

# How do Consumers Decide to Engage in Digital Shadow Work in Self-service Environment?: Grounded Theory Methodology Research

## 소비자들은 셀프서비스 환경에서 디지털 그림자노동 참여를 어떻게 결정하는가?: 근거이론접근

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### 〈 Abstract 〉

The development of digital technology has given rise to a new service model: self-service. This model introduces the concept of “digital shadow work”, in which consumers conduct unpaid behind-the-scenes digital tasks instead of employees. While consumers are engaging in increasingly more digital shadow work in self-service environments, they are unaware of their unpaid labor. This raises concerns about consumer rights and businesses’ long-term sustainability and health. This study aims to reveal the psychological awareness factors that influence consumers’ decisions to engage in digital shadow work in self-service environments. This exploratory qualitative study utilizes a grounded theory approach and semi-structured interviews to reveal the psychological awareness factors that contribute to consumers’ decision to engage in digital shadow work. By revealing the psychological awareness of decision-making factors, this study enhances consumer’s understanding and awareness of digital shadow work, which helps increase their awareness of self-protection in the context of self-service technologies. Additionally, understanding consumers’ decision-making psychology is crucial for non-face-to-face self-service technology companies and provides a theoretical basis for sustainable and healthy business development.

Key words: Consumer decision-making, Digital shadow work, Grounded theory, Self-service technology

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## 1. Introduction

In the digitization era, self-service is profoundly reshaping consumer behavior and business operations models. In the fast-paced consumer society, self-service consumption environments become increasingly prevalent, including self-service supermarkets, restaurants, and banks (Lusch & Nambisan, 2015). According to a PYMTS (2021) survey conducted in 2020, 34.7% of consumers preferred self-checkout due to its shorter waiting times, and 49.4% favored it for its faster checkout process. People are increasingly accustomed to using self-service to access quicker and more convenient services. Simultaneously, reports from The Business Research Company (TBRC, 2023) as of January 2023 indicated that the size of the global self-service market is projected to grow from \$35.23 billion in 2022 to \$38.42 billion in 2023, with a compound annual growth rate (CAGR) of 9.0%. Additionally, it is estimated to reach \$55.43 billion by 2027, with a CAGR of 9.6%, and the Asia-Pacific region is expected to be the fastest-growing region during this period. Further, it is anticipated that not only does self-service have the potential to become one of the mainstays of the future global retail and service industries, but mastering self-service technology appears to be an indispensable survival skill for consumers in the forthcoming society (Duarte et al., 2022).

In the self-service realm, customers utilize technological interfaces to complete consumption processes without the assistance of employees. Consumers' proactive engagement in human-computer interaction is a key driver of the rapid development of the self-service technology industry (Scherer et al., 2015). However, self-service technology

is not merely about providing consumers with faster, more convenient, and personalized services, while overlooking the consumer efforts required to complete their transactions (Reinders et al., 2008; Kimes & Collier, 2015; Galdolage, 2022; Liu & Hung, 2022). In recent years, information systems researchers have studied consumer behavior in self-service consumption models and have designated the non-monetarily rewarded labor performed by consumers, who directly use technology instead of employees, as "digital shadow work" (DSW) (Park, 2019; Park & Lee, 2019). Basically, DSW is consumers take on a more active and prominent role in the self-service process, transitioning from passive recipients of products or services to indispensable engagers. With the proliferation of self-service, an increasing amount of DSW has shifted to consumers who now perform tasks (without monetary compensation) that were traditionally completed by employees, thereby creating value for companies. The transition from passive consumers to active engagement in self-service involves consumers undertaking more tasks previously handled by service providers. However, the covert nature of DSW leads to a notable lack of awareness among consumers regarding their involvement in these activities. Therefore, this study aims to explore the factors contributing to consumers' unawareness regarding their engagement in DSW.

This research is valuable to multiple stakeholders in the self-service technology ecosystem. For consumers, gaining insights into DSW enhances their awareness and ability to make informed decisions in self-service environments. This knowledge empowers consumers to better understand the trade-offs involved in such interactions, potentially leading to more balanced and sustainable consumer

practices. From a business perspective, understanding consumers' behaviors and decision-making processes in the context of DSW provides valuable insights for service design and innovation. By acknowledging and addressing the hidden labor performed by consumers, businesses can develop more user-friendly and equitable service models, thereby improving customer satisfaction and loyalty.

For academia, this study contributes to the expanding field of consumer behavior in digital environments. It fills a gap in the existing literature by focusing on a relatively under-explored area of consumer engagement in self-service technologies, particularly in the context of DSW. This research adds a new dimension to the understanding of the consumer-service provider relationship in the digital age. Finally, this study has broader implications for policy makers and consumer rights advocacy. Highlighting the often-overlooked aspect of consumer labor in self-service technologies underscores the need for policies that protect consumer interests and promote fair labor practices in the digital economy.

## 2. Literature Review

### 2.1. Self-services

Self-service technologies (SST) have emerged as key innovations in business and services in recent decades, leading to a major shift in the way consumers interact (Fisher, 1998; Meuter et al., 2000; Lu et al., 2022; Lee & Lu, 2023). SST, including systems such as self-service checkouts, self-service banking, online shopping platforms, and self-service check-in, have transformed the traditional model

from human-to-human interactions to human-to-machine interactions (Curran & Meuter, 2005; Weijters et al., 2007). These technologies enable consumers to independently perform a variety of tasks and services without direct human intervention. However, existing SST research has focused on consumers' perceptions, attitudes, acceptance, and impact on their decision-making, especially in terms of perceived ease of use, usefulness, risk, and satisfaction. However, consumers' cognitive and decision-making mechanisms are crucial areas of research in the SST usage process. Consumer's SST usage behavior is not only externally affected but also driven by several internal cognitive decision-making processes. For example, it may involve how consumers make trade-offs between different options, decide whether to use a particular self-service, and what psychological decision-making factors influence these processes. There remains limited examination of the psychological decision-making factors that determine the use of self-service technologies by consumers from their perspectives. At the same time, the growth and development of SST in contemporary consumer culture has ostensibly provided consumers with greater convenience and efficiency but has also triggered profound changes in consumer roles and labor usage. In recent studies (Park, 2019; Park & Lee, 2019; Bu & Koh, 2022; Pentzold & Bischof, 2023), the phenomenon of consumers engaging in unpaid DSW in SST environments has been revealed. DSW refers to consumers unintentionally taking on tasks normally performed by service providers or employees in traditional service environments. These tasks include troubleshooting, data entry, and resolving technical issues. In popular self-checkout stations (SACATs), tasks originally performed by service staff, such as scanning items and processing payments, have been shifted to the consumer

