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Feasibility research of the implementation of an automated self-service biometric photo booth in Mongolia

Bachelor's Thesis

By

Munkhdelger Munkhbat

Study program: Industrial Engineering

Student ID: B2200380

1st Supervisor: Ph.D. Bolormaa. P

2nd Supervisor: Ph.D. Friedrich Thießen

Ulaanbaatar/Nalaikh

2026

Statutory Declaration

Munkhdelger Munkhbat	B2200380
Last Name, First Name	Student ID Number

I hereby affirm in lieu of an oath that I provided the submitted bachelor thesis.

Feasibility research of the implementation of an automated self-service biometric photo booth in Mongolia

I did not use any sources other than those stated. In case that the work is additionally submitted on a data medium, I declare that the written and the electronic form are completely identical. The work was not submitted in the same or similar form to any examination authority.

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Acknowledgement

I would like to express my sincere gratitude to my supervisors for their continuous guidance and support throughout my thesis journey. Despite being based abroad and facing time differences, they were always responsive and provided valuable direction, helping me stay on the right path.

I am especially grateful to Professor Bolormaa for her honest feedback and thoughtful recommendations, which greatly improved the quality of this work. I would also like to thank Professor Thießen for his encouragement, which gave me confidence and motivation throughout the process.

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Abstract

This study evaluates the feasibility of implementing an automated self-service biometric photo booth in Mongolia. The research focuses on assessing market demand, operational requirements, regulatory considerations, and financial viability of the proposed system. A mixed-method approach was applied, combining primary data collected through a consumer survey with secondary data obtained from publicly available technical specifications, supplier information, and industry sources.

The survey results indicate a strong willingness among consumers to use a self-service photo booth, particularly if it offers convenience, speed, and affordable pricing. A majority of respondents preferred a price range of 5,000 to 8,000 MNT per session, with an estimated average willingness to pay of approximately 7,500 MNT. These findings suggest the presence of a viable target market, especially in high-traffic locations such as shopping malls and government service centers.

From an operational perspective, the proposed system utilizes a semi-open kiosk design, which minimizes space requirements and reduces installation and maintenance costs while maintaining functionality. The system is capable of meeting international biometric photo standards, including ICAO requirements, ensuring suitability for official document use.

The financial analysis demonstrates that the project is economically feasible. With an estimated initial investment of approximately 48,000,000 MNT and monthly operating costs ranging from 1,550,000 to 2,430,000 MNT, the system can achieve profitability at relatively low usage levels. The break-even point is estimated at approximately 6 sessions per day, and the payback period ranges from 10 to 36 months depending on demand conditions.

Overall, the findings indicate that the proposed automated biometric photo booth is both technically and financially viable in the Mongolian context. Successful implementation will depend on strategic location selection and maintaining pricing within the acceptable range identified by consumers.

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1. Introduction

Background

In Mongolia, citizens applying for official documents such as national identity cards, passports, visas, and driver's licenses are required to submit photographs that comply with government-established standards. At present, the majority of these photographs are produced in traditional photo studios, those studios are mostly small scale privately operated and located in Ulaanbaatar also provincial centers. While these studios have fulfilled this function for many years, encountering several structural limitations including long waiting times, inconsistent photo quality, restricted operating hours, and limited accessibility these are continuing to create unnecessary delays for citizens in obtaining documents that are essential to their daily lives.

Globally, automated self-service photo booths have already become widely adopted and are in high demand. In countries such as France, Germany, United Kingdom, Japan, and South Korea, ICAO compliant kiosks are installed in locations such as railway stations, shopping centers, and government service facilities, operating around the clock and producing standardized photographs within a significantly shorter time frame.

In the case of Mongolia, recent years have seen increasing public familiarity with self-service digital kiosks. Citizens are now able to use nearby machines for a variety of purposes, including making payments, placing orders, accessing information, and printing tickets. This growing exposure has gradually fostered user acceptance and confidence in such digital technologies. As a result, this emerging user readiness suggests that the regulatory environment, infrastructure, and consumer behavior may be increasingly conducive to introducing similar technological solutions in the document photography sector.

1.1 Problem Statement

Although digitalization has been advancing rapidly across various sectors of public administration, the process of obtaining document photographs in Mongolia remains largely manual, studio dependent, and prone to quality inconsistencies. In rural areas, citizens often need to travel considerable distances to access professional photo studios. Even in Ulaanbaatar, limitations related to studio operating hours and locations, as well

as long waiting times at one-stop service centers, are common. As a result, it is not unusual for clients to receive photographs that do not meet quality standards or personal expectations.

At present, there is no standardized, accessible, and technology-driven alternative available for public use. While advances in artificial intelligence have made it possible to capture document photographs using mobile devices, such methods do not consistently meet official quality requirements.

This gap reflects both a service inefficiency affecting citizens and a potential commercial opportunity for businesses. However, automated photo booth solutions have not yet been systematically studied in the Mongolian context in terms of their technical feasibility, operational practicality, or financial viability. While automated self service technologies are widely implemented globally, it remains unclear whether such systems are feasible in Mongolia when evaluated simultaneously from market, operational, and financial perspectives. Existing studies do not provide an integrated assessment tailored to the Mongolian context.

1.2 Research Question

This study is guided by the following central research question:

How feasible is the implementation of automated self-service biometric photo booths for official document photography in Mongolia from market, operational, and financial perspectives?

This overarching question is further decomposed into three sub-questions, each corresponding to one dimension of the feasibility framework applied in this thesis:

1. Is there sufficient and commercially viable consumer demand for an automated biometric photo booth service in Mongolia, and how do existing market conditions position such a service relative to current competitors?
2. Can an automated biometric photo booth be realistically deployed and operated within Mongolia's regulatory, infrastructural, and institutional environment?
3. Does the proposed business model generate financially sustainable returns under realistic demand conditions, and at what utilization level does the system reach operational break-even?

1.3 Research objectives

This study aims to evaluate the feasibility of implementing automated self-service biometric photo booths in Mongolia. The research is guided by the following three objectives, which correspond to the three dimensions of feasibility analysis used throughout this thesis.

Objective 1: Market Feasibility. To assess market demand using survey-based evidence and analyze the current official document photography market in Mongolia and assess consumer demand for automated photo booth services. This includes a competitor analysis of existing service providers, a structured survey of 207 respondents, and interpretation of results using the Technology Acceptance Model (TAM).

Objective 2: Operational and Regulatory Feasibility. To examine operational feasibility under regulatory and infrastructural constraints, including suitable installation locations, operational requirements, and compliance with official biometric photography standards in Mongolia. This objective examines the technical specifications of automated photo booths, regulatory alignment with ICAO and national standards, and the practicality of deploying and maintaining such equipment in the local context.

Objective 3: Financial Feasibility. To determine financial feasibility through cost revenue modeling, including investment cost, pricing strategy, revenue potential, and profitability of the proposed business. This includes capital expenditure and operating cost estimates, revenue projections derived from survey data, and indicators such as payback period and break-even analysis.

Together, these objectives provide a structured framework for evaluating whether introducing automated biometric photo booths is a viable and practical initiative in the Mongolian market. The study adopts an exploratory analytical approach, aiming to identify indicative feasibility patterns rather than establish causal relationships.

2. Literature review

This chapter situates the study within the key concepts and previous studies relevant to the research topic. It focuses on four main areas: Biometric identification and photography standards, self-service technologies, technology adoption theories, and the digital development context of Mongolia. These areas provide the theoretical and practical foundation for understanding the feasibility of introducing an automated self-service biometric photo booth. The Technology Acceptance Model (TAM) is used as the main framework to interpret user perceptions and adoption behavior in later chapters.

