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# Perception of Self-service Checkouts in Hungary


## Summary

The study investigates consumer acceptance of self-service checkouts (SSCs) in Hungary, analyzing responses from over 10,000 participants to identify demographic and psychological factors influencing their use. The results show a clear preference for SSCs among younger, educated, and urban residents due to perceived efficiency and autonomy. However, a substantial segment of the population, particularly older and less tech-savvy individuals, resist using SSCs, citing a lack of personal interaction and technological challenges. The study emphasizes the need for retailers to maintain a balance between self-service and traditional checkouts to cater to the diverse preferences of their customer base, suggesting that a thoughtful integration of technology could enhance customer satisfaction without alienating those uncomfortable with digital transitions.


**Keywords:** self-service checkouts (SSCs), consumer acceptance, technology adoption, retail innovation, efficiency improvements

**JEL-codes:** L81, M31

## Introduction

Regan's research in 1960 discusses the evolution of self-service in retailing, emphasizing its impact on reducing operational costs while enhancing consumer autonomy. Introduced first by Clarence Saunders with the Piggly Wiggly store in 1916, self-service shifted responsibilities from the retailer to the consumer, leading to lower retail costs and altered consumer behaviours. Retailers have found self-service appealing as it reduces labour costs and enhances store efficiency. Consumers have embraced self-service due to its convenience and the control it offers, allowing them to shop without sales pressure and at their own pace. This model has proven particularly effective in sectors where goods are standardized and shopping can be expedited, such as groceries and drugstores (Regan, 1960). The development has continued unabated since then, with self-service expanding into more and more areas and sectors. Nowadays, one of the tools for increasing efficiency is the use of self-service checkouts (hereinafter referred to as SSCs). The adoption of SSC technology has brought significant changes to the retail sector, affecting consumer experience and shopping behaviour in many ways. Self-checkout systems have been in existence since 1986. The world's first self-checkout machine was introduced in July 1986 at a Kroger supermarket in Atlanta, USA. This innovative concept was developed by David R. Humble, who was inspired by an experience he had in 1984 while waiting in line at a supermarket (Beck, 2022; Dowell, 1987). Technology has advanced significantly. As of 2018, there were an estimated 350 stores in the world that offered a fully autonomous checkout process. The number of stores offering autonomous checkouts was forecast to grow substantially over the coming years, with 10,000 stores with autonomous checkouts anticipated by 2024 (Business Insider, 2019). EDEKA Jaeger, a German supermarket chain, has introduced an AI-based age verification system at their 24/7 store in Stuttgart Airport. This system, provided by Diebold Nixdorf, uses Vynamic Smart Vision I Age Verification to allow customers to authorize age-restricted purchases at SSCs quickly. The system analyzes facial characteristics to confirm age within 10 seconds, significantly reducing the need for staff intervention and improving customer flow and service. The technology has been adopted successfully, with over 80% of age-restricted transactions verified automatically in its first week. The solution is GDPR-compliant, ensuring that it neither recognizes nor stores any personal data (PR Newswire, 2024)

## The Prevalence of SSCs

The global landscape of self-service kiosks and checkout systems has grown significantly in recent years. As of 2023, there are over 217,000 self-service kiosks delivered worldwide, marking a 12% increase compared to the previous year. The global self-service kiosk market was valued at approximately 27.12 billion USD in 2021 and is projected to reach 46.72 billion USD by 2030, growing at an annual rate of 6.23% (Straits Research, 2023). According to Insightspartner the self-service kiosk market size is projected to reach 66.88 billion USD by 2031 from 29.65 billion USD in 2023. The market is expected to register a CAGR of 10.7 % in 2023-2031 (Insightspartner, 2024). As of 2013, there were 191,000 SSC units deployed around the globe, and by 2025, it is predicted that 1.2 million units will be installed worldwide. Forecasts suggest that the number of installed self-service terminals will reach 2 million by 2029 (Walk-Morris, 2024; RBR Data Services 2024).

The prevalence of SSCs and kiosks varies by region. North America holds the largest share of the market, accounting for over 44% of global revenues in 2021. The United States is a leader in the adoption of self-service technology (hereinafter referred to as SST), particularly in supermarkets and convenience stores. Europe is the second-largest market, with notable growth in countries like the United Kingdom, Russia, and Germany, where large-scale installations are taking place. The Asia-Pacific region is rapidly expanding, with significant installations occurring in China, South Korea, and other developing nations. The fast-food chain McDonald's is one of the largest users of SST, with over 130,000 kiosks deployed globally. In summary, while North America leads in terms of market share and revenue from self-service kiosks, Europe and Asia-Pacific

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are also experiencing rapid growth, contributing to the overall expansion of this technology worldwide. (Straits Research, 2023; Walk-Morris, 2024; RBR Data Services, 2024).

The number of SSCs in Hungary currently ranges between 3,500 and 4,000. This represents about 10% of all retail checkouts (Szeghalmi, 2024). A survey shows that 34% of Hungarians regularly use these checkouts, 22% alternate between self-service and traditional options, and another 22% oppose them entirely. Younger individuals aged 18-39 are the most frequent users, with 49% favouring self-service, while 37% of those over 60 dislike the system. Education and geography also play a role, as 43% of individuals with higher education and residents of Budapest or county seats prefer SSCs, compared to 30% in smaller towns who would like them removed. (Hercsel, 2024).

## SSCs and Technology Adoption

According to the literature, SSCs offer several benefits to consumers, including perceived usefulness, the need for autonomy and efficiency, and perceived ease of use (Ruangkanjanases & Tantrakul, 2015). These benefits contribute to improving the customer experience by reducing waiting times and offering innovative features that take gender differences into account (Wang & Han, 2022). Some research has also found that the quality of service provided by SSCs directly affects consumers' retail purchase intentions, especially in terms of reliability, personal interaction, and problem-solving capabilities (Lee et al., 2009). It is essential to mention that the presence of other customers in the self-service area may influence consumers' preferences for problem-solving in the event of errors, as people prefer employees to fix errors when others are present (Collier et al., 2004).