(Bandoim, 2020; Rieder & Voß, 2010). The essence of this model is to reduce business costs by shifting labor to the consumer while ignoring the value of consumer labor. Additionally, instead of reducing labor requirements as expected, the expanding use of SST has required consumers to learn new skills to operate these systems. Not only does this increase consumers' burden and use their personal time, but it may also cause them to resist the technology. This forced technological adaptation is a form of hidden labor, but currently, there is a significant lack of consumer awareness of the additional DSW that they undertake, and it is often not recognized or properly compensated. Thus, while SST offers apparent convenience, it reflects a fundamental problem in the modern service paradigm, which is the additional, unpaid DSW that consumers are unconsciously engaged in. This phenomenon requires a focus on the consumer experience and burden when implementing and optimizing SSTs, as well as attention to how to effectively balance the efficiency and user-friendliness of the technology and ensure that technological advances do not come at the expense of the value of human labor. Furthermore, an in-depth study of consumers' psychological and behavioral motivations when using SST will provide an important theoretical foundation and practical guidance for understanding and improving this phenomenon. Therefore, this study explores the psychological decision-making mechanisms of consumers' engagement in DSW in an SST environment from the perspective of consumers' cognitive decision-making.

## 2.2. Digital shadow work

The DSW concept, first articulated by Illich in 1981,

refers to the unpaid, preparatory labor that individuals or organizations engage in to achieve specific objectives (Illich, 1981). This concept holds significant social implications and intersects with various social spheres including labor markets, family dynamics, social equality, and prevailing social values. With the advancement and widespread adoption of high technology, Lambert, in 2015, highlighted the prevalence of DSW in modern life, particularly stressing the impact of SST, such as self-checkout systems, on service methodologies (Lambert, 2015).

This modern DSW interpretation suggests that consumers, in pursuit of leveraging technological conveniences, often find themselves performing unpaid tasks, a phenomenon increasingly ubiquitous yet frequently undervalued and overlooked. SST advent has subtly shifted the burden of labor onto consumers, allowing them to enjoy conveniences while simultaneously requiring more unpaid DSW from them. This trend has gained even more relevance and urgency recently, especially with the onset of the COVID-19 pandemic, which accelerated the consumer shift towards contactless SST. Thus, further amplifying the extent of DSW in daily transactions (Park, 2019; Ryoo & Park, 2021; Bu & Koh, 2022; Lee & Koh, 2022; Liu & Koh, 2023).

Current research in this domain predominantly revolves around understanding the nature of DSW and its impact on consumers' cognitive and emotional responses to technology usage. Considering the expanding scope and complexity of DSW, particularly in self-service contexts, this area warrants meticulous exploration to identify its nuanced implications on consumer behavior. However, research exploring the underlying reasons that induce consumers to perform DSW remains lacking. This study aims to fill this gap by comprehensively analyzing how decision-making

(Table 1) Research on shadow work

Researchers	Research Content	Research Methods
Park (2019)	The mechanics of user behavior in the context of password resets are explained through descriptive data from interviews conducted from a shadow work perspective.	Grounded theory
Ryoo and Park (2021)	A self-service research model with DSW as a parameter, information load and system functional load as explanatory variables, and fatigue and obsolescence as outcome variables are proposed.	Grounded theory
Kim et al. (2021)	An examination of whether customers' DSW and risk perception can affect the revisit intention of fast-food restaurants, mediated by different types of attributional tendencies.	Questionnaire method
Liu and Koh (2021)	An exploration of the relationship between consumers' negative attitudes towards shadow work and their behaviors during the self-service process in unmanned supermarkets. It begins with aspects of consumers' economic, psychological, self-development, and conversion costs.	Questionnaire method
Bu and Koh (2022)	Clarifies the concepts of mandates and rewards in the definition of digital shadow work and explores how users in shared services environments perceive costs and coercion from the perspective of digital shadow work.	Grounded theory
Shi and Koh (2023)	Explores the user's psychological mechanism, examines how shadow work influences user emotions while using self-service technologies, and discusses how user emotions contribute to user behavior.	Grounded theory

psychological factors affect consumer's engagement in DSW decisions and behaviors. Table 1 presents prior research on DSW in self-service environments.

### 2.3. Grounded theory

This study is based on rooted theory and further examines the SST phenomena and DSW within the theoretical framework of Glaser and Strauss (2017). This involves a methodology in which the researcher does not establish a priori theories or hypotheses, but rather builds the theoretical framework organically based on research data. This methodology is widely recognized for its potential and applicability in the in-depth study of complex phenomena. Rooted theory emphasizes a data-driven research methodology that can extract theory-building elements from consumer experience and behavior through a flexible and open-ended research approach. In self-service

environments, especially in contexts involving DSW, this approach can elucidate consumers' perceptions related to unpaid labor and associated psychological decision-making mechanisms. Due to the depth and comprehensiveness of this qualitative research methodology, it facilitates understanding consumer decision-making processes in self-help environments.

