or managers, which may be intentional. This could be the unauthorised misappropriation of money or even information, bank secrecy, bribery, mistakes or errors due to lack of professional competence. Operational risks also include incidents related to the ongoing business operations of the bank's infrastructure, such as system failures or system downtime. It also includes external events such as environmental/natural disasters or losses caused by third parties. Examples include floods, earthquakes, burglaries, vandalism, terrorist attack. There are many factors that can be classified as operational risks, many of which do not occur in banks, but when they do, they can have serious consequences (Lamanda, 2011). Market risk is the risk of changes in the value of products traded on financial markets, i.e. stocks, bonds, currencies and commodities, due to changes in market prices. (Dömötör-Miskó, 2016) Market risk is in fact the sensitivity to changes in market interest rates and market exchange rates, and consists of the following elements: position risk, foreign exchange risk, commodity risk, and the risk of changes in the value of the whole activity (Vértesy, 2020) Other risks include material risks that are not or difficult for the institution to quantify. Therefore, these risks are measured using quantitative methods. Other risks may also include risks arising from the regulatory environment, political risks, general legal risks and risks arising from external factors such as the economic situation of the country, etc. (Vértesy, 2020) In the case of risks, the probability of the risk occurring, the frequency with which it occurs and the extent of the damage that will be caused if it does occur play an important role. Frequently occurring risks with large losses can be a great threat to the life and viability of the bank (Dávid et al., 2018) Risk is present in many areas of our lives, such as economic, financial-banking, social, political. Risk is calculated by taking into account the objective and the and influencing factors. Risk is a phenomenon in the field of banking activities that can arise in the operation of banking companies and can also cause negative aspects by deterioration of the quality of business, reduction of profits or even accounting losses. What we really mean by risk in the banking sector is the probability of loss. It is not a purely mathematical probability, but it depends on the bank's transactions with its customers, the loans granted to customers, the development of the bank and its payment systems. The mathematical context and approach is used to assess credit risk (Krájnik-Demeter, 2021) The bank prepares to cover losses by building up internal reserves. On the one hand, it prepares for the expected loss (EL), which is well measurable and expected, by setting up impairment charges and provisions, and on the other hand, it prepares for unexpected losses (UL), which are less frequent and difficult to measure (Dávid et al., 2018). Risk management is a systematic approach that refers to the conscious awareness and active control of risks, with the aim of ensuring that the operation of the company and the achievement of its business objectives and the expectations of its owners and stakeholders are met and smooth. The aim of risk management is not necessarily to reduce or avoid risks, but rather to minimise the potential impact of risks by achieving and maintaining a high level of risk awareness and optimising the outcome of business decisions. The risk acceptance and risk management principles adopted by the Bank are summarised in the Risk Acceptance Policy and include the rules and risk management objectives that management expects to be applied throughout the institution. Risk appetite, or risk tolerance, refers to the amount of risk that the bank is prepared to take and is able to tolerate. Risk

appetite is a measure of the risks to which the bank is willing to be exposed and to what extent, which risks it considers acceptable and which it does not, and how it controls and reports risks (Vértesy, 2020).mThe main objectives of risk management in banking are: to identify risks; to develop appropriate methods for measuring and quantifying risks; to enforce established risk management methodologies in processes and decision making; to monitor and report risks; and to reduce and mitigate risks (Dávid et al., 2018)

Methodology

My questionnaire reached 25 small and medium-sized enterprises online using Google Form. My questionnaire consisted of multiple-choice and essay questions, and 5-point Likert scale questions. More than two thirds of my respondents are entrepreneurs in the form of an LLC, 20% (5) are self-employed and 12% (3) have established a business in the form of a Bt.

Figure 1.: Distribution of SME company forms (%)



Source: own ed.

Among the respondents, 13 enterprises have less than 10 employees, 8 enterprises have between 10 and 49 employees and 4 enterprises have between 50 and 249 employees.