The study by Scherer et al. (2015) investigates the long-term effects of technology-based self-service on customer retention. The findings reveal a U-shaped relationship between the mix of self-service and personal service usage and customer defection, suggesting that moderate levels of both types of service are optimal for retaining customers. Over time, the impact of this service mix on customer retention diminishes, indicating that customers adapt and become less likely to defect based on service type alone. The study emphasizes the importance of not pushing customers entirely towards self-service, especially in the early stages of customer relationships (Scherer et al., 2015)

According to the Technology Acceptance Model, consumers' attitudes toward self-checkout systems significantly influence their usage and intention for repeated use (Thomas-Francois & Somogyi, 2023). Facilitating conditions, social influence, and openness to new experiences all play a crucial role in adopting mobile SSTs within the retail sector (Liang et al., 2022). Leng and Wee (2017) found in their study that users of self-checkout systems perceive these technologies as more advantageous and less complex compared to non-users, which further contributes to the development of positive consumer attitudes (Leng & Wee, 2017).

Salomann et al. (2006) discuss the evolving role of self-services in customer relationships, emphasizing the challenge of balancing high-tech and high-touch elements. They highlight that while technology-driven self-service options expand, the crucial element remains the human interaction these services aim to supplement or replace. The study predicts future trends towards integrating self-services with traditional customer touchpoints, using voice-based technologies for more natural interactions, and developing „persona" designs to humanize technology interfaces. These strategies aim to enhance user experience by balancing technological efficiency and personalized service (Salomann et al., 2006).

Kattara and El-Said (2013) explore customer preferences for technology-based self-services (TBSS) versus human interaction services (HIS) in the hospitality industry, particularly in hotels. They found that while some customers appreciate the speed and convenience of SSTs, a significant majority still prefer personal interactions, especially during critical service encounters such as check-in or when making complaints. The study suggests that personal service remains crucial for customer satisfaction and loyalty, highlighting that even as technology advances, the human element remains indispensable in the hospitality sector (Kattara & El-Said, 2013). The study by Gültekin and Küçükkancabaş Esen (2020) investigates factors influencing the adoption of SSC technologies in supermarkets. The research was conducted through structured questionnaires from 425 consumers. Results show significant effects of situational factors on consumer attitudes and perceived behavioural control. Positive relationships were established between attitudes, perceived control, usage, and recommendation behaviours toward SSCs. The study emphasizes the strategic implementation of SSCs to improve operational efficiency and customer satisfaction in retail environments (Gültekin & Küçükkancabaş Esen, 2020).

The study by Meuter et al. (2005) explores customer adoption of SSTs, focusing on the factors that influence initial trials. The research highlights the importance of "consumer readiness", which includes role clarity, motivation, and ability, as key mediators between established adoption constructs like innovation characteristics and individual differences and the likelihood of trial. The findings suggest that understanding consumer readiness can significantly enhance marketing strategies by targeting specific aspects that influence consumer decisions to try new service delivery modes (Meuter et al., 2005).

Individual differences in the use of self-checkout systems significantly influence consumer decision-making. Millennials, in particular, demonstrate a high level of acceptance towards these technologies, as they have a lower need for human interaction during their shopping experiences (Lee & Leonas, 2021). Conversely, some studies, such as the one conducted by Matic et al. indicate that technical failures often lead to the rejection of self-checkout systems. Addressing such technological failures and ensuring error-free operation are crucial for enhancing user satisfaction (Matic et al., 2019).

## Service Quality and Customer Satisfaction of SSCs Worldwide

Fernandes and Pedroso (2017) have shown in their research that service quality characteristics of SSCs, such as speed, ease of use and reliability, directly impact consumer satisfaction and repurchase intention (Fernandes & Pedroso, 2017). Furthermore, demographic factors such as gender, age and technological attitude significantly influence the acceptance and long-term use of retail self-service systems (Lee et al., 2010). The research findings suggest that improving service quality and understanding consumer attitudes can promote the broader adoption of SSCs.

Bitner et al. (2002) examine the implementation and challenges of SSTs. The authors emphasize the need for firms to align SSTs with their strategic goals, whether to reduce costs, improve customer satisfaction, or both. They identify key factors such as customer readiness, which includes ability, motivation, and role clarity, that influence the adoption of SSTs. Through extensive research, they also highlight the importance of managing customer satisfaction and ensuring reliable technology operations to foster successful SST deployment (Bitner et al., 2002).

Inquiry Market Research examines the evaluation of SSCs in Polish stores in 2023. The highest-rated feature is making payments for convenience and security, with 83% of respondents giving positive feedback. Convenience follows closely at 81%. Other aspects like messages on display, ease of use and speed are also viewed favourably, with scores around 78%. The ability to check prices independently and the reliability of cash register operations received lower positive responses at 74% and 57%, respectively (Inquiry Market Research, 2023). 72% of Generation X consumers in the United States claimed that they were likely to use SSCs if available when shopping for home furnishings. This figure was 60% for Baby Boomers. (Furniture Today, 2020).

EMarketer (2019a) examines consumer usage and interest in using SSCs in-store in the United States in 2019. Nearly half of the respondents (47%) reported using SSCs regularly, while 31% have used them before but not regularly. A smaller segment of consumers, 12%, have not used these checkouts and are not interested in them, whereas 3% have not used them but are very interested. Only 5% have not used them but are somewhat interested, and a minimal 2% are unaware of what SSCs are (eMarketer, 2019a). Among the youngest group (18-34), a significant majority (59%) use SSCs regularly, which is the highest rate among all age groups. The 35-54 age group shows 46% regular use, while those aged 55-65 show 39%. Although they haven't yet, interest in trying these checkouts is relatively low across all age groups but highest in the 18-34 category at 4%. Conversely, the lack of interest in using SSCs increases with age, with the highest disinterest at 6% in the 55-65 category (eMarketer, 2019b).

OpinionWay & Keyneosoft (2016) examine which innovations should be implemented in stores to make the waiting time at the checkout more pleasant and reduced. The most favoured innovation is increasing the number of automatic/SSCs, receiving 35% of respondent support. This is followed by having salespeople within the store aisles for checkouts, favoured by 27%. Scanners for customers to scan products while shopping received 26% approval. Other less popular innovations include dematerialized waiting lines (23%), installing screens along the waiting lines (20%), and abandoning traditional waiting lines for more innovative solutions (17%) (OpinionWay & Keyneosoft, 2016).

