# Analysis of the Resistance of Elderly Individuals Living Alone in Utilizing Self-Checkout Systems in Supermarkets

Fugang Guo*

Ghazalie Shafie Graduate School of Government, Universiti Utara Malaysia, Sintok 06010, Malaysia

*Corresponding author:* Fugang Guo, Guofuganga@gmail.com

**Abstract:** Research on the rejection of technology among elderly people who are living alone is still scarce, so qualitative research methods are used to supplement the lack of exploratory research. The research was conducted in Harbin, which ranks middle in terms of economic development in China, and a total of 8 respondents were interviewed. The results of the interview showed that older people lack emotional support, instrumental support, and competence, and have subjective biases. Furthermore, active resistance encompasses factors limited usage opportunities, underdeveloped technology, unfavorable reputation, inefficiency, ambiguous equipment placement, minimal interaction, inadequate product information, and absence of instructional manuals. Conversely, passive resistance, aside from subjective biases, signifies the elderly's pessimistic outlook on life, including world-weariness, low motivation, lack of initiative, insecurity, fear of technology, cognitive decline, and apprehension about disrupting others' efficiency by using machinery. Additionally, this study highlights two significant findings: firstly, older individuals proficient in self-checkout technology are willing to accompany their less tech-savvy counterparts through automated aisles to alleviate feelings of isolation; secondly, older adults are wary of approaching employees and strangers, suspecting them of intending to sell products or perpetrate scams rather than provide technical assistance.

**Keywords:** Seniors; Supermarkets; Self-service technology; Rejection

## 1. Introduction

The global retail industry is currently undergoing a digital transformation [1]. Emerging technologies such as artificial intelligence (AI), cloud computing (CC), the Internet of Things (IoT), augmented reality (AR), big data analytics (BDA), and other digital strategies aimed at enhancing the well-being of consumers and retail enterprises are permeating the retail sector, aligning with the principles of Industry 4.0 and giving rise to Retail 4.0 [2]. Common digital technologies found in brick-and-mortar supermarkets include shopping guide robots (providing product attributes, and functionalities, and facilitating product location and price queries) [3], self-checkout systems

(allowing customers to independently track purchased items and complete self-checkout) [4], quick response (QR) codes (enabling product production date inquiries, product authenticity verification, and product inspection) [5], human-computer interaction [6], handheld self-scanning devices [7], and AI services [8]. Research around digital technologies in the retail sector is on the rise, which highlights the impact of smart retail on stakeholders [9].

Solitary elderly individuals are emerging as a distinct subgroup within the elderly population, a category often overlooked in research on the use of digital technology in supermarkets. According to statistics from the "Results of the Fourth Sample Survey on the Living Conditions of the Elderly in Urban and Rural China," the number of elderly people living alone or in empty nests in China has reached 118 million [10]. Compared to the overall elderly population in China (which exceeded 254 million in 2019, according to the World Health Organization [11]), the proportion of solitary elderly individuals is undoubtedly significant. Moreover, the elderly constitute a major demographic in Chinese supermarkets. During non-weekend hours, 60–70% of customers in supermarkets are elderly individuals, and during peak hours in the fresh produce section, this can even reach 88% [12]. In an effort to cater to these elderly customers, some supermarkets choose to forgo the use of self-checkout systems and maintain traditional checkout services [13]. The potential implications of such behavior include higher labor costs, longer consumer waiting time, and a suboptimal user experience resulting from extended queues. This study attempts to identify the reasons why elderly people living alone reject various self-service systems in supermarkets to guide the optimization of corporate strategies for the elderly.

# 2. Literature review

## 2.1. Status quo bias

Status quo bias generally refers to behavior and thoughts that are biased or irrational [14]. For example, people may consistently focus on one flavor when choosing a sandwich and never try other flavors, even if other flavors are more nutritious or delicious [15]. As described in some studies, status quo bias predicts that a person would maintain their current status for a long time.