Rooted theory was strategically selected as the research methodology for the present study because it has proven very effective in exploring new areas and generating new insights and theoretical perspectives, especially in relatively unknown areas such as DSW. This approach not only provides an in-depth understanding of DSW but also enriches the scholarly discourse in the field of SST and DSW by providing novel theoretical perspectives. By adopting this methodology, this study enhances the understanding of DSW's complexity, thus expanding the in-depth study of the DSW phenomenon.

### 3. Research Methods

#### 3.1. Interview respondents' selection

The primary objective of this study is to examine the psychological factors that influence consumers' decisions to engage in DSW within the context of SST. This issue is approached from the perspective of consumers' cognitive decision-making processes with a specific aim to understand how consumers contemplate their engagement in DSW while using SST, and the underlying psychological mechanisms that drive their decision-making. This area of inquiry remains relatively unexplored within the information systems field, making it essential for gaining insights into the intricate relationship between SST and consumers' engagement in DSW.

To thoroughly investigate this research question, a semi-structured interview methodology was employed. The key advantage of this approach lies in its flexibility, allowing the perspectives and experiences of the engages to be closely examined. Utilizing semi-structured interviews provided the freedom to explore open-ended questions while maintaining a clear focus on the core research questions. This approach proved invaluable in generating rich and insightful data to address the fundamental questions regarding the psychological mechanisms guiding consumers' decisions regarding DSW within SST environments. Table 2 provides a detailed overview of the interview questions utilized in this study.

In this study, we were confronted with the primary challenge of identifying the most appropriate sample to deeply explore the reasons behind consumers engaging in DSW when using self-service technology, as well as the

conscious decision-making processes leading to such behavior. Although random sampling is theoretically ideal for providing broader population representation and minimizing sample selection bias, considering the limitations of research resources and time, as well as the need for an in-depth understanding of specific groups, we opted for convenience sampling as our sampling strategy. This decision was based on several key considerations and objective reasons, the foremost being the specificity of the research objective. The purpose of this study is to delve into the reasons behind consumers' engagement in DSW in the context of self-service technology and the conscious decision-making processes that precipitate this behavior. Given that DSW is a relatively new theoretical concept, convenience sampling allowed us to selectively target individuals with relevant expertise and similar educational backgrounds, as well as users who frequently utilize self-service technology, which is crucial for obtaining insightful data regarding the research question. In contrast, random sampling, while potentially enhancing sample representativeness, may not guarantee the acquisition of a sufficient number of specific user groups, thereby impacting the depth of understanding of the research question. Secondly, the implementation of preliminary interviews necessitated significant time and resource investment, including the creation of a comprehensive population list, random selection of samples, and potentially higher recruitment difficulty and costs. Given the time frame and resources available for this study, convenience sampling provided a more efficient and feasible option, allowing us to effectively collect data under limited conditions. Therefore, through social media, we contacted the first group of eight engagements and identified two main user

groups of self-service technology: enthusiasts and regular users. Enthusiasts, defined as individuals who use self-service technology at least seven times per week, and regular users, those who use it at least twice per week, were identified. Engagements 1, 2, 4, 5, 6, and 7 were categorized as enthusiasts, while engagements 3 and 8 were considered regular users. This step aimed to establish the research question through preliminary interviews and gather initial information on engagements' psychological decision-making processes and the perceptions of unpaid work (DSW). Thirdly, the achievement of theoretical saturation was based on findings from preliminary interviews, leading to a second round of interviews involving six additional engagements to reveal new user types of self-service technology. This step not only increased the sample size but also reviewed new data, ensuring a closer examination of the research question, and obtaining a more comprehensive understanding. This strategy aligns with the common qualitative research practice recommended by Creswell and Clark (2017) and emphasizes our commitment to enhancing the depth and breadth of the study despite the limitations of the convenience sampling method. Furthermore, following the theoretical saturation principle proposed by Glaser and Strauss (1968), the observation of saturation during the second round of interviews, where additional data did not introduce new themes or concepts, confirmed the stability and completeness of the research findings. This indicates that a comprehensive understanding of the research question had been achieved, eliminating the need for new engagements or data. Finally, the widespread use of convenience sampling in many qualitative studies and consumer behavior research reflects its practicality in specific research scenarios and its ability to produce valuable and credible

research outcomes (Marshall, 1996). Scholars such as Bryman (2016) have emphasized the crucial role of convenience sampling in exploratory research and case studies, highlighting its importance for understanding complex social phenomena and developing new theoretical frameworks. Thus, convenience sampling enables researchers to selectively target consumers who may engage in DSW unconsciously, thereby obtaining deep insights and understanding. Similarly, Creswell et al. (2016) and Etikan and Alkassim (2016) also support the effectiveness of convenience sampling in qualitative research, especially when the study requires an in-depth exploration of complex psychological decision-making processes. Therefore, this sampling method allows researchers to focus on specific individuals or groups to better understand the intrinsic reasons behind consumers engaging in DSW and the underlying conscious decision-making mechanisms.

In summary, the aim of this study is to investigate the reasons behind consumers engaging in DSW within the context of self-service technology and the decision-making processes behind this behavior. Through the strategy of convenience sampling, we were able to effectively collect and analyze relevant data, hoping to provide new insights and theoretical contributions to consumer behavior. The choice of this method reflects our careful consideration of overcoming practical constraints in research and our firm commitment to enhancing the study's depth and breadth.