The annual turnover of the enterprises was as follows: between HUF 0-20 million for 2 enterprises (8%), between HUF 21-50 million for 3 enterprises (12%), between HUF 51-100 million (8%) and between HUF 51-100 million (12%). Forints 51-5100 million for 6 enterprises (24%), Forints 101-250 million for 2 enterprises (8%), between HUF 251-500 million to 5 enterprises (20%), between HUF 501 million and HUF 1 billion 501 million, 3 enterprises (12%) and 4 enterprises (16%) had an annual net turnover of over 1 billion. And the annual profits of the firms were as follows: between HUF 0-20 million for 10 firms (40%), between HUF 21-50 million for 8 firms (32%), between HUF 51-100 million (40%) and between HUF 51-100 million (32%). Between HUF 51-5 million, 4 enterprises (16%) and between HUF 101-250 million, 3 enterprises (12%) had an annual profit.

It can be clearly seen that the filling firms have high revenues, but compared to these high amounts, the firms' profits are low. For example, there were firms with annual net sales of over HUF 1 billion, but annual profits of only HUF 21 to 50 million. Only 5 firms (20%) had an annual net turnover below HUF 50 million, but more than two thirds (72%) had an annual profit of less than HUF 50 million. 56% of firms (14 firms) deal with products, 32% (8 firms) with services and 12% (3 firms) with both. 56% of the firms are engaged in trade, 16% in manufacturing, 8% in professional, scientific and technical activities and one firm each (4%) in: agriculture; construction; transport and storage; business services; information and communication; decorating services. More than two thirds of the responding enterprises have credit. 17 enterprises (68%) have credit and 8 enterprises (32%) do not. In terms of the type of credit used by enterprises with credit, 47.1% have a discretionary loan, 47.1% have a restricted loan and 5.9% have both types of loan. More than half of the earmarked loans are investment loans and one third are working capital loans. In addition to these two popular types of credit, leasing and overdrafts were also popular among businesses. The maturity of the most recent loan of enterprises with credit is mainly medium-term (70.6%), 23.5% have a loan with a maturity of less than 1 year or short-term and 5.9%

have a maturity of more than 5 years, i.e. long-term. 88.2% (15 firms) of the enterprises have secured loans and 2 enterprises (11.8%) have unsecured loans. 88.2% of enterprises (15 firms) have taken out a HUF loan and only 2 enterprises (11.8%) have taken out a foreign currency loan. Two thirds of enterprises taking out foreign currency loans borrowed in euro and the remaining one third, 1 enterprise, borrowed in Swiss francs. francs. 94.1% of firms have a subsidised loan and only one firm (5.9%) has a loan that is not subsidised. Of further interest is the bank from which the firms have taken out their loans. The 17 firms that took out a loan borrowed from 8 different banks, of which OTP Bank was the most popular, with 5 firms (29.4%) borrowing from OTP Bank. In addition to OTP Bank, more enterprises borrowed from Raiffeisen Bank, as 23.5% of them (4 enterprises) borrowed from Raiffeisen Bank. One enterprise borrowed from Unicredit Bank, Budapest Bank, K&H Bank and Merkantil Bank. 94.1% of enterprises borrowed from a Hungarian-based bank and 5.9% from a foreign-based bank. We were interested to know whether the enterprises that took out a loan borrowed from the same bank as the bank where they kept their current account. 94.1% of them borrowed from the same bank and 1 enterprise did not borrow from the bank with which the enterprise has a current account. Enterprises borrowed mainly to finance current assets, but also for improvements and modernisation. 1 enterprise borrowed to buy real estate and 1 enterprise borrowed to buy a car. It was asked whether businesses had found it easier or more difficult to obtain credit in recent years. 13 enterprises clearly feel that they have found it easier to obtain credit in recent years. For 2 businesses it was more difficult to access credit compared to their experience in previous years. One business has found it more difficult to get a loan, but they clearly feel that the choice of loans has increased over the last few years. Furthermore, there was 1 business that had applied for a loan for the first time, as an overdraft facility, as they were, as they put it, "quasi 0%". Of the 25 responding firms, 8 firms had no credit. In their case, I asked whether they planned to take out a loan in the future. 5 firms do not plan to take out a loan in the future, 2 firms plan to take out an investment loan in the future and 1 firm would take out a development loan. The majority of entrepreneurs feel that they have enough information about the process of taking out a loan. However, 10 businesses do not know what paperwork to submit when taking out a loan. In addition, there were a few businesses that do not know what paperwork needs to be submitted, but the majority believe they know what paperwork is required. A similar situation was found with regard to credit scoring indicators. Although most were unable to decide, businesses tended to believe that they were aware of the indicators that banks look at when analysing firms for credit. Businesses' views on the latest loan schemes were also similar. However, in this case, they also tend to think they are familiar with the latest loan structures. The majority of businesses are monitoring state-subsidised loans. Enterprises feel that they are aware of the risks that are likely to arise in connection with the loan. They fully agree with the statement that they can determine what expenditure cash flows will be incurred from period to period when taking out a loan. They also are fully aware of the extent to which a loan could affect the financial stability of their business. Although they fully agreed with the previous two statements, they were already divided on the information they needed to obtain credit. Nevertheless, entrepreneurs believe that they can find out for themselves the information they need to obtain credit. I have also used a 5-point Likert scale, where I was interested in the extent to which the statements were perceived by the entrepreneurs to be true for themselves. In the previous sections, I examined their awareness of credit, and in the following sections I will focus on their attitude towards credit. The statements were as follows:

To analyse the questions, I also performed a Pearson correlation analysis. For which I identified the following relationship preferences:

Table 1: Correlation analysis

Kérdések	*8A*	*8B*	*8C*	*8D*	*8E*	*8F*	*8G*	*9A*	*9B*	*9C*	*9D*
8A	1										
8B	0,74	1									
8C	0,74	0,75	1								
8D	0,36	0,75	0,54	1							
8E	0,52	0,70	0,73	0,66	1						
8F	0,47	0,72	0,55	0,58	0,59	1					
8G	0,58	0,67	0,53	0,53	0,57	0,72	1				
9A	0,52	0,71	0,43	0,54	0,42	0,73	0,83	1			
9B	0,53	0,78	0,68	0,65	0,67	0,79	0,64	0,73	1		
9C	-0,31	-0,33	-0,25	-0,17	-0,44	-0,15	-0,29	-0,18	-0,21	1	
9D	-0,24	-0,02	0,15	0,14	0,14	-0,04	-0,17	0,04	0,21	0,22	1

Source: owned.

Although the entrepreneurs' opinion was divided on the first statement, they still feel that they do not like to take out loans. Despite the fact that they do not like to take out a loan, the majority of the responding enterprises do have a loan and have sufficient information about taking out a loan (0.52) The majority of enterprises do not agree at all that they only like to take out investment loans. There was a mixed response to the question of when businesses take out credit. The same number of enterprises strongly agree with the statement that they only take out credit as a last resort as those that strongly disagree. The majority neither agree nor disagree, but a minority of businesses still leaned towards disagreeing with the statement. Although the previous question had mixed responses from entrepreneurs, they disagreed strongly with statement 4. That is, they disagree with the statement that they would not take out a loan even if they were developing. Businesses also disagree with the statement that operating credit is a "sin", i.e. they do not consider it to be one. Nor do they agree that any form of credit would be detrimental to their own business. The last statement was the one that most firms strongly disagreed with. This was not surprising, in fact I expected them to disagree, but what is surprising is that there are 6 firms that agree with the statement. That is, 24% of the 25 responding firms would rather let their firm go bankrupt than take out a loan. I asked the entrepreneurs to list the documents they would need to submit in order to apply for a loan. According to their answers, most of them were aware of the documents to be submitted. 6 entrepreneurs did not know which documents to submit, i.e. there were entrepreneurs who knew anyway, which documents were required, that they did not have credit. There was 1 entrepreneur who had credit but did not know which documents were required. In addition, there was 1 entrepreneur who only indicated that he only knew incompletely, as he has his own financial expert and he used to help him prepare the documents. I asked the entrepreneurs what THM meant. On the positive side, 88% of them were aware of it, but 3 were not. On the negative side, 2 of the 3 enterprises that did not know what APR was, had a loan. Moreover, both of them have investment loans in foreign currency. One of the enterprises borrowed in Swiss francs and the other in euros. We are now interested in how business-friendly the banking sector is perceived to be by businesses and how they think banks' lending policies towards firms have changed over the last 5-10 years. Thirteen enterprises, i.e. the majority of businesses, believe that banks are business-friendly and feel that they are increasingly open to SMEs, that there is a greater choice of loans and that they can access credit more easily and quickly than in the past. They feel that banks are becoming more helpful towards SMEs. 6 enterprises cannot give an opinion, as some have no credit and never had credit before, and there were also enterprises that have just taken out credit for the first time. The other 6 enterprises absolutely do not consider the banking sector to be business friendly and unfortunately have negative experiences. Some feel that the situation has only worsened in recent years and others feel that the banking sector is profit hungry. Some people named a specific bank that had a lot of negative comments. My last question to entrepreneurs was actually four questions. Firstly, I was interested in whether they thought it was possible to grow from credit, and whether financing from credit could be a trigger for growth. And also, to what extent this can be achieved in a company. Finally, they are interested in the extent to which it is true that credit creates the possibility of growth and development in the life of a firm and whether credit has indeed developed the firm for those who have credit. On the positive side, there are only three firms that do not believe that credit can be used to grow at all and on the negative side The other entrepreneurs think that it is possible to grow from credit. There are some who fully agree