While it is true that the persistent pursuit of existing behaviors without too much thinking can improve decision-making efficiency and reduce unnecessary brain capacity [15], it can lead to missing out on better outcomes. In terms of using technology, individuals might reject new technologies due to their doubts about the effectiveness of the technology [16].

## 2.2. Counter-conformity motivation

Counter-conformity motivation refers to individuals adopting behaviors that are less common to avoid being the same as others [17]. Older individuals might be influenced by their identity complex, holding onto a "non-digital native" identity, and resisting the adoption of digital technology in supermarkets. Identity refers to self-awareness shaped by individual and group perceptions within the cultural context of one's region [18]. Some studies suggest that the digital age has further refined population segmentation, giving rise to different identities [19].

In the context of digital technology use, social group identities are often divided into "digital natives" and "non-digital natives" [20]. Older groups less accustomed to using digital technology are often classified as non-digital natives [21]. Over time, they come to embrace this classification, recognizing it as part of their identity [22]. Their personal identity perspectives and societal stereotypes influence them to perceive a lower need for utilizing supermarket self-service technology. Consequently, they may resist adopting the same self-service technology in supermarkets as younger generations. The reasons for this resistance are also intertwined with personal desires and intentions.

Kim and Kankanhalli [23] affirmed that factors such as loss aversion, uncertainty costs, net benefits,

sunk costs, transition costs, control, and social norms contribute to status quo bias. Self-service systems in supermarkets are typically implemented to save overall consumer time costs and improve supermarket service efficiency [24]. However, this advantage may not be appealing to older folks as one of their major concerns is to pass time [25].

## 2.3. Innovation resistance theory

Innovation resistance theory (IRT) describes how some people resist new products or technologies due to certain emotions and thoughts [26]. This resistance stops consumers from adopting innovative technologies. It is often categorized into active resistance and passive resistance [27].

Active resistance is often associated with negative features of products and services related to innovation [28]. When using self-checkout systems in supermarkets, elderly individuals might encounter issues such as the screen font being too small, inappropriate key types, and insufficient volume, which fails to cater to their visual, tactile, and auditory requirements. Previous research has identified factors like screen font size, volume levels, input methods, and key types as influential factors affecting elderly individuals' use of digital technology [29]. Passive resistance typically refers to resistance factors related to users' own issues in adopting innovative technologies, such as computer self-efficacy, computer anxiety, hedonic motivation, habit, and personal ideas about internet technology [30].

## 2.4. Social support theory

Social support means receiving help and care for society [31]. There are mainly two forms of support: problem-centered and emotion-centered support. Emotional and instrumental support have become the two mainstream categories for the subdivision of social support in the research field [32]. The sadness caused by the death of a spouse and the departure of loved ones continues to impact the social support and social networks of elderly individuals living alone [33].

They strive to adapt to living alone, while the ongoing developments in the digital society and the quest for meaning in life exert pressure on them mentally and cognitively. The assistance received by elderly individuals from family, friends, social organizations, supermarket staff, or other customers in operating self-checkout systems can be classified as instrumental support. On the other hand, care, encouragement, greetings, sympathy, consolation, and other forms of support can be seen as emotional support.

## 3. Methodology

Emotional dimensions and informational dimensions in theories such as social capital and social support may evolve into profound friendships with staff, the need for conversation, and the frustration of lacking someone to teach technological knowledge among elderly individuals living alone. Therefore, this study is considered exploratory to a certain extent, aiming to uncover influencing factors beyond the researchers' preconceptions through qualitative research within an interpretive framework [34]. Qualitative research has been deemed excellent in unveiling the nature behind behaviors by many researchers [35].

Special attention was given to the ethical aspects of the sampling method for this study. Elderly individuals living alone experience stronger feelings of loneliness and a higher prevalence of psychological disorders compared to other populations [36]. To prevent intentionally asking about their living situation, which might intensify their dislike for researchers and stimulate negative emotions, the researchers employed a snowball sampling method. Snowball sampling allows interviewees to introduce other potential interviewees to join the study [37].