Finally, ethical standards were meticulously adhered to and encompassed obtaining informed consent, safeguarding consumer privacy and rights, and complying with local ethical review regulations. The research plan and interview procedures received approval from the Ethics Review Committee of Chonnam National University, South Korea,

(Table 2) Open questions set

Number	Research Questions
1	Have you had experience utilizing self-service technologies?
2	Why do you choose to use self-service technologies?
3	When using self-service technology, do you find yourself helping the organization with tasks that should be done by staff? If so, please describe.
4	Do you feel that using self-service technology sometimes requires extra effort or work to complete some tasks?
5	Please characterize your sentiments when undertaking additional responsibilities within self-service technologies and explain the reasons behind such feelings.
6	Do you think that this extra work is a normal part of using the service? Why?
7	What factors make you more inclined to do this extra work in a self-service setting?
8	Are there specific scenarios wherein you opt to abstain from performing extra duties in self-service environments? If yes, could you expound on the rationale behind such choices?
9	Can you delineate specific tasks or situations in self-service technologies, in comparison to conventional services, which engender perplexity or inconvenience for you?
10	What factors underpin your decision to engage with self-service technologies? Is this predicated on autonomous choice or driven by external variables?
11	When undertaking additional tasks in self-service technology, do you believe it is driven by an immediate intuition or a well-considered decision?
12	Describe an instance where you felt you “automatically” completed a task within a self-service environment. At that moment, did you perceive your actions more as a habitual response or a deliberate choice?
13	Within self-service contexts, are there certain tasks that prompt you to pause and deliberate, weighing the pros and cons before deciding to proceed? Conversely, which tasks do you find yourself completing almost thoughtlessly, based on instinct?

ensuring the ethical integrity and compliance of the study.

The study interviewees included fourteen Chinese students in South Korea. The choice to focus on students majoring in Management Information Systems (MIS) as subjects is due to this group’s higher understanding and frequency of use of SST and DSW, which is crucial for exploring the psychological drivers between SST and DSW. Furthermore, this study ensures internal consistency within the sample in specific demographic characteristics or backgrounds. By selecting engagement with similar professional and cultural backgrounds, the transferability of the research is enhanced. This means that the research findings can be understood and applied by other researchers under similar conditions, thus improving the reliability and

depth of the research results. Lastly, by observing saturation during the second round of interviews, the stability and completeness of the findings were ensured, indicating that the sample size used in this study is sufficient to deeply understand the research question. The sample included five graduate students and nine Ph.D. students, with an average age of 28 years, among which 64% (9 individuals) were male, and 36% (5 individuals) were female. These have been actively using SST for an average of 27 months. Interviews were conducted in an informal one-on-one setting, with each lasting 10 to 30 minutes. In appreciation engagement, each interviewee received a \$5 gift certificate as a token of gratitude. Detailed information about the respondents is presented in Table 3.



(Table 3) Characteristics of respondents

Process	Number	Gender	Age (y)	Education	Time (min.)	Use Experience
1	1	Male	31	Ph.D.	10:32	Self-check-in/Self-ordering/Self-fueling/Self-service library systems/Self-service pharmacy vending machine/...
	2	Female	30	Ph.D.	19:40	Self-checkout/Self-ordering/Self-service library systems/Self-service registration kiosk/Self-service baggage drop/Self-service immigration kiosk/Self-service baggage claim/...
	3	Female	31	Ph.D.	15:41	Self-check-in/Self-ordering/Self-service laundromats/Self-service immigration kiosk/...
	4	Male	29	Ph.D.	22:36	Self-ordering/Self-service printing/Self-service library systems/Self-service laundromats/...
	5	Female	30	Ph.D.	18:48	Self-checkout/Self-scanning/Self-ordering/Self-service laundromats/Self-service baggage drop/Self-service baggage claim/...
	6	Male	24	Master's	21:25	Self-ordering/Self-service printing/Self-checkout/Self-service laundromats/Self-service registration kiosk/Self-service pharmacy vending machine/Self-service baggage drop/Self-service immigration kiosk/...
	7	Male	31	Ph.D.	29:13	Self-check-in/Self-ordering/Self-checkout/Self-service laundromats/ Self-service registration kiosk/Self-service pharmacy vending machine/Self-service immigration kiosk/...
	8	Male	25	Master's	27:34	Self-checkout/Self-scanning/Self-ordering/Self-service laundromats/Self-service baggage drop/...
2	9	Male	26	Master's	18:27	Self-checkout/Self-ordering/Self-service laundromats/Self-service immigration kiosk/...
	10	Male	31	Ph.D.	14:30	Self-checkout/Self-scanning/ Self-service laundromats/...
	11	Female	26	Master's	30:12	Self-checkout/Self-ordering/Contactless payment solutions (cellphone pay)/...
	12	Male	28	Ph.D.	19:06	Self-checkout/Self-scanning/Self-service laundromats/...
	13	Female	25	Ph.D.	23:06	Self-check-in/Self-ordering/Self-service registration kiosk/Self-service laundromats/Self-service pharmacy vending machine/Self-service immigration kiosk/Self-service baggage claim/...
	14	Male	24	Master's	14:48	Self-checkout/Self-ordering/Self-service laundromats/Self-service baggage drop/Self-service immigration kiosk/Self-service baggage claim/...

### 3.2. Analysis methods

This study sought to enhance the understanding of the DSW phenomenon using grounded theory and adhered to the processes of open, axial, and selective coding as proposed by Strauss and Corbin (1998). Initially, in the open coding stage, primary phenomena were identified and

conceptualized into categories based on individual words, sentences, and events. This entailed systematically organizing concepts derived from line-by-line and paragraph-level analysis of the collected data, identifying properties within these concepts, and subsequently conceptualizing and categorizing the phenomena. Next, during the axial coding stage, the categories identified through open coding were

(Table 4) Paradigm differentiation in grounded theory

Paradigm	Clarification
Causal Conditions	Events or motivating factors that trigger a phenomenon
Contextual Conditions	A series of conditions in which a phenomenon is situated
Central Phenomenon	Central events, occurrences, or thoughts that are related to context, mediating conditions, and interactions
Mediating Conditions	Conditions that facilitate or inhibit the central phenomenon within a specific context
Interactions	Regulation and performance strategies related to the interaction phenomenon
Outcomes	Consequences or final actions resulting from the interactions and conditions

recombined. This recombination process involved directly linking each concept, re-examining them, and then undergoing a process of combination, elimination, and reconnection to develop a framework. Using this framework allows researchers to comprehensively understand the phenomena and is referred to as a paradigm model. It is comprised of six categories: causal conditions, contextual conditions, central phenomena, intervening conditions, interactions, and outcomes (Strauss & Corbin, 1998).