The feasibility of automated photo booths depends on the interaction between user acceptance through the Technology Acceptance Model, service efficiency through self service technologies, and regulatory constraints within the Mongolian context.

2.1 Biometric Identification and Document Photography Standards

Biometric identification refers to the automated recognition of individuals through measurable physiological or behavioral characteristics. Over the past two decades, the governments around the world have increasingly integrated facial biometrics into national identification systems, driven by improvements in technology, cost efficiency, and the need to reduce identity fraud [1].

The quality of the photograph is one of the most important factors affecting facial recognition performance. Research shows that elements such as lighting conditions, head position, resolution, and facial alignment have a direct impact on matching accuracy [2]. This is especially relevant for this study, as automated photo booths are designed to standardize these conditions and produce more consistent results compared to traditional manual photography.

International standards also play a key role in ensuring consistency. ICAO guidelines specify requirements for official document photographs, including background color, face positioning, and visibility of facial features [3]. In Mongolia, the official biometric image requirement state that the face must occupy at least 90% of the total image area. For passport photos, the image size is 531x413 pixels, with face height of 425-470 pixels, as illustrated in Figure 2.1. For national identification cards, stricter size is used, with the face height occupying 70-90% of the total image height, as displayed in Figure 2.2 [24]. These specifications are fully consistent with the requirements of ICAO 9303, and achieving such accuracy in traditional photo studio depends on the skill and editing skills of the photographer.

In addition, technical standards define the format and quality of biometric images, including resolution, color space, and compression [4]. More recent developments also consider compatibility with advanced facial recognition technologies [5]. Therefore, any automated booth used in Mongolia must meet both current and emerging standards,

particularly if the images are intended for digital submission through government platforms. Thus, an automated photo booth system has significant advantage by standardizing the process and ensuring that all images consistently meet the required specifications.

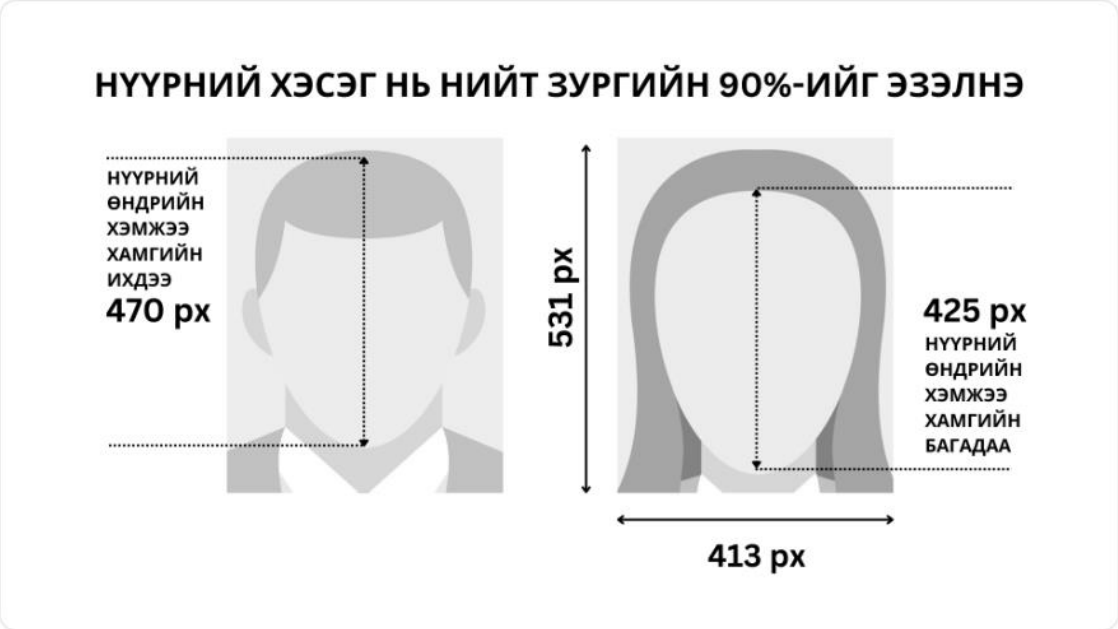


Figure 2.1 Passport photo specification

Source: Adapted from General Authority for State Registration of Mongolia *https://photo.burtgel.gov.mn/*



Figure 2.2 National ID photo specification

Source: Adapted from General Authority for State Registration of Mongolia https://photo.burtgel.gov.mn/

2.2 Self-Service Technology and Kiosk Adoption

In recent decades, the widespread adoption of self-service technologies has fundamentally modified how consumers interact with commercial and public service environments. Rather than relying on staff-mediated transactions, users now routinely engage with automated systems to accomplish tasks ranging from banking to check-in procedures. Among these, kiosk-based solutions occupy a particularly significant position, as they combine physical accessibility with digital functionality in spaces that users already frequent.

Meuter et al. [6] found that customer satisfaction in self-service environments is largely influenced by system reliability and ease of use. Their study also highlights an important behavioral insight: users tend to place greater trust in kiosks located within institutional settings, such as government service centers, compared to purely web-based alternatives. This increased trust can be attributed to the physical presence of the device, which conveys a sense of stability, legitimacy, and accountability.

In addition, interface design plays a crucial role in shaping user adoption. Research by [7] indicates that higher cognitive load caused by complex interface structures negatively affects user satisfaction. In practical terms, this suggests that excessive navigation steps or unclear instructions can reduce the overall effectiveness of the system, even if its core functionality is sound. This perspective is further supported by [8], who argue that reducing perceived effort is often more important than increasing functional benefits when it comes to user adoption.

From a value creation perspective, [9] propose a three-dimensional framework explaining how self-service kiosks generate user utility: by reducing transaction costs, extending temporal and spatial accessibility, and enabling independent task completion. In the context of this study, an automated photo booth aligns closely with all three dimensions. It lowers the cost per session compared to traditional staffed studios, operates beyond standard business hours, and allows users to complete the entire process without the need for direct human assistance.

These advantages are particularly relevant in a city such as Ulaanbaatar, where service congestion and the geographic concentration of photo studios can create additional time and travel costs for consumers. By addressing these constraints, the proposed system offers a more accessible and efficient alternative for obtaining biometric photographs.



Figure 2.3 Example of a commercially available ICAO-compliant self-service photo kiosk [28]

2.3 Technology Acceptance Model (TAM) as Theoretical Framework

The Technology Acceptance Model (TAM), originally developed by Davis [10], serves as the primary theoretical framework for understanding user adoption behavior in this study. At its core, TAM suggests that two key cognitive factors perceived usefulness (PU) and perceived ease of use (PEOU) collectively influence an individual's intention to adopt a technology. This behavioral intention is then considered a strong predictor of actual system usage.

Perceived usefulness refers to the extent to which a user believes that a particular technology will improve task performance, while perceived ease of use reflects the degree to which the system is expected to be free of effort. The reliability and applicability of TAM have been widely validated across various technological contexts [11], making it an appropriate framework for analyzing user acceptance in this research.

The Mongolian context presents two specific conditions that further support the use of TAM. First, automated biometric photo booths represent a relatively new service concept for most users, meaning that prior experience is limited, and initial perceptions are likely to play a critical role in shaping adoption decisions [12]. Second, the survey instrument developed for this study is structured around TAM's core constructs, allowing for a direct and theoretically grounded interpretation of user responses in terms of adoption readiness.