Harbin was selected as the area of study, a city of medium development level in China, ensuring the generalizability of the results. Initially, the distribution of elderly individuals living alone and their living patterns were understood through interactions with other residents and security guards. Face-to-face interviews in a semi-structured format were then conducted during the outings of these elderly individuals.

There is no fixed standard for sample size for qualitative research [38]. In some cases, even a sample size of 1 may be considered valid [39]. As Marshall *et al.* [40] assert, the choice of sample size is subjective and culture-specific. In light of this, data collection ended after the researchers identified highly consistent responses among interviewees. A total of 8 datasets were collected in this study.

**Table 1.** Descriptive analysis

| Profile | Particulars | *f* | % |
| --- | --- | --- | --- |
| Gender | Male | 3 | 37.50 |
| | Female | 5 | 62.50 |
| Living status | Alone | 8 | 100.00 |
| Age (years) | 60–70 | 2 | 25.00 |
| | 70–80 | 3 | 37.50 |
| | 80 and above | 3 | 37.50 |
| Education level | Primary school and below | 5 | 62.50 |
| | Junior high school | 1 | 12.50 |
| | High school | 1 | 12.50 |
| | Undergraduate degree and above | 1 | 12.50 |

The survey had a higher number of female respondents compared to male respondents, and elderly individuals generally exhibited lower levels of education (**Table 1**). The average life expectancy of Chinese women (81.52 years) surpassed that of men (76.18 years) [41], potentially accounting for the observed difference in respondent numbers. Historically, China had relatively low levels of education, as the inclusion of primary and junior high schools in compulsory education only commenced in 1986 [42].

**Table 2.** Factors and sub-factors

| Factors | Sub-factors |
| --- | --- |
| Lack of emotional support | Lack of guidance, trust, encouragement, support, attention, sympathy, and care |
| Lack of instrumental support | Lack of reminders, guidance, instructions, training, equipment, and information. |
| Lack of competence | Difficulty in reading, comprehension, and typing, and visual and hearing impairment, low memory, physical impairment, and lack of mobility. |
| Subjective bias | Loss aversion, uncertainty cost, low net benefit, resistance to changing long-term habits, digital technology resistance, non-digital native identity, low perceived usability, low perceived availability, and low self-efficacy. |
| Passive resistance | Low initiative and motivation, loss of desires, technological anxiety, lack of cognition and security, and fear of inconveniencing others. |
| Active resistance | Lack of usage opportunities, immature technology, poor reputation, inefficient performance, unclear device locations, lack of interaction, incomplete product descriptions, absence of user manuals, lack of assistance from the staff |
| Social factors | Social trust and influence. |

# 4. Results

## 4.1. Lack of emotional support

The study findings indicate that none of the elderly individuals were encouraged by their family members, friends, or even supermarket staff to use self-checkout systems. The identified lack of emotional support in this aspect includes persuasion, trust, encouragement, support, attention, greetings, sympathy, care, and consideration, as illustrated below:

> P2 stated: *"Things are different from back then. After moving into the building, I no longer have neighbors. It seems like the younger generation can't see me, and no one cares about what I do. Nobody advises me on anything."*

> P4 expressed: *"I have quite a few friends, and when we play mahjong, everyone is willing to chat. But regarding using those apps and devices in the supermarket, no one encourages that. No one knows how to use them, so we don't talk about it to avoid embarrassing ourselves. In the supermarket, the staff ignores us; no one greets us or pays attention to us."*

> P5 mentioned: *"My children don't allow me to get involved with those things; they're afraid I might be deceived."*

## 4.2. Lack of instrumental support

The channels through which the elderly receive guidance on using self-service technology in supermarkets are relatively scarce, and there is no one to teach them. In this regard, the identified lack of emotional instrumental support includes the lack of reminders, guidance, instructions, training, equipment, and information.