Finally, the selective coding stage involved developing a narrative framework using categories identified through open and axial coding to construct a theoretical understanding of the phenomenon. A diagrammatic representation of the open, axial, and selective coding processes is depicted in Table 4.

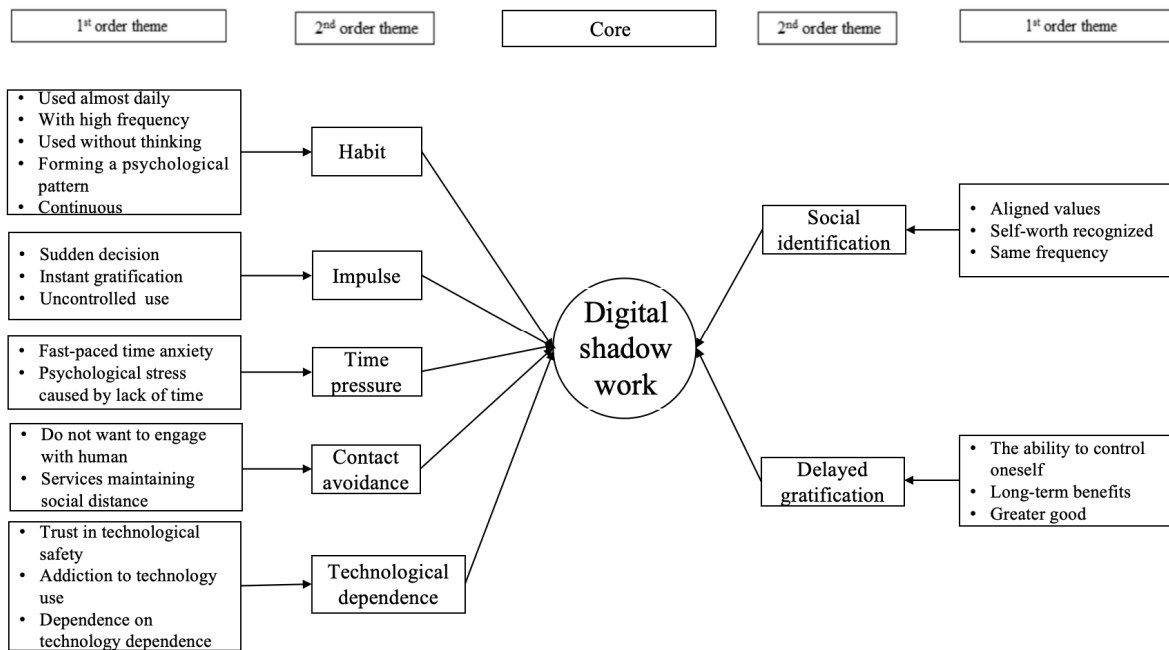
### 3.3. Data coding

This study's interviews were meticulously recorded and transcribed, with the subsequent analysis adhering to the concepts of open and axial coding delineated by Strauss and Corbin (1998). In the initial open coding phase, the interview transcripts were carefully reviewed, and the key concepts embedded within the textual data were identified and labeled. These processes were pivotal to elucidating

the psychological decision-making mechanisms employed by engagement when engaged in DSW. Subsequently, the identified concepts were grouped into broader thematic categories. This process facilitated the capturing of common threads across various codes and streamlined the conceptual landscape, thereby fostering the development of a robust theoretical framework.

During this phase, open coding served as an instrumental tool, enabling the effective categorization and organization of concepts into coherent and meaningful clusters. Transitioning into the axial coding phase, these established categories were then intricately linked into causal relationships. This exercise provided initial insights into the psychological decision-making mechanisms at play among consumers, thereby shaping the core study categories. Building upon these foundational insights, a sophisticated framework drawn from cognitive decision psychology and the dual-system theory in neuroscience was then incorporated. This approach was crucial to synthesizing and connecting the various categories and concepts. The integration of such diverse theoretical perspectives culminated in the formulation of our comprehensive research model, offering a nuanced understanding of consumer behavior in the DSW context. Figure 1 shows the coding results.

In the confirmatory phase of our research, seven critical



〈Figure 1〉 Coding results

decision factors emblematic of psychological decision-making were rigorously explored. These were intricately linked to the core category of DSW, which was identified as the dependent variable. This exploration, based on grounded theory, identified new perspectives and theories rooted in the dual-system theory which served as an expansive and integrative explanatory framework for all identified decision factors.

The interconnections among these decision factors and their relationships with the dependent variable were intricately traced utilizing grounded theory as the methodological backbone. This process was pivotal in constructing a novel theoretical framework and a comprehensive research model, which is detailed in subsequent sections. This approach, based on empirical data and systematic analysis, not only revealed new insights into the psychological underpinnings of DSW in SST environments but also contributed to the literature by offering fresh theoretical perspectives. This

methodology, centered on discovering and developing new theories from the ground up, significantly enhanced the understanding of complex DSW dynamics.