with the statements and believe that their business is also growing steadily thanks to credit. There were also firms that need higher stock to achieve growth and in their situation credit is/was the means to finance the stock. Also, there were firms where credit contributed to growth because they had increased orders and therefore needed to buy more lines of machinery or needed more raw materials, which were financed by credit. There are some who believe that credit helps them to grow and that it helps them to grow faster, but they do not believe that taking out credit is a good solution at the moment because of the uncertainty of what is happening in the world. Some also think it is very important for companies to keep growing. Some believe that the right use of credit is necessary for a company to grow significantly. Some people have been able to buy in larger volumes thanks to credit, which has led to better purchasing prices. And they had a higher turnover thanks to a wider choice. All this had an impact on the company's results. One could argue that if an entrepreneur finds/chooses the right credit structure, it should have a positive impact on the development of the company. Some entrepreneurs have been able to grow thanks to the loan by buying a more modern property and moving their company there. 76% of my respondents were men and 24% women. In terms of age, more than half of the respondents (52%) are between 41 and 55 years old. 24% of respondents (6) were aged 31-40, 20% (5) were aged 55+ and only one respondent was aged 18-30. I also considered it relevant to know how many years of entrepreneurial experience the respondents had. On the positive side, many (32%) have over 30 years of entrepreneurial experience. 24% of the respondents had between 11-20 years of entrepreneurial experience, 20% between 21-30 years, 12% between 6-10 years, 8% between 1-5 years and only one entrepreneur had less than one year of entrepreneurial experience. We were further interested in the region in which the enterprises are located. In terms of the region where the enterprise is based, 60% of respondents (15) have their headquarters in the Southern Great Plain, 16% in Central Hungary, 8% in the Southern Transdanubia and 4-4% in the Central Transdanubia, Western Transdanubia, Northern Great Plain and Northern Hungary. Also of interest is the type of municipality in which the business owners have their business. 56% of owners have their business in a county seat, 36% in a city and 8% in a municipality. Finally, we are interested in the highest level of education of the business owners. 24% have a vocational education, 36% have a high school education, 16% have a college education and 24% have a university education.

Conclusions

My questionnaire for small and medium-sized enterprises was mainly filled in by SMEs, which is not surprising, since limited liability companies are the most numerous among partnerships. The majority (68%) of the businesses that completed the questionnaire have credit, which was confirmed by the banks, as this is about the proportion of SMEs that have an account with a bank. The most popular types of loans for SMEs are investment loans and working capital loans, as revealed by the in-depth interviews with banks. Of the firms with credit, all but one have subsidised credit. The banks specifically pointed out that there is always a strong interest in subsidised loans. OTP bank was the most popular bank among SMEs, with the highest number of borrowers. This is not surprising as OTP bank is the largest commercial bank in Hungary. As I have pointed out in the literature, banks turned mainly to large companies in the 1990s, and from the 2000s onwards started to lend more to the SME sector. SMEs have noticed this, they have much easier access to credit, there is more choice and, in addition, the loans are very cheap. As they put it, it is almost "free". Even companies that never borrowed before have taken out loans because the credit is so cheap. Because of the favourable conditions, even those who do not currently have credit are planning to take out loans in the future. Members of the SME sector feel that they are aware of the risks involved in taking out a loan, but nevertheless feel that they would not be able to gather the necessary information to take out a loan on their own. The majority of SMEs feel that they are familiar with the credit rating indicators, they know what indicators banks look at when analysing firms when they are borrowing. However, all of the responding banks say that firms are not aware of these indicators. According to one bank, they are not even aware of them because they are not published. In fact, firms only have a rough idea of which indicators are used by banks and which balance sheet ratios are compared by banks. Businesses will only know, when applying for a loan, whether the application has been assessed positively or negatively. They will know on what criteria they decided, what indicators they have calculated, will not be made public to businesses, even if the assessment is negative. This may in fact have caused the conflict between SMEs and banks. Although the majority of SMEs have credit, business owners are reluctant to take out loans. In addition, firms see credit as a