> P2 stated: *"I never had a staff member take me to the machine for checkout. They ignored me because my phone was different than theirs. No one taught me how to buy things without using cash. Anyway, I don't ask."*

> P4 expressed: *"No one tells us what functions those devices have, how to use them, and no one around understands, let alone teach. I'm old, and I want to experience and try everything in this life, but unfortunately, I never got the chance."*

> P5 mentioned: *"If these things are useful and can save time, I really want to try them. Queuing in the supermarket every day is a waste of time. Sometimes, when buying things for my grandson, I'm afraid of getting products near their expiration dates. However, in the supermarket, I'm not comfortable asking others how to use them, and there are no staff members to teach me, so I never learned."*

## 4.3. Incompetency

Aging significantly impacts a person's ability in using technology. The identified deficiencies in abilities include reading, comprehension, vision, typing, hearing, memory, mobility, and action, as illustrated below.

> P1 stated: *"I have difficulty picking things up, and I probably can't scan the QR code. I have limited mobility and rarely go to the supermarket. Usually, the nanny goes to buy groceries, or they deliver them to me."*

> P3 expressed: *"It's not that I don't want to use it; I can't see or hear clearly, I walk slowly, my hands shake, and I don't know how to type. I don't understand the supermarket's technology. Sometimes, when I go to the supermarket with the nanny, we just buy things normally."*

> P6 mentioned*: "I exercise every day, and my body is in good shape. There are no issues with my vision or hearing. However, I don't know how to type. I contact my friends from the gym using my phone, and it's always through video calls."*

## 4.4. Subjective bias

Elderly individuals are often reluctant to use technology due to subjective bias, including loss aversion, uncertainty costs, low net benefits, resistance to changing long-term habits and using digital technology, non-digital native identity, low perceived ease of use and usefulness, and low self-efficacy, as illustrated below:

P1 expressed: *"I can buy groceries by making a phone call; the seller downstairs is very kind and takes good care of me."*

P2 stated: *"I'm familiar with what the supermarket I often go to. There's no need for any self-service technology. There's no need to compete for time with young people. Technology isn't a good thing. Nowadays, everyone treats each other like air, and they treat their phones as their children."*

P5 mentioned: *"I have a son, a grandson, and a father. My daughter-in-law is busy with work and can't take care of my grandson, so I have to go to their house quite often. I'm aware of the technologies in the supermarket, like checking product locations, finding out where the products come from and their shelf life, and using self-checkout. I've seen my son and daughter-in-law use them. However, I don't have time to learn. I'm old and clumsy, afraid that I won't learn it, and even if I do, it might take a long time."*

## 4.5. Passive resistance

The elderly exhibit are less motivated to use technology. Passive resistance factors include low initiative, motivation, and desire, and technological anxiety, cognitive deficiencies, a lack of security, and fear of inconveniencing others, as described below.

P1 expressed: *"If you hadn't told me, I wouldn't have any idea about the high-tech things in the supermarket. The cashiers told me a few times that the places where there are fewer people and that we can avoid the long queue by checking out ourselves."*

P2 stated: *"My spouse passed away early, and with no children, there's nothing left for me to learn. Maybe I won't even finish learning before I'm gone."*

P5 mentioned: *"Although I went to school for a few years, I didn't learn these things back then. Who could have expected technology to develop so quickly? I can't keep up with the times. I'm afraid of losing money even when using mobile payment, let alone getting involved in other technologies. We're different from others. They react quickly and think fast, but we are not as nimble, and us lining up for self-checkout also affects others because we're not as quick."*

## 4.6. Active resistance

Elderly individuals generally do not use self-service technology in supermarkets, and the described active resistance does not stem from inherent flaws in the technology itself. Active resistance identified in this study includes a lack of opportunities for use, immature technology, poor reputation, inefficiency, unclear device locations, lack of interaction, incomplete product descriptions, absence of user manuals, and the lack of assistance from the staff.