It is also important to acknowledge the Unified Theory of Acceptance and Use of Technology (UTAUT), developed by Venkatesh et al. [13], which builds upon TAM by incorporating additional factors such as social influence and facilitating conditions. In the Mongolian context, these elements remain relevant, as consumer decisions are often influenced by peer recommendations, and access to supporting infrastructure may vary across different locations [14]. However, for the purposes of this study, TAM provides a sufficiently robust and focused framework for analyzing the key drivers of user acceptance.

While the Technology Acceptance Model explains user adoption behavior, it does not account for operational feasibility or financial viability, which are essential for evaluating real world implementation.

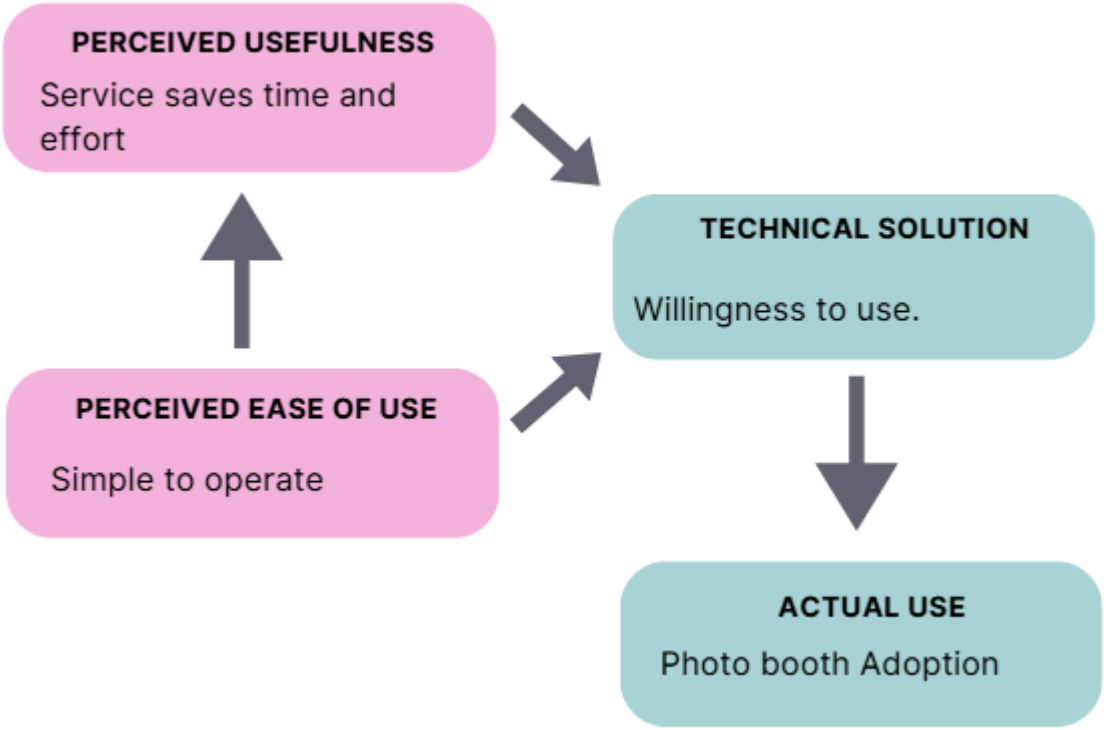


Figure 2.4 Technology Acceptance Model [10]

2.4 Market Demand and Service Convenience

Service convenience has been identified in the marketing literature as one of the primary determinants of consumer choice, encompassing the dimensions of access, transaction efficiency, and post-purchase experience [15]. Automated photo booths are structurally advantaged across all three of these dimensions: they eliminate appointment requirements, compress service duration to a matter of minutes, and are deployable in locations that consumers visit for other purposes.

What distinguishes the biometric photography market from most other service categories is the non-discretionary character of its demand. Citizens who are required to renew an identity document, apply for a passport, or complete a visa application have no meaningful alternative to obtaining a compliant photograph; the transaction is administratively mandated rather than preference driven. This structural characteristic insulates demand from the volatility typically associated with discretionary consumer spending and creates a predictable revenue base for service providers operating in this space.

Within Mongolia specifically, the existing supply of biometric photography services is concentrated in traditional studios that are subject to well-documented operational constraints, including restricted hours, uneven geographic distribution, and variable output quality. The potential for an automated alternative to capture a share of this structurally stable demand appears meaningful, particularly in Ulaanbaatar, where population density and document processing activity are highest. Mongolia's comparatively young demographic profile and its documented uptake of digital public services further suggest a population that is not categorically resistant to technology-based service engagements [16].

2.5 Mongolia’s Digital Transformation and Regulatory Context

Mongolia's trajectory of public service digitalization has accelerated notably over the past decade, with the e-Mongolia platform serving as the primary vehicle for consolidating citizen-facing government services into a single digital interface. Transaction volumes through the platform have grown substantially since its launch, reflecting both expanding service coverage and increasing citizen uptake [17, 18].

This momentum has been reinforced by targeted government reform initiatives and multilateral development support, which have directed investment toward the modernization of public service delivery infrastructure [19]. For the purposes of this study, the significance of this broader context lies in the enabling conditions it creates: a population already accustomed to digital service interactions, a government with demonstrated institutional will to modernize service delivery, and an expanding technical infrastructure capable of supporting connected devices in public spaces.

Nevertheless, the regulatory dimension warrants careful attention. Any equipment intended to produce photographs for official documents must demonstrate compliance with the specifications maintained by the General Authority for State Registration. This requirement applies irrespective of the technological format of the service provider, and it represents a prerequisite rather than an optional consideration for any prospective operator. Additionally, connectivity limitations in areas outside Ulaanbaatar remain a practical constraint,

as consistent network access cannot be assumed for all potential deployment sites [16].

2.6 Feasibility Study Framework

A feasibility study represents a structured pre-investment assessment designed to determine whether a proposed initiative is practically implementable and economically justified under prevailing conditions. Its function within the project development process is to surface material risks and structural limitations before resources are committed, thereby informing the decision of whether to proceed, modify, or abandon the concept [20, 21].

Feasibility is conceptualized as multidimensional construct consisting of market demand, operational feasibility, and financial sustainability, which are jointly evaluated to determine overall viability.

The analytical architecture of feasibility assessment varies across disciplines, but three dimensions recur consistently across methodological frameworks: market viability, operational practicability, and financial sustainability [20]. In this study, these three dimensions are operationalized as follows. Market feasibility addresses the question of whether sufficient and accessible demand exists to sustain the proposed service, drawing on competitor analysis and primary survey data. Operational feasibility examines whether the service can be realistically deployed within the Mongolian institutional and logistical environment, with particular attention to regulatory requirements and site conditions [22]. Financial feasibility evaluates whether the projected revenue structure is capable of recovering the initial capital outlay and sustaining operations at economically acceptable margins, using payback period and break-even analysis as the primary indicators [23].

2.7 Research Gap

This study contributes context specific empirical evidence on the feasibility of automated photo booth systems in Mongolia, where integrated assessments remain limited.

Chapter 3: Methodology

This chapter explains how the research was conducted. It describes the research design, data collection methods, and data analysis techniques used in the study. It also discusses the limitations encountered and how they were addressed. The purpose of this chapter is to provide a clear understanding of how the feasibility of the proposed business concept was evaluated.