Rakuten Insight (2023a) examines the most common services used to enhance the shopping experience in India as of November 2023. The most popular service is „Click-and-collect" (buy online, pick up in-store), with 34% of respondents using it. This is closely followed by express delivery options at 33% and SSC at 31%. Other notable services include item availability indicators (26%), customer messaging service (25%), and pre-orders (22%). Less commonly used services are cross-channel returns at 18% and in-store appointments at 13%. A small percentage of respondents, 11%, did not use any listed services (Rakuten Insight, 2023a).

According to Salesforce (2020) the most well-known and utilized service in Germany in 2020 is „Click & Collect" recognized by 85% of respondents and used by 38% in omnichannel retail services. SSC is also popular, known by 82% and used by 43%. „Ordering in-store" is known by 79% of respondents, with 25% using the service. Other services like „Item availability indicator" and „Shopping list" are also widely recognized at 76% and 71%, respectively, but have lower usage rates of 47% and 28%. Less familiar services include „Video chat" known by 51% of respondents but used by only 11% (Salesforce.com, 2020). Rakuten Insight (2023b) examines the leading services enhancing the shopping experience in Japan as of November 2023. The most effective services identified by respondents are the item availability indicator and SSC, each used by 45% of respondents. Pre-orders follow with 27% usage. Other services like „Click & Collect" and express delivery options are used by 19% and 18% of respondents, respectively. Less commonly used services include in-store appointments (11%), cross-channel returns (10%), and customer messaging services (5%). A small segment of respondents (6%) mentioned other services, and 8% did not use any listed services. Rakuten Insight (2023b).

Capgemini (2023) examines worldwide consumer expectations towards companies during the cost-of-living crisis 2022. consumer expectations towards companies during the cost-of-living crisis worldwide in 2022. The highest expectation, at 70%, is for companies to provide more discounts on essential items such as food, medicine, fuel, apparel, and utilities. Close behind, 69% of consumers expect bigger discounts for loyal customers. Other significant expectations include accepting lower prices for essential products (67%) and forfeiting excess profits for the benefit of society (65%). Technological solutions to lower prices are expected by 56% of respondents („To use technology to lower prices, e.g., replacing staffed check-out counters with self-service payment areas to lower overheads"), the same percentage that also desires reduced prices on non-essential items that improve standards of living, such as toys, books, and electronics. Working with banks to provide credit to customers is expected by 50% of respondents (Capgemini, 2023).

42% of respondents globally find the ability to use SSC kiosks appealing when shopping in physical stores. This data comes from a survey conducted in December 2022, published by PwC, reflecting the preferences of consumers who have shopped online at least once in the previous year. The result highlights a significant interest in this technology, emphasizing its role in enhancing the in-store shopping experience (PwC, 2023). Results of PwC (2024) examine the preferences of Central American consumers for attributes in brick-and-mortar stores in 2024. The survey results show that 88% of respondents value in-store offers and promotions most highly. Following that, 69% appreciate attentive and helpful sales staff. Other significant factors include in-store pick-up services at 37%, SSC options at 32%, in-store entertainment at 19%, and immersive digital experience options at 18%. Only 9% are interested in scheduling appointments, and a minority of 5% do not prioritize any of the listed attributes. This survey conducted by PwC includes responses from 170 individuals across countries like Costa Rica, the Dominican Republic, El Salvador, Guatemala,

Honduras, Nicaragua, and Panama, aged between 18-60 years (PwC, 2024).

Research by Apparel Magazine (2015) examines the preferred in-store technologies to enhance shopping experiences: 1. Ability to check stock quickly (40%), 2. SSC (36%), 3. In-store Wi-Fi (25%), 4. Real-time, personalized offers (19%), 5. Mobile payment options (13%). These technologies reflect a growing consumer preference for convenience, speed, and personalized shopping experiences (Apparel Magazine, 2015). products (67%) and forfeiting excess profits for the benefit of society (65%). Technological solutions to lower prices are expected by 56% of respondents („To use technology to lower prices, e.g., replacing staffed check-out counters with self-service payment areas to lower overheads"), the same percentage that also desires reduced prices on non-essential items that improve standards of living, such as toys, books, and electronics. Working with banks to provide credit to customers is expected by 50% of respondents (Capgemini, 2023).

**Table 1. Socio-demographic composition of the sample (N=10,358)**

| Socio-demographic variables | Number of respondents | % |
|---|---|---|
| Male | 5,738 | 57.3 |
| Female | 4,268 | 42.7 |
| **Distribution by education** | | |
| Below 8th grade | 11 | 0.1 |
| 8th grade | 127 | 1.3 |
| Vocational training | 973 | 9.7 |
| Secondary-school leaving certificate | 3,638 | 36.3 |
| College, university | 5,283 | 52.7 |
| **Distribution by age** | | |
| < 18 years | 24 | 0.2 |
| 18-29 years | 372 | 3.7 |
| 30-39 years | 1,092 | 10.9 |
| 40-49 years | 2,310 | 23.0 |
| 50-59 years | 2,725 | 27.1 |
| 60-69 years | 2,259 | 22.5 |
| 70-79 years | 1,197 | 11.9 |
| >80 years | 77 | 0.8 |
| **Distribution by status** | | |
| Student | 159 | 1.6 |
| I receive childcare benefits | 130 | 1.3 |
| Housewife | 112 | 1.1 |
| Unemployed | 163 | 1.6 |
| Performs physical work | 1,745 | 17.4 |
| Performs intellectual work | 4,179 | 41.6 |
| Pensioner with disability, pensioner | 2,671 | 26.6 |
| None of the categories above | 886 | 8.8 |
| **Distribution by income status of the household** | | |
| Significantly below the average | 519 | 5.2 |
| Slightly below the average | 1,278 | 12.8 |
| Average | 4,740 | 47.6 |
| Slightly above the average | 2,725 | 27.4 |
| Significantly above the average | 694 | 7.0 |
| Distribution by the place of living | | |
| Village/settlement | 1,598 | 15.8 |
| City | 3,833 | 37.8 |
| County seat | 1,959 | 19.3 |
| Capital city | 2,747 | 27,1 |

*Source: Author's own research, 2025*

SSCs are becoming increasingly common in retail stores, allowing customers to pay for purchases. These types of checkouts aim to speed up the checkout process and reduce store costs. In theory, this is a win-win situation for both customers and retailers. With a self-service system, customers scan the barcode of the products they want to purchase and then choose from various payment methods. In newer systems, barcode scanning is no longer necessary, with RFID technology further simplifying the identification of products in the cart. While automated checkouts can be convenient and efficient, they are still a new and unusual solution for many, such as technical issues or situations requiring assistance. In theory, self-service checkouts are fast, easy, and straightforward, but what does reality show? What do consumers think about self-service checkouts? I am looking for the answer to this question in my primary research.