P6 mentioned: *"I haven't paid attention to what devices the supermarket has. The decoration seems to be getting better, and the staff is very enthusiastic. We can pay with WeChat or Alipay."*

P7 expressed: *"I like fishing, playing chess, and having a drink with friends. These technologies are not good for us. The supermarket staff are all good. They always help us out when we can't handle something through our phones. Can those robots you mentioned help us? Probably not in the future."*

P8 commented: *"I often read some Chinese news. There have been quite a few reports on the problem of inaccurate reading of the quantity of products by the robots. Among older people, we warn each other about the financial security of using smartphones. Some elderly people find it challenging to check their*

*bank card and mobile phone balances, let alone identify property losses in supermarkets. In addition, the current technology in supermarkets is still lacking. What we need is moving robots and taxi services, not product location searches, authentication, or production date searches. The Chinese law probably doesn't allow the sale of expired products anyway, so these technologies are not helpful."*

## 4.7. Social factors

Some older adults are wary of other people and avoid any interaction with strangers, leading to their reluctance to listen to the supermarket staff.

P6 stated: *"I go to the supermarket just to buy daily necessities, so I don't go there often. No one asks me anything. When service personnel greet me, I don't respond. I'm afraid of being fooled or deceived, so they just leave. Living alone is relatively simple; I don't cook, I eat out."*

In addition to this, we identified another social factor, namely social influence.

P8 mentioned: *"Self-service technology is not that difficult. But I'm used to going out shopping together with others. If they don't use it, I won't either. Other elderly people don't know how to use it, and we will stand out if we do."*

## 5. Discussion

This study identified the lack of emotional and instrumental support as two main barriers hindering the use of self-service technologies in supermarkets by elderly individuals in China. This particular group is often overlooked, experiencing social isolation, limited technological proficiency, and even facing death alone [43]. They not only lack assistance from their children but also support from friends and supermarket staff. The physical distance of their children and the indifference of others result in fewer opportunities for them to acquire relevant technological skills compared to other elderly groups. P5's children actively discourage the elderly from using digital technologies due to concerns about their low digital literacy, fearing potential financial scams or property losses due to improper operations. Research on elderly fraud victims in China reveals that over 30% of targeted seniors experience financial losses [44]. While supermarket digital technologies are typically unrelated to scams, the persistent anti-fraud mindset of distant children continues to influence the behavior of the elderly. Stereotypes and biases towards the elderly exist, as described by some researchers who find that people doubt the elderly's ability to easily adapt to rapidly advancing technologies [45]. Encouraging them to use technology may not always be perceived as a friendly gesture. Some regions in China have initiated training programs on digital technology for the elderly, such as Xiamen [46], and have launched online training initiatives on platforms like WeChat and Alipay [47]. Unfortunately, these efforts fall short of addressing the widespread challenges faced by elderly individuals in adopting digital technologies. Moreover, online training policies only benefit those who are already proficient in using smartphones. In terms of devices, additional challenges for the elderly point to the integration of self-checkout systems with smartphones. The "2021 Global Mobile Market Report" indicates that smartphone ownership among those aged 65 and above is only around 53% [48]. Financial concerns for elderly individuals living alone are troubling [49], as their smartphone ownership and internet access rates are likely lower. P8's unique explanation is that supermarkets, aware of the elderly's proficiency in self-service technologies, might prefer extending machine usage rather than improving efficiency. This perspective adds a new dimension to the discussion on the lack of emotional support from supermarket staff.

This study reveals that inadequate competence and subjective biases are contributing factors to the voluntary abandonment of technology adoption among older adults. They often face challenges in various aspects, such as reading, understanding, visual impairments, typing difficulties, hearing impairments, memory issues, physical