3.1 Research Design and Orientation

This study adopts an exploratory research design due to the limited prior evidence on automated biometric photo booths in the Mongolian context. Since such systems are not yet widely used in Mongolia, the study focuses on identifying indicative patterns, user preferences, and feasibility indicators rather than testing causal hyptheses.

The research is based on three main dimensions: market, operational, and financial feasibility. The primary focus is on market and operational aspects, where data can be directly collected, while financial feasibility is analyzed using simplified estimates.

The Technology Acceptance Model (TAM) is used as the theoretical framework for designing the survey and interpreting user responses [10].

3.2 Research Approach and Data Collection

Primary data were collected through an online questionnaire using Google Forms between March and April 2026. The survey included questions about user experience, preferences, pricing expectations, and willingness to use automated photo booths.

A total of 207 valid responses were collected. The survey was distributed using convenience sampling, where participants were selected based on availability. This method was chosen due to time constraints and the exploratory nature of the study. The use of convenience sampling may introduce bias towards urban and digitally active populations, limiting generalizability.

Each survey question was designed to reflect the key concepts of TAM. Questions related to timesaving and quality measured perceived usefulness, while questions related to ease of use and willingness to try the service measured perceived ease of use.

3.3 Treatment of Financial Data

The initial research design included interviews with photo studio owners to collect financial data. However, most participants were not willing to share such information due to confidentiality concerns [22].

To address this limitation, alternative methods were used. Equipment costs were estimated based on publicly available supplier data. Revenue projections were developed using survey responses related to willingness to pay and usage frequency. These estimates are treated as indicative rather than exact figures.

Therefore, the financial estimates are based on publicly available benchmark data and survey derived assumptions, and should be interpreted as indicative rather than precise.

3.4 Data Analysis Methods

The collected data were analyzed using descriptive statistical methods. Survey responses were organized using frequency counts and percentages to identify general patterns. Descriptive statistical analysis and cross-tabulation are used to identify patterns in user preferences, which are interpreted through the TAM framework.

In some cases, cross-tabulation was used to compare responses across different groups. Visual tools such as charts are used in Chapter 4 to present the findings clearly.

3.5 Limitations

This study has several limitations. The use of convenience sampling may result in bias, as the sample mainly includes urban and digitally active individuals. Rural populations and older age groups may be underrepresented.

In addition, the study relies on self-reported data, which may not always reflect actual behavior. Financial estimates are based on assumptions rather than verified data, which may affect accuracy.

3.6 Ethical Considerations

All participants were informed that their responses would be used only for academic purposes. Participation was voluntary, and no personal information was collected. All data were kept anonymous, and participants had the option to withdraw at any time.

Chapter 4: Market feasibility analysis

4.1 Current market situation in Mongolia

In Mongolia, the demand for official identification, and passport photographs is structurally embedded in the country's administrative and legal framework. Citizens are required to present standardized format photograph for various government and institutional purposes, including issuing and renewing domestic ID cards, obtaining passports and visas, applying for university admission, concluding employment contracts, and various state registration processes. This recurring demand for documents creates stable and predictable market for photographic services across the country.

To estimate market more accurately, this study attempted to collect primary data on the number of customers who takes biometric photography services through interviews with government one stop service centers and small traditional photo studios. Nevertheless, access to such data was limited due to confidentiality policies. As a result, the lack of publicly available official statistics on the volume of services and the size of the market is major limitation of the study.

According to the 2023 Statistical Report of the Mongolian Immigration Service (Foreign Citizens, Citizenship,2024) the total number of documents requiring official photographs processed by the agency during the reporting period reached 109,119 cases, including 9492 visas issued, 31242 e-visas, 44830 visa approvals, and 23555 new residence permits. These figures represent 157.9% increase from 2022, reflecting the recovery of cross border movement after the pandemic and the increasing administrative workload [25]. These figures only apply to foreign citizens but are used as proxy for the scale and growth trend of document related administrative processes in Mongolia and are not direct measure of domestic demand.

From the perspective of local consumers, the photography market in Ulaanbaatar is currently divided into several types of service providers. A preliminary survey conducted for this study (total number n=207) found that most respondents 56.5% currently use traditional photo studios for taking biometric photographs and printing the photos. An additional 21.7% use print and copy service centers, while 16.4% use government run photo booths. Only 5.3% reported using other means as illustrated in Figure 4.1. This

distribution suggests that no single provider has dominated the market and that, despite acknowledged service quality deficiencies, traditional photo booths remain the primary service channel.

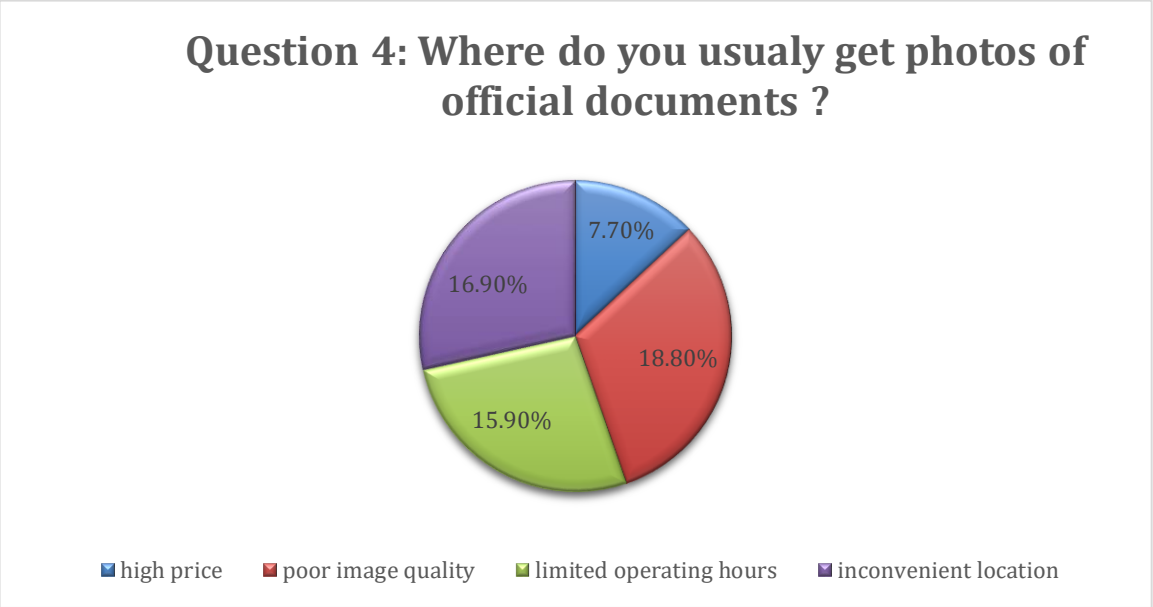


Figure 4.1. Current service provider distribution

The current market is characterized by limited opening hours, and locations, geographical constraints within one specific urban area, and manual production processes that are prone to quality fluctuations. These structural weaknesses create a significant gap between customer expectations and service delivery. Automated photo booth technology can address these inefficiencies by offering a more standardized, accessible, and time efficient solution. The following sections provide more detailed analysis of competitive dynamics and consumer demand based on primary data collected in this feasibility study.

4.2 Competitor analysis

4.2.1 Traditional photo studios

Traditional photography studios represent the most common type of service, currently covering 56.5% of the surveyed consumers. These businesses typically open between approximately 10:00 or 11:00 to 18:00, and provide services such as photo shoots, editing, and printing within 10-15 minutes or longer. Their main competitive advantage

lies in the familiarity of consumers and the quality assurance associated with supervision of the photographers.