### 3.4. Findings

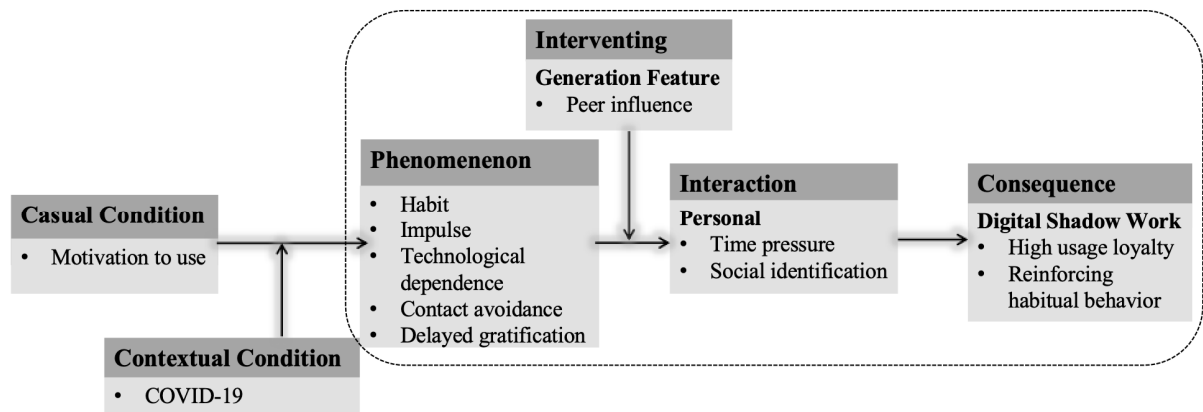
Overall, this study elucidated multi-dimensional psychological factors influencing consumer decision-making through semi-structured interviews. Employing Atlas.ti, a qualitative data analysis software program, the interview content was meticulously coded and analyzed, resulting in the identification and naming of 114 codes. These were then categorized into broader and higher-level categories during the axial coding phase, with 28 categories intended to evolve into theoretical constructs. This process yielded nine principal categories: habit, impulse, time pressure, technology dependence, contact avoidance, social identification, delayed gratification, peer influence, and DSW. The core

phenomenon identified was consumer decision-making, the psychological factor which was the expected outcome.

In the context of this study, habit referred to a mechanical pattern of decision-making that consumers develop over long periods through repeated use of self-service technologies. For this dimension, respondents indicated that they chose to engage in DSW because they had developed operating habits due to their usage frequency. These indications included “developed automated and unconscious decision making” and “regular and consistent decision-making behaviors conserve cognitive resources”. Here, impulse described an emotional decision to engage in DSW without prior planning or forethought. On this dimension, respondents’ responses included that they “often decide to use self-service technology out of the blue”, “even without careful consideration”, “make the decision to use the technology because of the instant gratification it brings”, “make the decision to use the technology on a regular and continuous basis decisions” and was “sometimes seemingly uncontrollable”. Time pressure described the psychological state in which consumers decided to engage in DSW due to a perceived sense of urgency or time constraints. In this regard, respondents mentioned that “time anxiety motivates me to use self-service technology” and “faced with time constraints and the need for efficiency, I choose SSTs that save me more time than manual service”. Technology dependence reflected the psychological over-reliance of consumers on smart tech or SST during their daily consumption process. On this dimension, respondents indicated that “the use of technology has become addictive”, “I feel anxious without self-service technology”, “a dependency on SST has developed”, and “a day without using SST is stressful”. Contact avoidance referred to the behavioral tendency

of consumers to use SST (engage in DSW) to contact avoidance or interaction with others in consumer or social situations. Respondents stated, “I choose to perform digital shadow work due to the non-contact nature of self-service technology”, and “I think using self-service technology helps me keep a social distance from others”. Social identification also conveyed a sense of belonging and identification that consumers feel when using SST (doing DSW), which comes from them considering themselves part of a social group. On this dimension, respondents noted that “using the same service method feels in sync with social values”, “it seems that the use of SST can feel recognized by society”, and “it feels like I am in sync with social development synchronization”. The ability to delay gratification referred to the willingness of consumers to endure difficulties and stress associated with using SST (engaging in DSW) and to postpone immediate gratification to obtain greater long-term rewards in the future. Respondents mentioned that they “learn to use SST as a self-regulating ability to adapt to the digital society”, “believe that the use of SST will bring long-term benefits”, and “choose to use SST for the long-term benefits of the service technology”. Peer influence referred to the fact that an individual’s purchasing and consumption decisions were influenced by the opinions, behaviors, and advice of peers or social network members. Respondents mentioned that “there is usually an unconscious desire to align with the choices of my peers” and that “paying attention to the choices of my peers has had a significant impact on my decision-making”.

As previously mentioned, within the scope of this research, Digital Shadow Work (DSW) is defined as the uncompensated labor undertaken by consumers when using



(Figure 2) Comprehensive model

SST. DSW involves the actions of consumers providing services for themselves without directly receiving compensation from service providers. Firstly, respondents commonly perceived that they were essentially substituting the work of employees of the service provider when engaging in DSW. This perception stems from their understanding of the role they play in the service process, transitioning from traditional service recipients to partial service providers. Secondly, many respondents described DSW as a burdensome type of work, a burden that is manifested not only physically but also psychologically. Consumers taking on additional labor without corresponding compensation undeniably increases their burden of service experience. Lastly, respondents emphasized that using SST for self-service effectively consumes their valuable personal time. This suggests that despite the original intention of SST design to enhance efficiency and convenience, it may, in some cases, lead to increased time pressure and labor burden for consumers. Based on the coding results and feedback from respondents, Figure 2 presents a comprehensive framework that integrates the key drivers of DSW and consumer psychological decision-making perceptions. This framework elaborates on the potential psychological

decision-making mechanisms behind consumers' engagement in DSW within the Self-service Technology (SST) context. Through an in-depth analysis of the coding results and constructed storylines, Figure 2 offers a holistic perspective on consumer behavior regarding DSW engagement.