limitations, and mobility challenges [50,51]. They are well aware that these competence-related obstacles can hinder bidirectional information exchange between them and digital technology, leading to reduced efficiency in technology use and additional efforts in the learning process. Long-standing habits, uncertainty costs, delayed losses, and low net benefits are common manifestations of the current biases [52]. In the context of technology use in supermarkets by elderly individuals living alone, the predominant manifestation is a low perceived practical value of supermarket technology, implying that the effort they may need to invest is not proportional. For instance, P1 mentioned that some supermarkets implement telephone shopping to provide extra services and care for the elderly. Clearly, older adults can achieve more desirable results without engaging with these technologies. P8 stated that he/she is familiar with the locations of products in the supermarket, and there are laws that prohibit the sale of expired or false products. Therefore, certain self-service technologies related to location and product information queries appear redundant for older adults. This further confirms a perspective within the SQB framework, suggesting a correlation between individual technology use and skepticism about its effectiveness [52]. Many explanations for older adults maintaining non-digital behaviors imply a reasonable assumption that society consistently reserves traditional checkout counter services and holds biases against technology. P2 believed that technology diminishes emotional connections between people and the meaning of life. The preservation of traditional services suggests an overall societal awareness, including among older adults, that they are non-digital natives, and any changes in technology use may be deemed unnecessary.

Passive resistance, active resistance, and social factors play a negative role in the use of supermarket technology among elderly individuals. Passive resistance among these individuals involves conventional factors like technological anxiety [53], concerns about financial security [54], and worries about privacy [55]. Passive resistance, excluding subjective bias, is correlated with the characteristics of elderly individuals living alone. These characteristics include low initiative, a sense of world-weariness, and low motivation. An intriguing discovery is the ethical factor, in which they worry about inconveniencing others, a concern less explored in past research on elderly supermarket technology use. Regarding active resistance, there is a need to enhance the functionality and comprehensiveness of self-service technology. Self-service technology often reinforces areas that elderly individuals do not necessarily need, rather than providing services they desire, such as taxi services or smart transportation. For instance, P8 expressed the need for smart transport and taxi services rather than services like product location queries, authenticity checks, and production date inquiries. Given current Chinese regulations that likely prohibit the presence of expired products, the significance of these features is limited, aligning with some studies in food safety regulations. China has explicit management regulations requiring the labeling of production dates and origins, and the prohibition of selling expired food [56]. The study does not deny the redundancy of technical manuals for those with high digital literacy among young and middle-aged individuals, but for the elderly, it remains one of the few sources to acquire knowledge. P4 believed that assistance from the staff and manuals are prerequisites for elderly individuals to engage with these technologies. What troubles elderly individuals in the use of digital technology is not only their deteriorating physical health but also the need for clear sources of knowledge. Elderly individuals who live alone wish for lasting friendships and avoid inconsistent behaviors. This is consistent with the principle of constructivism [57], which states that people tend to reduce conflicts and radicalism by acting the same way as others. For example, when shopping with peers, P8 does not use the self-checkout systems to foster closer interactions with his/her peers.

## 6. Conclusion

The study found that, in addition to personal factors among solitary elderly individuals (such as reading and comprehension barriers, visual impairments, typing difficulties, hearing impairments, memory issues, physical

hindrances, mobility issues, aversion to loss, uncertainty costs, low net benefits, resistance to change long-term habits, digital technology resistance, non-digital native identity, low perceived usability, low perceived availability, low self-efficacy, low initiative, motivation, and desires; technological anxiety, cognitive deficiencies, lack of security, fear of inconveniencing others), biases towards the digital literacy of elderly individuals prevents them breaking free of their non-digital native identities. This leads to skepticism among elderly individuals that supermarkets intentionally neglect technological support for the elderly. After all, the inclusion of elderly individuals in the self-service system may result in decreased efficiency and a depletion of digital resources. Additionally, the lack of trust that elderly individuals have in staff, perceiving their interactions as mere marketing ploys or potential scams is also notable. Surprisingly, the study did not anticipate that solitary elderly individuals would voluntarily forego the self-service lanes to facilitate interaction with those who do not use such technology. It is suggested that concerns about being replaced by machines for the sake of companionship, although mentioned, were not supported by the findings of this study.

## Disclosure statement

The authors declare no conflict of interest.

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