According to the consumer survey price data, 54.1% of respondents currently pay between 5000-10000 tugriks for personal photography services, 30.4% between 10000-15000 tugriks, and 7.2% over 15000 tugriks as presented in figure 4.2. Due to the lack of official data, estimates of individual studio revenues were made using conservative operating assumptions. Studios operate nearly 7-8 hours per day, with 1-2 hours of downtime, resulting in an effective operating time of approximately 6-7 hour. Assuming an average service time of 10-15 minutes per customer, the theoretical capacity is approximately 24-42 customers per day. However, considering demand fluctuations and operational inefficiencies, more realistic estimate of traditional studio serving around 20-30 customers per was used. Based on observed price levels, this equates 3-9 million tugriks, which is interpreted as indicative rather than definitive. These estimates are presented at conceptual level to support comparative analysis, with detailed financial calculations will develop further in Chapter 6.

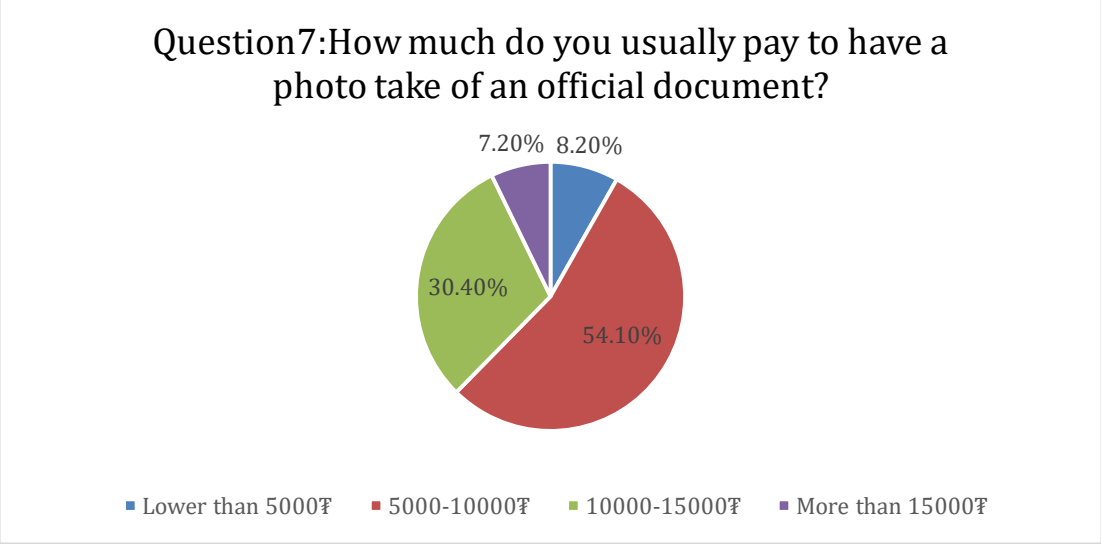


Figure 4.2 Current price paid by respondents.

The main limitations of traditional studios identified in the study are considerable. Among respondents who reported service-related problems, as shown in Figure 4.3, 18.8% reported poor image quality, 16.9% reclaimed inconvenient location, 15.9% reported limited operating hours, and 14.5% reported excessive waiting times. Only 26.1% of respondents chose no problems, indicating that significant portion of customers are experiencing at least one service deficiency.

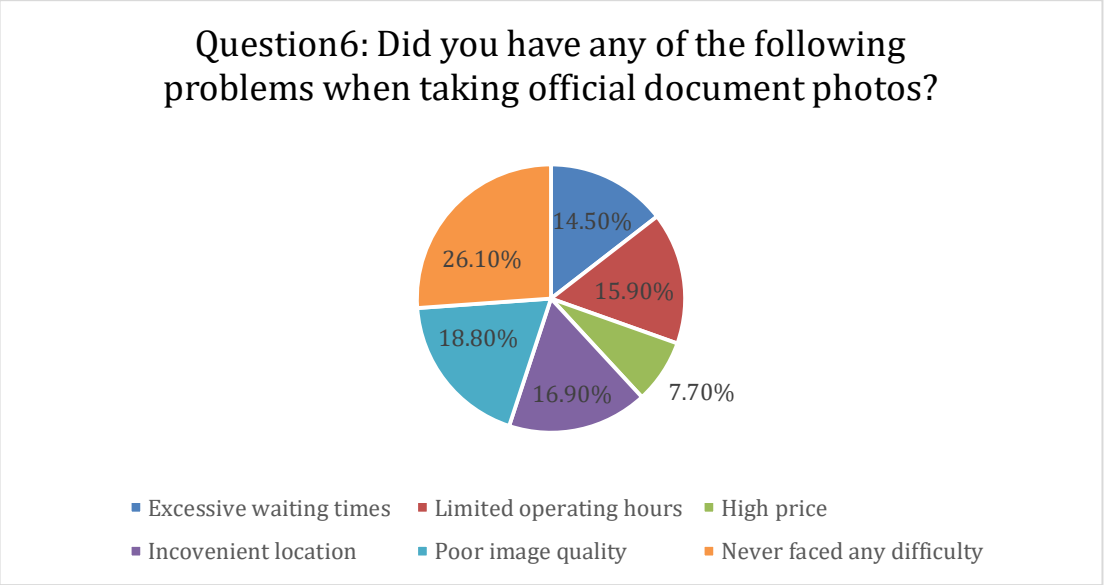


Figure 4.3 Service problems reported by respondents.

The high proportion of respondents reporting service-related problems indicates clear market gap, supporting the potential demand for automated solutions. These findings suggest that the proposed automated photo booth can address existing service weaknesses in the current service market by improving accessibility, reducing waiting time, and providing more standardized output quality.

4.2.2 Printing and Document Service centers

Print and Document service centers serve 21.7% of the surveyed consumers and are the second most competitive category. These organization offer scanning document, printing, and copying services, as well as taking biometrics photography. Their competitive advantage is primarily related to geographic location, as they are more widely distributed in residential areas and near universities in the city center than in specialized studios.

4.2.3 Government One-Stop Service Centers

Photo services within government service centers are used by 16.4% of the respondents. The main competitive advantage of these in house services is administrative integration. If you come to renew your ID card, the location can take your photo, submit everything immediately, and complete the process in a single visit. This is a form of co-location that neither photo studios nor automated photo booths can replicate, and these options often require applicants to come with their photos already taken. However, they are limited by

the organization's opening hours and the ability to serve large numbers of people quickly. Their market reach is also limited by their co-location with the government service points.

4.2.4 Competitive positioning of the proposed Photobooth

Taken together, the three existing competitor categories reveal a market that is functional but disconnected, and where no provider fully addresses all consumer needs.
The proposed automated photobooth is positioned to address the most reported gaps simultaneously:

- Extended availability (work 24/7)
- Standardized output quality meeting ICAO biometric specifications
- Faster service delivery
- Broad geographic deployment.

Its competitive advantage does not rest on one dimension alone, but rather on a combination of attributes that no existing provider currently offers together.

4.3 Survey results

A structured questionnaire survey was conducted via Google Forms to assess consumer behavior, service preferences, and readiness to adopt technology. A total of 207 valid responses were collected from different age groups and professional categories, increasing the representativeness of the results for the target city population. The survey instrument was designed in line with the Technology Acceptance Model (TAM), which posits that technology adoption is primarily determined by two cognitive constructs:

- Perceived Usefulness (PU)
- Perceived Ease of Use (PEOU)

Which together influence Behavioral intentions (BI) to adopt technology. The following analysis interprets the study result in terms of these constructs.