## 4. Discussion and Implications

### 4.1. Discussion of findings

A rooted theory approach was used to develop a psychological framework for decision-making from the consumers' cognitive decision-making perspective. This framework elucidates the psychological impetuses propelling consumers to engage in DSW within self-service milieus. This model is predicated on a meticulous examination of causal determinants, identifying consumer engagement with SST as the quintessential catalyst for the manifestation of DSW engagement. Concurrently, the COVID-19 pandemic emerges as a contextual variable that, while secondary, exerts a nuanced and stratified influence on consumer behavior patterns. The crux of this exploration is the

identification of a central phenomenon: the psychological decision-making patterns of consumers. This encompasses various behaviors such as the crystallization of habitual engagement, impulsive utilization, reliance on technological means, an inclination to eschew direct interpersonal contact, and the capacity to accept delayed gratification. Within this schema, peer influence is discerned as an intervening variable that surreptitiously sways the decision-making continuum of consumers. A pivotal aspect of the interaction within this model is the concept of time pressure. This element galvanizes consumers toward the adoption of self-service options, thereby influencing their propensity to engage in DSW. This study's revelations are profound, and illuminate the fact that consumers inadvertently engage in a form of unremunerated labor termed DSW when interfacing with SST. This phenomenon not only heightens their fidelity to specific technological solutions but also entrenches their related habitual behaviors.

This study aligns with the dual-systems theoretical framework within cognitive decision psychology which explains that human behavior is predominantly steered by two distinct decision-making systems. System 1 is characterized as fast, intuitive, and unconscious, and System 2 is slow, rational, and conscious (Kahneman, 2003; Kahneman, 2011; Heather, 2020; Li et al., 2021). System 1 operates as an automated, intuitive process requiring minimal conscious intervention, whereas System 2 requires active, deliberate cognitive engagement. The findings of this research, within a self-service environment, underscore that consumers' decisions to engage in DSW are principally guided by the System 1 mentality. This manifests in various behaviors including habitual engagement leading consumers to automatically replicate previous patterns; impulsive use

driving rapid, unpremeditated reactions; technology dependence indicating an underlying, unconscious trust in SST; and contact avoidance suggesting an inherent, automatic preference for minimizing human interaction. Even secondary influences like time pressure and social identity are rooted in System 1's domain. When under time constraints, consumers are inclined toward quick, impulsive decisions as opposed to thoughtful deliberation. Similarly, social identification subconsciously compels consumers to align their behavior with those of their peers or societal norms. This predominance of System 1's unconscious, automated processing offers a compelling explanation for the lack of consumer awareness in their DSW engagements within self-service settings. Due to the rapid and automatic nature of System 1's, consumers may not fully recognize the additional effort and time they invest in using SSTs, due to it being overshadowed by the perceived immediacy and convenience these services offer. Therefore, while consumers might experience a sense of expedience and ease with self-service usage, there remains an obscured awareness of their integral role and the labor expended in the interactive process.

In summary, this research, from the perspective of consumers' cognitive decision-making, provides a detailed description of how various psychological factors integrate to shape the behavioral patterns of consumers engaging in DSW in self-service environments. Insights gained from this study are crucial for developing better policies and regulations aimed at safeguarding consumer rights and encouraging businesses to adopt more transparent and ethical self-service practices. Increasing consumers' awareness of potential psychological factors associated with DSW can also assist them in making more informed choices to protect

their interests. For example, businesses that abuse DSW may engage in unhealthy business practices, damaging consumer trust and market integrity. In general, enhancing consumer awareness of these underlying psychological factors is of paramount importance to ensure consumer protection and the advancement of SST.

## 4.2. Study limitations

Although convenience sampling provided practicality and specificity for this study, allowing us to effectively collect data under resource and time constraints, the choice of this method also introduced several limitations. Firstly, convenience sampling may lead to sample selection bias since the sample is chosen based on accessibility rather than randomness, which could impact the representativeness and generalizability of the research findings. Secondly, convenience sampling may limit the comprehensive understanding of the research question as it tends to focus on specific groups or individuals, overlooking other potentially important perspectives within the broader population. Furthermore, the outcomes of convenience sampling may be influenced by the specific characteristics of the sample, thereby somewhat limiting the ability to generalize the research findings to a wider population. Subsequent research should consider employing a more diverse sample to increase the results' applicability. Additionally, the study did not differentiate among various SST types, a factor that could significantly impact consumer decision-making. Considering Transformative Consumer Research (TCR), future investigations should distinguish between various SST categories and examine how these technologies influence consumer decision-making across

diverse social and cultural contexts. For instance, through an examination of diverse technologies such as mobile payment systems, self-checkout terminals, or online customer service platforms, deeper insights into the acceptance and utilization of these technologies in distinct social settings can be made along with illuminating their specific effects on consumer DSW behavior. This differentiation not only contributes to a more precise understanding of the psychological mechanisms within consumer decision-making processes but also elucidates how these technologies can either facilitate or hinder societal transformation. For instance, certain SSTs, despite enhancing efficiency, may exacerbate social inequalities or cultural disparities. Consequently, a comprehensive exploration of the social and cultural ramifications of these technologies is not only academically significant but could also offer practical guidance for the development of equitable and rational technology policies and practices.

## 4.3. Implications for research

In the realm of academic discourse, this study exhibits several pivotal attributes. Primarily, it introduces an innovative theoretical framework, meticulously crafted through an analysis of consumers' cognitive decision-making processes within SST environments. The study is based on rigorous methodologies and data analysis, which define the key categories and concepts that influence consumer psychological decision-making. These categories, encompassing habit, impulse, time pressure, technological dependence, contact avoidance, social identification, delayed gratification, peer influence, and DSW, intricately weave the consumer behavior landscape. This nuanced approach transcends

surface-level examinations of consumer actions, and ventures into the profound depths of consumer psychological decision-making. Furthermore, it provides a comprehensive narrative of how consumers navigate decisions amidst a confluence of diverse psychological and situational factors. Moreover, the study's profound exploration of DSW as a central tenet in consumer behavior not only augments our comprehension of behavioral patterns in the milieu of SST but also identifies novel perspectives and avenues for research within the synergistic domains of cognitive science and consumer behavior studies.