## Material and Methods

During my primary research, I asked consumers to give their opinions about self-service checkouts. Potential respondents could find the questionnaire on the Pénzcentrum's online interface (www.penzcentrum.hu; a popular website in Hungarian dealing with economic topics, particularly). The questionnaire was open to everyone; identification and registration were not required for completion; it was anonymous and voluntary. The questionnaire was filled in by 10,358 people between July 29, 2024, and September 2, 2024. The strength of our research is that the large number of respondents and the diversity of the sample definitely provide significant indicative value about consumer opinions. *Table 1* illustrates the distribution of respondents according to socio-demographic variables.

The questionnaire contained 11 questions in addition to socio-demographic questions. I had one question where the answers were determined using a five-point Likert scale, which measured the strength of agreement. Respondents weren't also asked any open-ended question. The questionnaires were processed using SPSS 28.0, Microsoft Excel During the quantitative processing, we used mean and some measures of variability (standard deviation, coefficient of variation), and the existence and closeness of the association between the variables was analyzed based on the Chi-square test and Cramer's association test. I used K-means cluster analysis to create homogeneous consumer groups. In addition, I examined the differences between the groups with Kruskal-Wallis one-way analysis of variance. The SPSS calculations were based on Field's (2009) guidelines.

## Results

At the beginning of our questionnaire, I included a screening question asking the participants whether they have ever used a self-service checkout at any point in their lives. It is essential to clarify in advance, as it will be an important grouping factor later. Out of the 10,358 participants, a vast majority of 9,753 in-

dividuals, 94.2% of respondents, have used a self-service checkout at some point in their lives.

## Responses of Participants Who Have Used a SSC at Any Point in their Lives

In this chapter, I only examine the responses of those participants who have used a SSC at some point in their lives. I will not always detail this long reference, as it would make my sentences cumbersome, but it is always this group I am referring to when I mention respondents or participants in this chapter. In my research, I asked these respondents to indicate how often they had used a self-service checkout in the past 30 days. The responses to this question are illustrated in *Figure 1*.

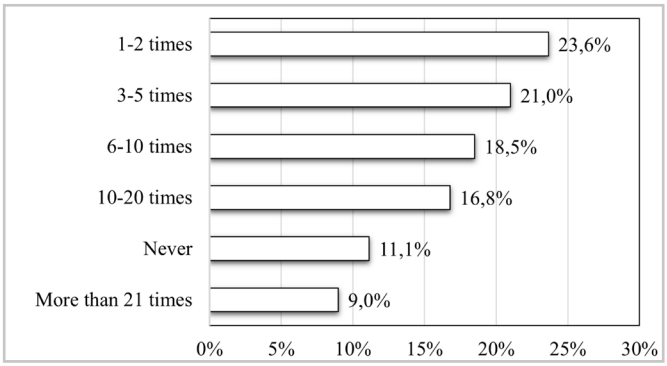


**Figure 1. How many times have you used a SSC in the last 30 days? (N=9,753)**
*Source: Author's own research, 2025*

Overall, the data reveals a high frequency of use of SSCs, supporting the observation that the frequency of visits to grocery stores, the most frequently visited type of store, has decreased over the past years and decades. Our shopping habits have changed. Typically, we no longer visit grocery stores daily, and when we do, purchases tend to involve fewer items and lower basket values. This fundamentally favours the spread of SSCs, allowing for quick and easy scanning of product barcodes. In Hungary, large weekly or biweekly shopping trips are more dominant. Only 11.1% of respondents indicated that they had not used a self-service checkout in the past 30 days. The proportion of those who used them 1-2 times was only 23.6%. Of the respondents, 18.5% used them 6-10 times, 16.8% used them 10-20 times, and 9% used them more than 21 times.

79.8% of respondents believe they often shop where SSCs are readily available. 18.5% say that SSCs are present in their area but not very common. Only 1.7% of respondents reported having no or almost no access to payment options at SSCs. Based on these numbers, we could think there is no significant problem with the availability of self-service checkouts; they are present in stores. However, what do the respondents feel about the current number of SSCs - is it too many, too few, or just right? 26% of respondents feel there is a need for more SSCs, indicating that there are not enough available. Men, individuals under 39 years old, those with college or university degrees, those with slightly above-average incomes, residents of county capitals and the capital city, intellectual workers, and the relatively few students who participated in the study are more likely to hold this view. 42.4% of student-status respondents mentioned that more SSCs are needed. 33.1% of respondents believe the number of SSCs is appropriate; the number of SSCs and traditional cash registers is balanced. Signs of oversaturation are also noted, with 40.9% of respondents believing there are too many SSCs, pushing out traditional cash registers from stores. Women, those over 50, individuals with vocational training and high school diplomas, those with below-average incomes, res-