4.3.1 Sample profile

The survey used adults as a general representative of the population. The largest group consisted of those aged 46 and over, accounting for 29.5% of the survey respondents. This was followed by respondents aged 18-25 at 23.2% , and those aged 36-45 at 21.7%. Respondents aged 26-35 at 13.5% , while respondents under 18 at 12.1% .

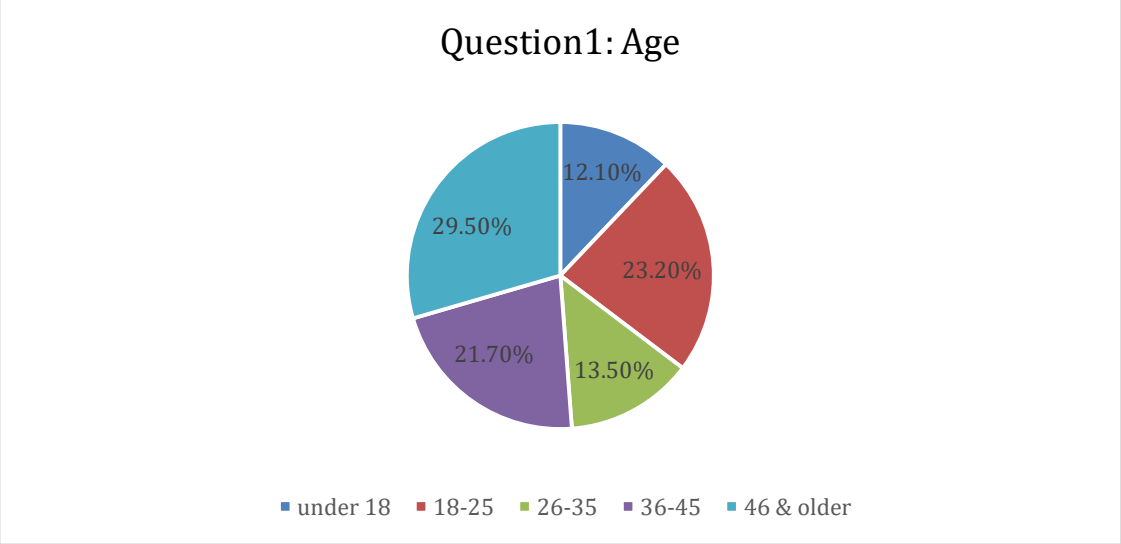


Figure 4.4 Respondent age distribution

In terms of employment, private sector employees accounted for 25.6% and public sector employees for 22.2%. Students accounted for 20.3% of the survey respondents, self-employed for 15.0%, and respondents who selected other answers for 16.9%.

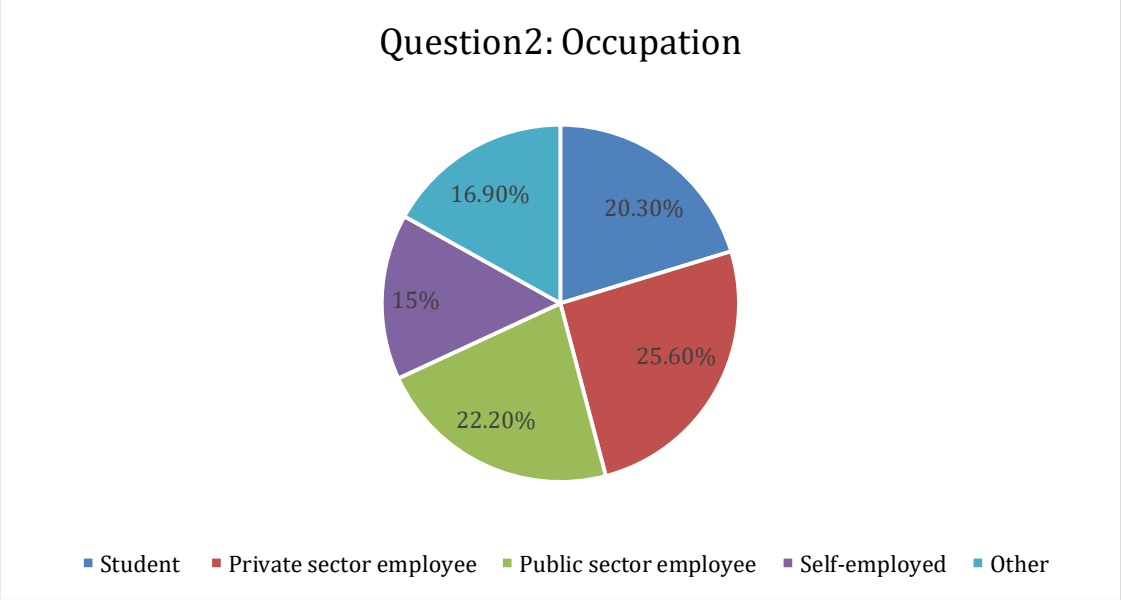


Figure 4.5 Respondent employment distribution

In general, this distribution reflects an economically active urban population, which tends to regularly receive official document services.

4.3.2 Perceived Usefulness

In the TAM framework, perceived usefulness (PU) refers to the extent to which potential users believe that a given technology will improve their performance [11]. In this study, PU was measured by questions about the value of photo booth features, problems with current services, and satisfaction with current options.

Responses to current service problems provide the strongest evidence of usefulness. The majority of respondents (73.9%) reported at least one significant problem with their current photo booth. The main problems included poor image quality (18.8%), inconvenient location (16.9%), limited hours (15.9%), long wait times (14.5%), and high prices (7.7%). Only 26.1% reported no problems, these data illustrated in
Figure 4.3. From the TAM perspective, these service-related problems strengthen perceived usefulness because the automated booth directly responds to issue such as poor image quality, inconvenient location, limited operating hours, and long waiting times. Photo booths that offer automated quality control, wider availability, and 24-hour service are designed to address these problems. This high level of dissatisfaction strongly supports the idea that users see real value in automated solutions.

This is further supported by the trend towards 24-hour service. The majority of respondents (81.6%) rated it as “very convenient”, while 13.0% rated it as “moderately convenient”. Only 5.3% considered it not important. This suggests that limited service hours are widely seen as a major disadvantage, which reinforces the customer support argument. The most attractive features of the photo booth were fast service (45.4%), easy access (20.8%), and no waiting time (15.0%), which are the main advantages of the automated kiosk.