#### 4.4. Implications for practice

From the perspective of practical application, the insights provided by this study are significant to gaining a profound understanding of consumer behavior. Mastering the key factors influencing consumer engagement in DSW is crucial for enterprises designing SST that are more user-centered and efficient. This research further emphasizes the importance of integrating consumer psychology into the design and implementation of self-service systems. On a practical level, a deep comprehension of DSW behavior is necessary for enterprises to understand and effectively manage consumer behavior within self-service environments. The study highlights the necessity for consumers to protect their interests when utilizing technology and offers corresponding practical and feasible recommendations for businesses. Notably, the cultivation of consumer habits plays a critical role in enhancing customer loyalty and increasing user retention rates. Therefore, businesses should implement targeted strategies to foster these habits. For example, with automatic check-in at hotels, designing an intuitive and user-friendly

self-service interface ensures that consumers can easily complete the service process. Simplified operations can reduce the learning cost for consumers, making them more willing to reuse the service. Additionally, hotels can develop self-check-in systems using Artificial Intelligence (AI) and machine learning technologies. These systems can provide personalized service options based on consumers' past preferences and habitual behavior patterns, such as recommendations for room types or specific welcome gifts. Furthermore, in restaurants, by integrating social elements into self-ordering systems, such as allowing users to view friends' recommendations or reviews, the sense of social identity among users is increased, promoting interaction, and sharing among customers. Overall, these academic insights and practical implications make significant contributions to both the academic community and the practical application field, effectively bridging the gap between theoretical exploration and real-world application.

## 5. Conclusion and Future Directions

Following an in-depth exploration utilizing a semi-structured interview approach, this study scrutinized consumers' engagement in DSW within self-service technology environments. Utilizing Atlas.ti software to encode and analyze interview data, this study identified consumers' psychological decision-making patterns in SST environments, scrutinizing the underlying determinants influencing these psychological decisions. This research not only effectively bridges a significant gap between academic and practical understanding but also makes substantial contributions to the theoretical discourse surrounding



consumer interactions with digital technology and SST environments. The decision to base this study on the cognitive decision-making perspective of consumers was motivated by the quest to profoundly understand the essence of consumer behavior. Consumers' cognitive processes, as the bedrock of their behavior, provide critical insights that enable us to meticulously analyze their information processing methods, decision motivations, and ultimately how they make choices under the influence of various factors.

Moreover, the adoption of this research methodology facilitates the establishment of a more robust connection between theory and practical application. Through an in-depth understanding of consumers' psychological decision-making processes, businesses and product designers can more effectively customize their products and services to better align with the specific needs of their consumers. This research perspective, grounded in consumer cognition, is not only crucial for enhancing user experiences and bolstering customer satisfaction but also holds significant implications for driving market innovation and adapting to the rapidly evolving consumer landscape.

In summary, this study provides profound insights into consumers' cognitive decision-making processes from an academic standpoint while simultaneously offering practical guidance for the effective design and implementation of SST. It holds substantial theoretical value and considerable practical relevance, laying a robust foundation for future research in related fields. Regarding future research directions, while this study comprehensively explores consumer behavior in SST environments, it also paves the way for future investigations. Potential avenues for future exploration include expanding the research scope to

encompass diverse demographics and cultural backgrounds, examining the long-term effects of habitual SST usage, and exploring the influence of emerging technologies on consumer behavior within SST environments. This ongoing research is imperative for keeping pace with the rapidly evolving landscape of consumer-technology interaction.

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〈국문초록〉

# 소비자들은 셀프서비스 환경에서 디지털 그림자노동 참여를 어떻게 결정하는가?: 근거이론접근

유틀링\*, 고준\*\*

디지털 기술 발전은 전통적 서비스 형태와 다른 셀프서비스기술 형태를 점차 보급시키고 있다. 이러한 새로운 서비스 형식은 "디지털 그림자노동"이라는 소비자의 노동 참여 방식을 출현시켰다. 즉, 소비자가 셀프서비스기술을 사용하여 직접 자신에게 서비스를 제공하기 때문에 기업의 노동력 자원을 절약하지만, 셀프서비스 환경에서 소비자로서 하여금 디지털 그림자노동을 하도록 함에 따라서 자신이 수행하는 무급 노동에 대한 인식의 문제 또한 발생하고 있다. 이는 소비자 권익 관련 이슈는 물론이고 기업의 장기적인 지속 가능성과 건강한 발전에 대한 심각한 우려를 불러일으키고 있다. 본 연구는 셀프서비스 환경에서 소비자가 디지털 그림자노동에 참여하는 결정에 영향을 미치는 심리적 인식 요인을 밝히고자 한다. 이는 소비자가 셀프서비스기술에서 지속적으로 증가하는 참여도와 자신의 무급 노동에 대한 인식 부족 문제에 대응하기 위함이다. 이론 기반의 방법과 반 구조화된 인터뷰를 통해 소비자가 디지털 그림자노동에 참여하는 결정에 영향을 미치는 심리적 인식 요인을 탐구했다. 이러한 결정 요인의 심리적 인식에 대한 이해를 통하여 본 연구는 소비자가 디지털 그림자노동에 대한 이해와 인식을 제고하고, 셀프서비스기술 환경에서 자신의 권익을 보호하는 의식의 수준을 높일 수 있도록 도울 수 있다. 또한, 본 연구의 결과는 비대면 셀프서비스기술 관련 회사에게 소비자의 결정 심리 이해의 중요성을 알림과 동시에 지속가능한 비즈니스 모델의 고안과 발전을 위한 이론적 기초를 제공할 것이다.

주제어: 소비자 의사결정, 디지털 그림자노동, 근거 이론, 셀프서비스기술

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