**Table 2. Proficiency in using SSCs (N=9,753)**

| Socio-demographic variables | I am very good at using SSCs | I am generally good at using SSCs | I have serious difficulty using SSCs |
|---|---|---|---|
| **Sex** | | | |
| Male | 39.0 | 52.3 | 8.7 |
| Female | 31.2 | 58.5 | 10.2 |
| **Distribution by education** | | | |
| Below 8th grade | 25.0 | 62.5 | 12.5 |
| 8th grade | 41.1 | 48.2 | 10.7 |
| Vocational training | 30.9 | 56.0 | 13.1 |
| Secondary-school leaving certificate | 33.1 | 56.3 | 10.6 |
| College, university | 38.0 | 54.2 | 7.9 |
| **Distribution by age** | | | |
| < 18 years | 66.7 | 33.3 | 0.0 |
| 18-29 years | 61.2 | 38.3 | 0.6 |
| 30-39 years | 53.2 | 43.2 | 3.7 |
| 40-49 years | 39.7 | 53.3 | 7.0 |
| 50-59 years | 31.8 | 59.8 | 8.4 |
| 60-69 years | 26.7 | 59.7 | 13.7 |
| 70-79 years | 27.9 | 56.2 | 15.9 |
| >80 years | 19.4 | 50.0 | 30.6 |
| **Distribution by status** | | | |
| Student | 61.1 | 38.9 | 0.0 |
| I receive childcare benefits | 45.0 | 50.4 | 4.7 |
| Housewife | 30.8 | 59.6 | 9.6 |
| Unemployed | 34.7 | 52.7 | 12.7 |
| Performs physical work | 35.6 | 55.6 | 8.8 |
| Performs intellectual work | 40.1 | 53.5 | 6.3 |
| Pensioner with disability, pensioner | 26.7 | 58.3 | 15.0 |
| None of the categories above | 34.2 | 55.2 | 10.7 |
| **Distribution by income status of the household** | | | |
| Significantly below the average | 24.5 | 51.5 | 24.0 |
| Slightly below the average | 27.7 | 60.9 | 11.5 |
| Average | 34.4 | 56.8 | 8.8 |
| Slightly above the average | 40.1 | 53.1 | 6.9 |
| Significantly above the average | 47.7 | 43.2 | 9.1 |
| **Distribution by the place of living** | | | |
| Village/settlement | 32.2 | 56.7 | 11.1 |
| City | 33.5 | 56.1 | 10.4 |
| County seat | 37.5 | 54.5 | 8.0 |
| Capital city | 38.9 | 53.1 | 8.1 |

*Source: Author's own research, 2025*

idents of smaller settlements (villages, towns, cities), physical workers, and those on disability or old-age pensions are more likely to agree with this view.

Examining consumer opinions, we can conclude that it is not necessarily prudent for retail chains to uniformly strive to install more and more SSCs at the expense of traditional cash registers. A more targeted approach that aligns with the needs of specific customer segments might be more effective, especially if there is indeed consumer demand for additional SSCs. A misguided development could easily trap a retail chain into a situation where the savings on cashier wages are outweighed by reduced revenue and profits due to lost customers. Decision-makers should proceed cautiously with such developments and consult their customers to determine if there is a demand for an increase in the number of SSCs.

When asked how often they choose SSCs over traditional cash registers, 25.1% of participants said they always use them, 28.9% frequently use them, 13.2% sometimes use them, 21.7% rarely use them, and 11% never use them. The demographic segmentation previously outlined also applies here. Regarding handling self-service checkouts, 35.2% of respondents consider themselves highly proficient, reporting no difficulties using them. 55.1% say they generally manage well but sometimes encounter minor issues. Only 9.6% of the respondents reported having significant problems using SSCs. As this is an important question, the detailed data can be found in *Table 2*.

Although *Table 2* offers a detailed examination, I would highlight only the most crucial points. If we disregard the distorting effect of the groups represented in relatively smaller numbers, we can conclude that proficiency with SSCs varies significantly across different demographics. Specifically, the proportion of individuals who report excelling at using SSCs decreases with age but increases with higher educational attainment and family income. Additionally, this proficiency tends to increase with the size of the respondent's place of residence. I conducted a Chi-square test and then Cramer's association test to reveal whether there is an association between socio-demographic characteristics (gender, age, education, etc.) and how easily respondents can handle SSCs. Based on the results of the Chi-square test, there is an association between the variables ($p<0.05$). The results typically showed a weak relationship, i.e. the highest Cramer's V value is 0.166 in case of age.

In my research, I also examined how satisfied respondents were, in general, with the user experience of SSCs. Respondents were able to provide their answers using a 5-point Likert scale, where a value of 1 indicated "I do not like them at all" and a value of 5 indicated "I am very satisfied with them; I particularly like them." The average response value was 3.11, the mode was 4, the median was 3, and the standard deviation was 1.48. Naturally, there are differences based on the demographic characteristics previously presented, which are detailed in *Table 3*.

According to their own admission, the proportion of those who are excellent at handling self-service cash registers decreases with age, increases with educational attainment and family income, and increases with the size of the settlement where they live. Based on the Kruskal-Wallis test values, the means of groups proved to be different ($p<0.05$). The values of the coefficient of variance, on the other hand, usually exceed 10%. Therefore, the elements of each group do not cluster well around the averages.

**Table 3. The perception of SSC user experience based on demographic characteristics (N=9,753)**

| Socio-demographic variables | Mean | Mode | Median | Standard Deviation |
|---|---|---|---|---|
| **Sex** | | | | |
| Male | 3.17 | 4.00 | 4.00 | 1.47 |
| Female | 3.07 | 4.00 | 3.00 | 1.49 |
| **Distribution by education** | | | | |
| Below 8th grade | 2.70 | 3.00 | 3.00 | 1.49 |
| 8th grade | 3.31 | 4.00 | 4.00 | 1.49 |
| Vocational training | 2.90 | 1.00 | 3.00 | 1.52 |
| Secondary-school leaving certificate | 3.03 | 1.00 | 3.00 | 1.50 |
| College, university | 3.22 | 4.00 | 4.00 | 1.45 |
| **Distribution by age** | | | | |
| < 18 years | 3.79 | 4.00 | 4.00 | 0.98 |
| 18-29 years | 3.77 | 4.00 | 4.00 | 1.14 |
| 30-39 years | 3.51 | 4.00 | 4.00 | 1.33 |
| 40-49 years | 3.09 | 4.00 | 3.00 | 1.46 |
| 50-59 years | 2.99 | 4.00 | 3.00 | 1.49 |
| 60-69 years | 2.96 | 1.00 | 3.00 | 1.53 |
| 70-79 years | 3.24 | 4.00 | 4.00 | 1.50 |
| >80 years | 2.72 | 1.00 | 3.00 | 1.48 |
| **Distribution by status** | | | | |
| Student | 3.87 | 4.00 | 4.00 | 1.04 |
| I receive childcare benefits | 3.50 | 4.00 | 4.00 | 1.40 |
| Housewife | 2.94 | 1.00 | 3.00 | 1.43 |
| Unemployed | 3.12 | 4.00 | 4.00 | 1.54 |
| Performs physical work | 3.00 | 1.00 | 3.00 | 1.49 |
| Performs intellectual work | 3.23 | 4.00 | 4.00 | 1.43 |
| Pensioner with disability, pensioner | 3.08 | 1.00 | 3.00 | 1.52 |
| None of the categories above | 2.81 | 1.00 | 3.00 | 1.53 |
| **Distribution by income status of the household** | | | | |
| Significantly below the average | 2.71 | 1.00 | 3.00 | 1.55 |
| Slightly below the average | 3.03 | 4.00 | 3.00 | 1.46 |
| Average | 3.11 | 4.00 | 3.00 | 1.48 |
| Slightly above the average | 3.24 | 4.00 | 4.00 | 1.44 |
| Significantly above the average | 3.21 | 4.00 | 4.00 | 1.54 |
| **Distribution by the place of living** | | | | |
| Village/settlement | 2.97 | 1.00 | 3.00 | 1.48 |
| City | 3.00 | 1.00 | 3.00 | 1.50 |
| County seat | 3.23 | 4.00 | 4.00 | 1.45 |
| Capital city | 3.29 | 4.00 | 4.00 | 1.46 |