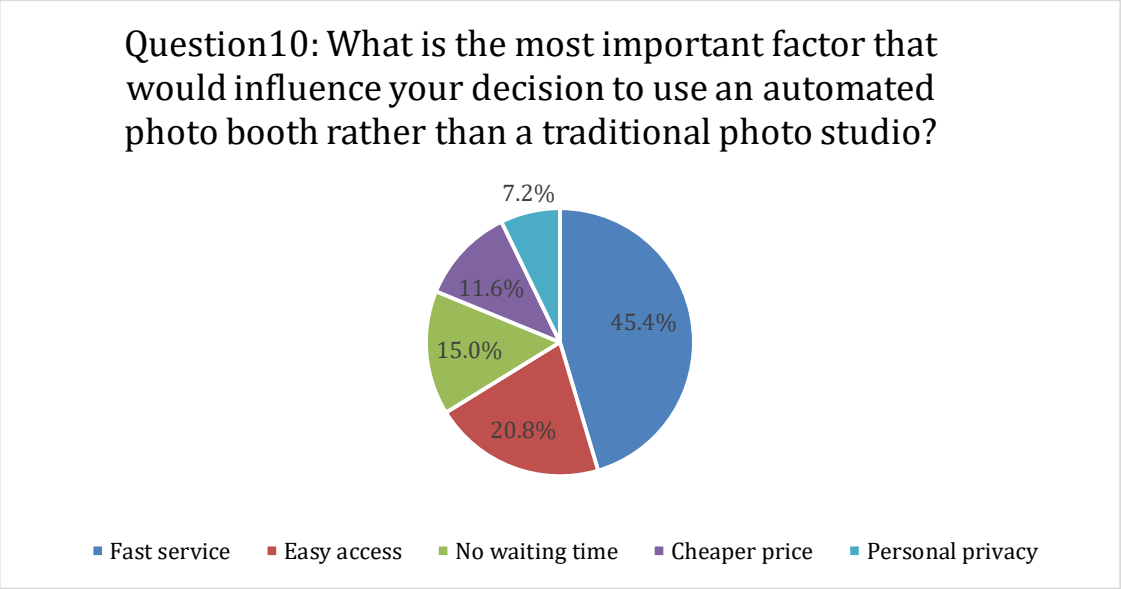


Figure 4.6 Most attractive photobooth features

Satisfaction with current services also supports this conclusion. While 34.3% were satisfied and 2.9% were highly satisfied, the most common response was “moderately satisfied” (44.4%). Meanwhile, 15.9% were dissatisfied and 2.4% were very dissatisfied. Since strong satisfaction is not dominant, many users may have interest in willing to switch to a better-performing alternative.

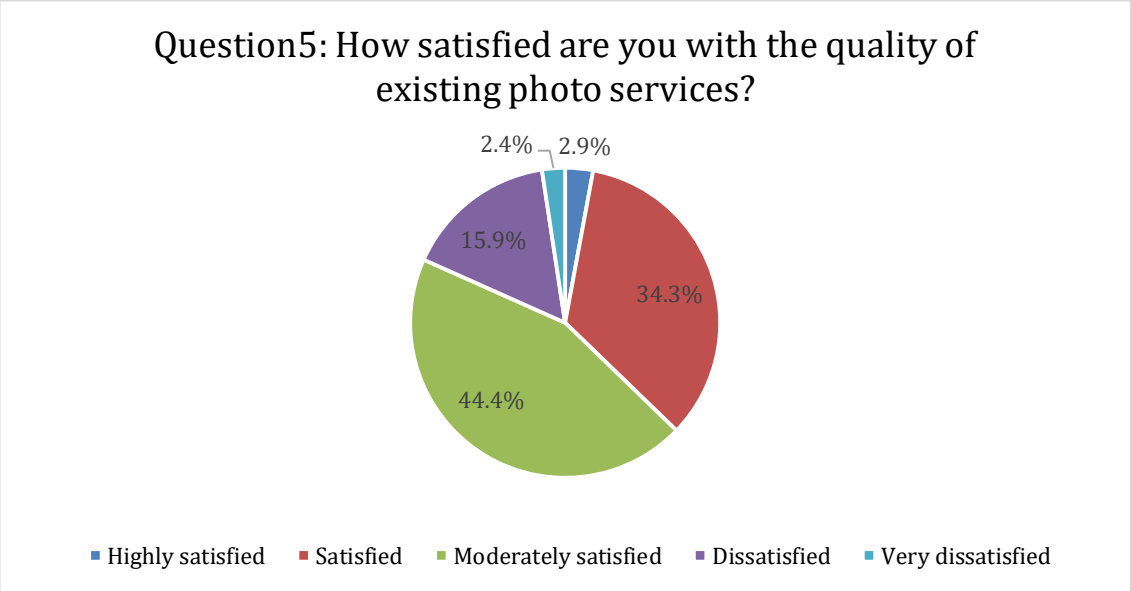


Figure 4.7 Current service satisfaction levels

4.3.3 Perceived ease of use (PEOU)

Perceived Ease of Use (PEOU) refers to extent to which users expect a technology to be easy to operate and require minimal effort. In this study, PEOU was assessed using two factors:

1. Prior experience with automated photographic equipment
2. The trust in the quality of machine product images.

The findings are more varied than those for Perceived Usefulness (PU). Majority of respondents reported no prior experience with automated photo devices, while 32.9% indicated previous use. Although lack of familiarity does not directly prevent adoption, it suggests that ease of use will play an important role in actual usage. For first time users, the system interface and on-screen instructions must be clear and intuitive. This has direct implications for the operational design of the proposed photobooth and will be discussed further in Chapter 5.

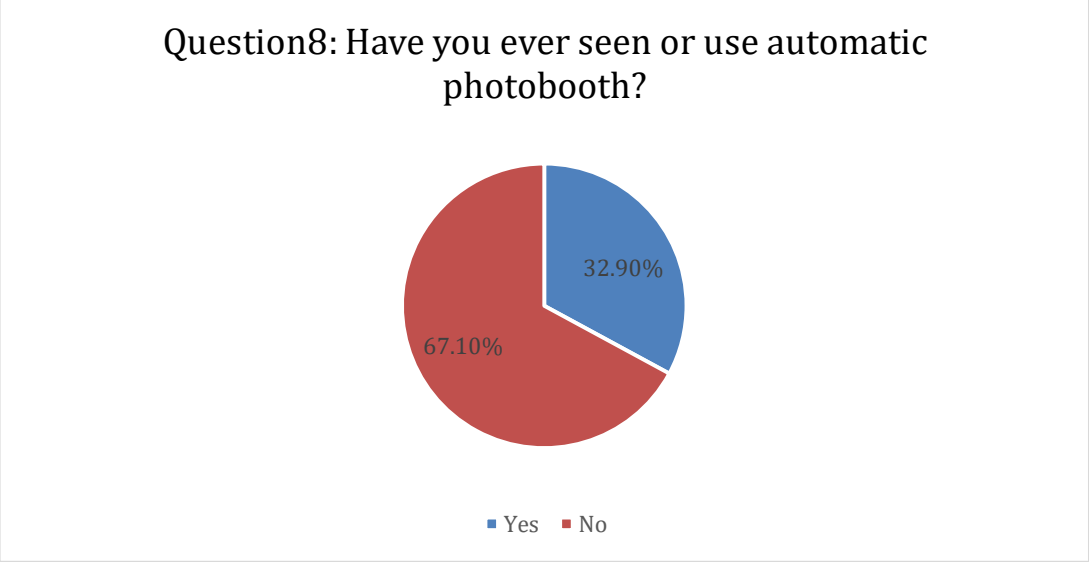


Figure 4.8 Prior experience with automated photo devices

In terms of trust in output quality, 46.9% of the respondents expressed confidence that the photobooth would produce satisfactory level of result, while 49.8% indicated conditional confidence of possibly. Only 3.4% expressed distrust. The combined positive conditional acceptance rate is high of 96.6%, suggesting that uncertainty is not a major barrier to initial adoption. However, conditional trust may not translate into repeated use if the actual output quality fails to meet expectations during the first interaction. This highlights the importance of using ICAO passport photo standards compliant equipment

and providing visible quality assurance features, such as on-screen preview before printing, to strengthen user confidence.

4.3.4 Behavioral Intention

Behavioral intent (BI) is a key outcome variable in the TAM framework, indicating how likely individuals are to use the technology. In this study, BI was measured using two related dimensions: intention to use the photo booth and intention to recommend it to others.