growth engine - which the banks have confirmed - and have reported a number of successes, growth and development, yet they do not prefer to take out loans. So much so that 24% of firms would rather go bankrupt than take out a loan. However, businesses do not see operating loans as a "sin", which is not surprising given the strong interest in EU zero-percent operating loans during the pandemic. Small and medium sized enterprises perceive themselves as being familiar with the process of taking out a loan, but banks do not think they are very familiar with it, and banks were divided on this issue. Some banks pointed out that start-ups are not familiar with the process of borrowing. On the other hand, among the SMEs, the responding firms are companies with several years of experience and more than 50% of the owners have more than 20 years of entrepreneurial experience. This may have caused the split in opinions. The majority of businesses are aware of the documents to be submitted when applying for a loan, as the majority of businesses have credit. Banks' opinions were divided on whether SME members, as corporate customers, go to the bank prepared to negotiate when applying for a loan. This may be because larger companies and medium-sized enterprises have their own financial experts and economic/financial directors and they come to the banks for negotiations. In the following, I accept or reject my hypothesis based on the conclusions drawn from the questionnaire and the in-depth interview with the experts:

- H1: SME sector actors are not aware of their credit options.

SMEs are aware of their credit options. On the one hand, more than two thirds of them have access to credit, and on the other hand, in the current situation there are a lot of opportunities for the SME sector in the field of credit. The majority of SMEs agreed with the statement that they are aware of the latest credit schemes. In addition, SMEs are monitoring the loans subsidised by the state. Bank executives also highlighted that there is significant interest in subsidised loans. Moreover, people who have not taken loans before and those who do not have loans are planning to take loans in the future. On these grounds, I reject my hypothesis.

- H2: The SME sector is afraid of borrowing.

SMEs are aware of the risks they are likely to face when taking credit. They can also determine the cash flows of expenses that will be incurred from period to period in the case of a borrowing. They are also aware of the extent to which borrowing could affect their financial stability. Most of them have credit and are reluctant to take out a loan. But even if they do not like to borrow, they are not afraid of borrowing. On this basis, I reject my hypothesis.

- H3: Two-thirds of the SME sector only takes out operating loans.

SMEs do not have operational credit at the moment, but they are absolutely not against it. The respondents included financially stable firms with several years of experience. Although the experience of bank managers suggests that there is a strong interest in operating loans, in this case I have to reject my hypothesis.

- H4: The managers and owners of SMEs do not have sufficient information about the process of obtaining loans.

SMEs are sufficiently informed about the process of borrowing, as most of them have a credit history and some of the larger SMEs have their own financial experts. According to bank managers, start-up strat-up firms are not familiar with the process of borrowing. The responding SMEs included owners with several years of entrepreneurial experience and who have taken out several loans over the years and are therefore already familiar with the process of borrowing. On this basis, I reject my hypothesis. Overall, it can be said that SMEs have a positive attitude towards borrowing. Although they are reluctant to take out loans, a very large number of enterprises have access to credit. SMEs see credit as an opportunity for growth and development, which is confirmed by bank managers. They are willing to take risks to achieve their goals and succeed, as they could not do it on their own. Businesses that do not have access to credit do not dare to take the risks that may arise. They do not like uncertainty, they prefer stability. On the other hand, they do not have enough information about credit and do not know what documents to submit. Many account holders are looking to their contact person for help, but some do not consider the banking sector to be business-friendly at all, and therefore lack confidence. Without

trust, they will not take the risk of taking out a loan. Some businesses would only take out a loan as a last resort, but there are also those who would rather let their business fail than take out a loan. There are also businesses that did not have access to credit before, but took out a loan because of the favourable conditions in order to grow and succeed. In addition, businesses that do not have credit also include those that plan to take out credit in the future, which is also because of the favourable interest rates and state-subsidised loans.

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