*Source: Author's own research, 2025*

It is also essential to examine which types of stores customers believe significantly benefit from using SSCs compared to traditional checkouts. Respondents could choose from a closed list I defined. Multiple answers were allowed, but I asked participants to limit their selection to store types where, in their opinion, the use of self-service checkouts offers a significant advantage. Respondents were informed that the order of store types in the questionnaire followed alphabetical order and that the list's order did not reflect the priority or preferences of other respondents or researchers. *Figure 2* illustrates the percentage of the 9,753 participants who selected each store type.

Based on *Figure 2*, it can be concluded that respondents believe the most significant advantages of using SSCs are found in grocery stores, gas stations, and drugstores. The top three categories stand out slightly from other store types; for sports, clothing, or garden/DIY stores, installing SSCs may require more consideration. For the author of this study, the lower ranking of sports stores is somewhat surprising, as there are players in the Hungarian market in this sector where self-service checkout systems function exceptionally well - quickly, efficiently, and as a positive user experience. Young shoppers particularly appreciate this. In the next question, respondents were asked to select the advantages of using SSCs from their own perspective. The detailed options provided were as follows:

- Entertainment and Technology: I enjoy using new technologies, which make the shopping process more enjoyable.
- Faster Shopping: SSCs offer a much quicker and more convenient solution for smaller basket sizes.
- Greater Flexibility: I can pack and pay for items at my own pace without feeling rushed.
- Continuous Availability: SSCs are always available, which is especially useful for late-night or early-morning shopping.
- Modern Payment Options: I can often use card and mobile payment methods, which are faster and more secure.
- Privacy: I can shop more discreetly as I don't have to interact directly with another person.
- Product Protection: Unlike traditional checkouts, there is no risk of cashiers mishandling or throwing the purchased items.
- Less Queuing: SSCs typically have fewer users, reducing queuing and waiting times.
- Accuracy and Control: I can verify the items' prices and quantities, giving me greater control over the shopping process.

For this question, respondents were allowed to select multiple options, but they were asked to limit their choices to those advantages they considered particularly important from their own perspective. The order of the categories was randomly generated and did not reflect the priorities of other respondents or the researchers. Participants were informed of this before completing the questionnaire. *Figure 3* illustrates the percentage of the 9,753 respondents who selected each option.

Among the responses, the possibility of faster shopping (i.e., SSCs offering a much quicker and more convenient solution for smaller basket sizes) and reduced queuing (i.e., SSCs typically having fewer users, thereby reducing wait times and queues) were dominant. In addition to the advantages, examining potential disadvantages is equally essential. Respondents were asked to select the disadvantages of using SSCs from their own perspective. The detailed options provided were as follows:

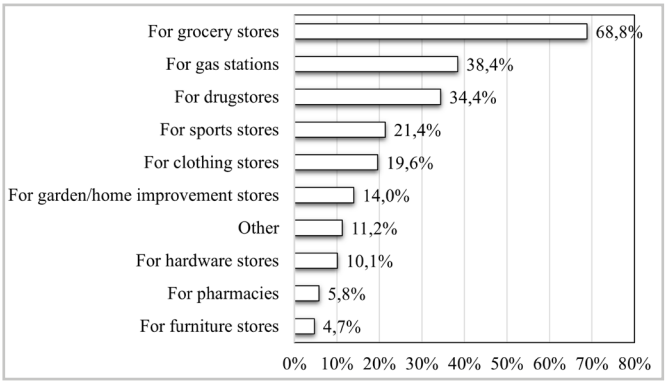


**Figure 2. Where are the greatest advantages of using SSCs? (N=9,753)**
*Source: Author's own research, 2025*

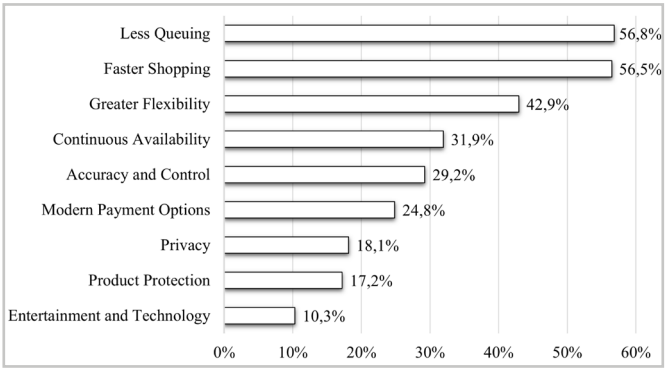


**Figure 3. What are the greatest advantages of using SSCs? (N=9,753)**
*Source: Author's own research, 2025*

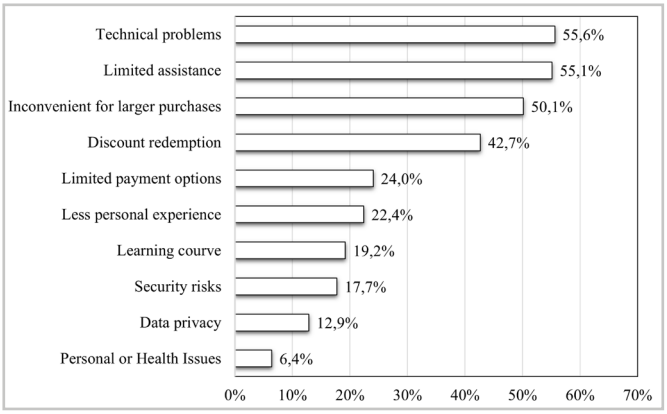


**Figure 4. What are the greatest disadvantages of using SSCs? (N=9,753)**
*Source: Author's own research, 2025*

- Learning Curve: It may take time to get used to and learn how to use the new system, which can be frustrating initially.
- Personal or Health Issues: I have difficulty seeing what is displayed on the screen or hearing the system's audio prompts.
- Less Personal Experience: I miss the personal interaction, a smile, or a kind word from the cashier.
- Inconvenient for Larger Purchases: Using SSCs can be cumbersome and time-consuming for more extensive shopping trips.
- Limited Payment Options: It may not be possible to pay with cash, which can limit my choices.
- Technical Problems: Issues with the system, such as difficulty scanning barcodes, can slow down the shopping process.

– Security Risks: The system may not detect all items accurately, potentially leading to accusations during checkout.
– Limited Assistance: Help is not always immediately available if I encounter an issue.
– Data Privacy: Self-service systems may collect more data about me, raising privacy concerns.
– Discount Redemption: I am unable to redeem coupons or other payment discounts.

The logic of the question was entirely consistent with that described for the advantages. The following figure illustrates the percentage of the 9,753 respondents who selected each option. The results are presented in *Figure 4*.

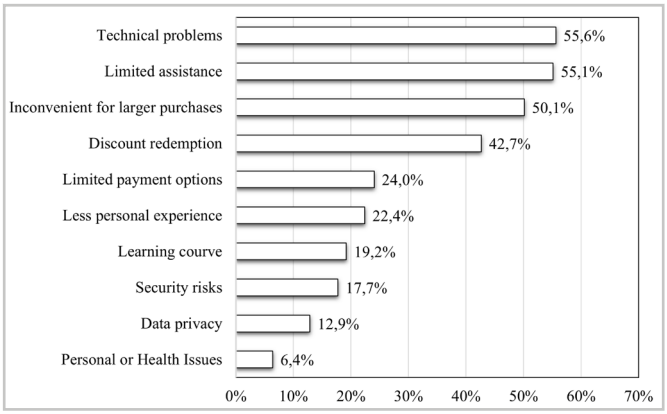


**Figure 4. What are the greatest disadvantages of using SSCs? (N=9,753)**
*Source: Author's own research, 2025*

The responses highlight the dominance of concerns about technical problems (e.g., issues with the system such as difficulty scanning barcodes, which can slow down the shopping process), limited assistance (help is not always immediately available when problems arise), and the inconvenience of using SSCs for larger purchases, which can be cumbersome and time-consuming. SSCs often face criticism like the following: "*Instead of a cashier, I'm doing the work, but I don't get any discounts for it.*" In my research, I examined how much respondents agreed with this statement:
– 33.9% of respondents completely disagreed, considering it nonsense. They believed they also benefit significantly from using SSCs.
– 38.8% felt there was some truth to the criticism but only partial validity.
– 27.3% fully agreed with the statement.

Agreement with this statement was above average among respondents over 40 (with agreement increasing with age), those with lower levels of education, lower household incomes, the unemployed and physical workers, and those living in smaller settlements.

In my research, I also looked to the future. With advancing technology, Hungary now has container-sized automated stores without staff or traditional checkouts. Customers can enter these automated stores after prior registration and identification, freely browse, and pack items into their bags or baskets. The cost of selected items is automatically deducted from the customer's previously provided bank account upon exiting. There is no visible staff, except occasionally during restocking, and a remote monitoring system is in place. Due to their size, these stores have a limited selection, but they are open 24/7. These stores represent a new generation of SSCs and fully automated retail. I examined respondents' opinions on these types of stores in my research:
– 51.6% of respondents felt this option was not for them and were sure they would not shop in such stores.
– 48.4% found the concept appealing and would be willing to try it.

Among supporters, there is a higher proportion of younger individuals (up to 39 years old), men, those with higher levels of education and income, and particularly those with a student status. Although students were underrepresented in the sample, they showed an exceptionally high support rate of 72.6%. Thus, this result should be interpreted with caution but highlights strong interest among students.

In summary of the results, I also examined the respondents' opinions on the SSC system using K-means cluster analysis. To conduct the analysis, I included all the essential questions detailed above as variables. The accuracy and correctness of the analysis are excellently demonstrated by the fact that reliable values were obtained for every variable ($p<0.001$). The F-ratio values proved the correctness of the variables and the weight of the segmentation characteristics. I managed to identify two segments who like the SSC system, are satisfied with its use, would like more such checkouts, and handle them confidently. The proportion of those who particularly like it is 45.7%, while the proportion of those who like it is 13.2%. The cluster analysis confirms previous statements: Men, those under 39 years old, those with college and university degrees, those with incomes slightly or significantly above average, residents of county capitals and the capital city, white-collar workers, and students tend to like self-service checkouts more than average. A segment can also be identified whose opinion is quite close to the previous segment members, perhaps a bit more skeptical; closer to neutral. Its proportion is 12.3%. In addition, a segment can be identified that is rejecting regarding the self-service checkout system. Its proportion is 28.8%.

## Responses of Participants Who Have Never Used a SSC At Any Point in their Lives

As I have already written, at the beginning of my research I used a screening question, namely, whether the person filling out the questionnaire has ever used a SSC in their lifetime. A small portion of the 10,358 participants, namely 605 people, or 5.8% of those surveyed, have never used a SSC in their lifetime. In this chapter, I examine them and their answers in more detail. The reference to "respondents who have never used SSCs" is not always written out in detail in this chapter, as this would make our sentences cumbersome. Still, under the terms respondents or questionnaire participants, I always refer to this group in this chapter.

Of these respondents, 81.9% are at least 50 years old (10.5% over 70 years old, 18.2% over 80 years old never users), 46.1% are on disability or old-age pensions (8.6% among them never users). Among those with significantly above-average income, the proportion of never-users is 15.4%. Among those with lower educational qualifications, the proportion of never-users ranges from 9.1-11.0%. Living in a smaller locality does not necessarily mean that the respondent has never used a SSC; 7.3% of those living in villages and 6.7% of those in cities have never

used a SSC. For comparison, this number is 4.3% among residents of the capital. The reason for non-use is not primarily due to the absence of SSCs. 53.8% of the never-users say they often shop where SSCs are available and could easily access them. 29.0% say SSCs are not very common in their area, while 17.2% have no or almost no access to payment options at SSCs. But do the never-users want more SSCs? 90.4% say that there are already too many SSCs, displacing traditional checkouts, thus reducing their number. 7.6% think the number is appropriate, and only 2% believe that more SSCs are needed; there are not enough of them available. 71.3% of the never-users fully agree with the statement that at SSCs, they do the work instead of a cashier, for which they receive no discount. Only 4.4% reject this idea, while the remaining 24.3% consider it partially true. The previously detailed fully automated stores are rejected by 90.2% of those who have never used a SSC, and only 9.8% say they would try them.

Of course, I also asked those who have never used them what they see as the most significant disadvantages of SSCs. The way the question was posed, the circumstances, and the answer options were the same for users and never-users, ensuring comparability. The proportion of disadvantages mentioned by those who have never used them is shown in *Figure 5*.

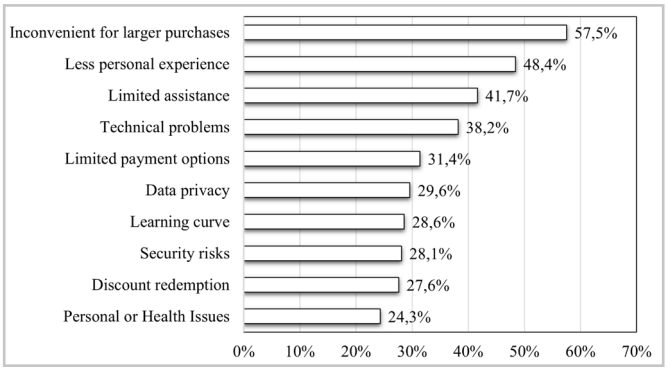


**Figure 5. What are the greatest disadvantages of using SSCs? (N=605)**
*Source: Author's own research, 2025*

In their case, the less personal experience (lacking personal interaction, missing a smile, a kind word from the cashier) and personal, health issues (I can't see what the machine displays well, or I can't hear what it says) appeared at a much higher rate. The lack of a personal experience was missed by 22.4% of those who had used it before, while 48.4% of those who never used it felt the same. The proportion of references to health reasons also increased from 6.4% to 24.3%. Is there a realistic possibility of reaching consumers who have never used SSCs? Realistically and painlessly, there is not. It is clear that the problem in their case is not with the prevalence but that they find the use of SSCs impersonal. They do not want to use them; they do not ask for them.

## Discussion and Conclusions

The results of the present research confirm and, in several aspects, refine the findings of earlier studies on self-service checkouts (SSCs). Similar to Ruangkanjanases and Tantrakul (2015) as well as Wang and Han (2022), the Hungarian respondents identified speed, convenience, and autonomy as primary advantages of SSCs. In my sample, "faster shopping" and "less queuing" were the two dominant benefits, each exceeding 56% of mentions, which closely aligns with Fernandes and Pedroso's (2017) observation that service speed and ease of use directly influence satisfaction and repurchase intentions. However, the Hungarian results also reveal a pronounced generational and socio-demographic divide, echoing Lee and Leonas' (2021) conclusion that younger consumers, especially Millennials, have lower needs for personal interaction and higher technology acceptance. In my data, respondents under 39 years old, with higher education and above-average incomes, were significantly more likely to prefer SSCs and to handle them confidently. Conversely, older cohorts, particularly those over 60, and individuals with lower educational attainment showed resistance to SSC adoption - a pattern consistent with the Technology Acceptance Model - based findings of Thomas-Francois and Somogyi (2023), where attitudes, social influence, and facilitating conditions shaped usage intention. The high proportion of respondents citing "technical problems" and "limited assistance" as disadvantages (both above 55%) aligns with Matic et al.'s (2019) emphasis on the role of error-free operation in sustaining user acceptance. Similarly, the relatively high share (over 50%) finding SSCs inconvenient for larger purchases mirrors Kattara and El-Said's (2013) findings in hospitality, where consumers often prefer human interaction in complex or critical service situations. A unique contribution of the present study is the detailed segmentation via cluster analysis, which identified three main consumer groups: strong supporters (45.7%), moderate supporters (13.2%), and rejecters (28.8%). This distribution supports Scherer et al.'s (2015) U-shaped model of service mix effects, suggesting that a balanced coexistence of SSCs and staffed checkouts may maximize customer retention. In line with Salomann et al. (2006), the results also reinforce the importance of balancing "high-tech" efficiency with "high-touch" personalization, especially for those segments that value interpersonal interaction. Interestingly, while international surveys (e.g., PwC, 2023; Rakuten Insight, 2023c) often report SSC appeal rates of around 40-50%, my research found even higher habitual usage among Hungarian respondents with access to the technology, but also stronger outright rejection among never-users (over 90% considered there to be too many SSCs). This polarization suggests that, as Bitner et al. (2002) recommend, retailers should avoid uniform rollout strategies and instead tailor implementation to local demographics and consumer readiness. Overall, the Hungarian findings are consistent with global literature in highlighting that SSC adoption is not simply a matter of technology availability, but is mediated by demographic patterns, perceived benefits, and service quality. As also concluded by Gültekin and Küçükkancabaş Esen (2020), strategic implementation - taking into account situational factors, user control, and targeted communication - will be critical to improving both acceptance and satisfaction.

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