The results are very positive. When asked whether they would use the photo booth, 71.0% of respondents answered “yes”, 27.1% answered “probably”, and only 1.9% answered “no”. This is a very high percentage of positive and conditional responses, which is 98.1%. A similar pattern can be seen in the recommendation intention: 73.9% would recommend the service, 25.1% would probably recommend it, and only 1.0% chose would not recommend it. Below is the illustration of the questionnaires result.

Table 1 Behavioral intention results

Question	Response	Number of Respondents	%
Intention to use	Yes	147	71%
Intention to use	Probably	56	27.1%
Intention to use	No	4	1.9%
Would recommend	Yes	153	73.9%
Would recommend	Probably	52	25.1%
Would recommend	No	2	1%

The close relationship between intention to use and intention to recommend is important. Consumers are not only willing to use a service, but also willing to recommend it to others, indicating that they see real value in it. From a business perspective, this

suggests a good potential for word-of-mouth growth, which is especially important for new services that do not have strong brand recognition.

These results are consistent with TAM framework, which suggests that high perceived usefulness (PU) plays main role in shaping behavioral intention (BI). In this study, high perceived usefulness appears to compensate for moderate perceived ease of use, resulting in strong behavioral despite limited prior experience with automated systems. This indicates that respondents are willing to adopt the proposed photo booth primarily because they associate it with practical benefits such as faster service, improved accessibility, and reduced waiting time.

4.3.5 Consumer Choice: Location, Price and Time

In addition to TAM variables, the study examined practical choices that may guide implementation. These factors do not explain whether consumers will adopt a service, but rather how and where they prefer to use it.

In terms of location, 42.5% of respondents preferred government service centers, 39.1% preferred shopping centers. These accounted for 81.6% of the total responses. Embassies and visa centers were selected by 6.3%, universities by 2.4%, and other locations by 9.7%. The preference for government and shopping centers reflects everyday behavior: people already visit these places for official work and daily activities. Therefore, focusing on these places will allow the service to effectively reach a large number of users. In addition to the options listed above, several respondents mentioned stores as a possible location for a photo booth. Although this was not one of the most frequently selected options, it demonstrates the practical demand for accessible, everyday locations. This suggests that stores can be a useful additional location strategy, especially when it comes to increasing accessibility and spontaneous use.

In terms of price, 61.8% of respondents said they would be willing to pay 5,000-8,000 tugriks for a one-time service, 30.4% said 8,000-10,000 tugriks, and 7.7% said they would be willing to pay more than 10,000 tugriks. The average price is around 7,500 tugriks. This is slightly lower than the price of a high-end studio but is still generally competitive. The price range of 6000-8000 tugriks seems to be acceptable to consumers and suitable for business sustainability.

In terms of service hours, 50.7% of respondents preferred 24-hour availability, while 29.5% preferred daytime, 11.1% preferred morning, and 8.7% preferred evening. The preference for 24-hour service supports previous findings related to benefits. It also indicates a clear gap in the current market, as existing service providers do not offer this level of availability despite high consumer demand.

Table 2 Location, price and timing preferences

Question	Option	Number of Respondents	%
Preferred location	Government service centers	88	42.5%
Preferred location	Shopping centers	81	39.1%
Preferred location	Visa centers	13	6.3%
Preferred location	Universities	5	2.4%
Preferred location	Other	20	9.7%
Willingness to pay	5000-8000₮	128	61.8%
Willingness to pay	8000-10000₮	63	30.4%
Willingness to pay	Above 10000₮	16	7.7%
Preferred timing	Any time [24 hours]	105	50.7%
Preferred timing	Daytime	61	29.5%
Preferred timing	Morning	23	11.1%
Preferred timing	Evening	18	8.7%

4.4 Customer Demand Analysis

The potential demand for the photo booth services offered in this section is estimated directly from the results of the primary research. Instead of using a formal market sizing framework, this analysis uses three research variables: frequency of use, adoption intent,

and willingness to pay to create a direct picture of demand based on actual respondent behavior.

- **Usage frequency**

Respondents were asked how often they need personal photos for official purposes. The results show that 42.0% of respondents need photos very rarely, in other words less than once every three years. Furthermore, 28.0% need photos every two to three years, and 27.5% need photos approximately once a year. Only 2.4% reported that they do not need them at all. These figures indicate that personal photos are an infrequent but universal need almost all working age adults need them at some point, and a meaningful proportion need them approximately once a year.

- **Adoption Intention**

Among the 207 survey respondents, 71% answered that they would use the automated photo booth, and an additional 27.1% answered “probably.” Only 4 respondents equal of 1.9% said they would not use it. This high level of readiness to adopt, combined with the frequency data, allows for a direct projection of demand. The 147 confirmed users, combined with the conditional group, represent a strong potential customer base that extends well beyond the survey sample. For the purpose of financial projections in Chapter 6, lover bound adoption rates are based on the confirmed “yes” group only, as they reflect the most reliable signal of actual willingness to use the service.

- **Willingness to Pay**

Out of the 207 respondents surveyed, 61.8% indicated that they are willing to pay between 5,000 and 8,000 tugriks per session, while 30.4% reported a willingness to pay between 8,000 and 10,000 tugriks, and 7.7% stated that they would pay more than 10,000 tugriks. By taking the midpoint of each price range, the weighted average willingness to pay is estimated to be approximately 7,400–7,600 tugriks.

For planning purposes, a price point of 7,500 tugriks has been adopted in the financial model presented in Chapter 6. This pricing is competitive when compared to traditional studio services, which typically range from 5,000 to 15,000 tugriks, while remaining affordable for the majority of respondents.

Demand is structurally stable due to non-optional nature of document photography services, as citizens require standardized photographs for passports, identity cards, visas, employment documents, and other official administrative purposes. Overall, the demand analysis suggests that there is a commercially viable customer base for the proposed service. In particular, the project is likely to succeed if the booth is strategically located in high-traffic areas and priced within the identified acceptable range.

Chapter 5: Operational and Regulatory Feasibility Purpose

5.1 System Description of the photobooth

5.1.1 Booth Configuration and Design Choice

For the proposed system, a semi-open kiosk-style photo booth is selected as the most appropriate configuration. Unlike traditional enclosed photo booths, which require additional space, structural components, and ventilation, the semi-open design integrates all functional elements camera, lighting, touchscreen interface, printer, and payment system into a compact, standalone unit.

This configuration is particularly suitable for high-traffic public environments such as shopping malls, government service centers, and universities, where space efficiency and ease of access are critical. The absence of a full enclosure reduces installation costs and simplifies maintenance, while also enabling faster user throughput. In terms of spatial requirements, the physical footprint of the kiosk unit itself typically ranges from approximately 0.6 to 1.0 square meters. However, for practical operation and user accessibility, a total installation area of around 1.5 to 2.0 square meters is recommended. This allows sufficient space for user positioning, interaction with the interface, and minimal clearance for movement in public settings.

Existing commercial implementations of semi-open kiosk systems demonstrate their effectiveness in autonomous, self-service environments [26]. These systems are designed for continuous operation with minimal supervision, supporting both usability and operational efficiency.

Figure 5.1 illustrates the proposed spatial layout of the biometric photo booth in a top-view configuration. The design follows a semi-open kiosk structure, with the machine positioned on one side and a designated user interaction area adjacent to it. The layout ensures efficient use of space while providing sufficient room for user movement and interaction. The total operational area is approximately 1.5 to 2.0 square meters, making the system suitable for installation in compact, high-traffic environments.

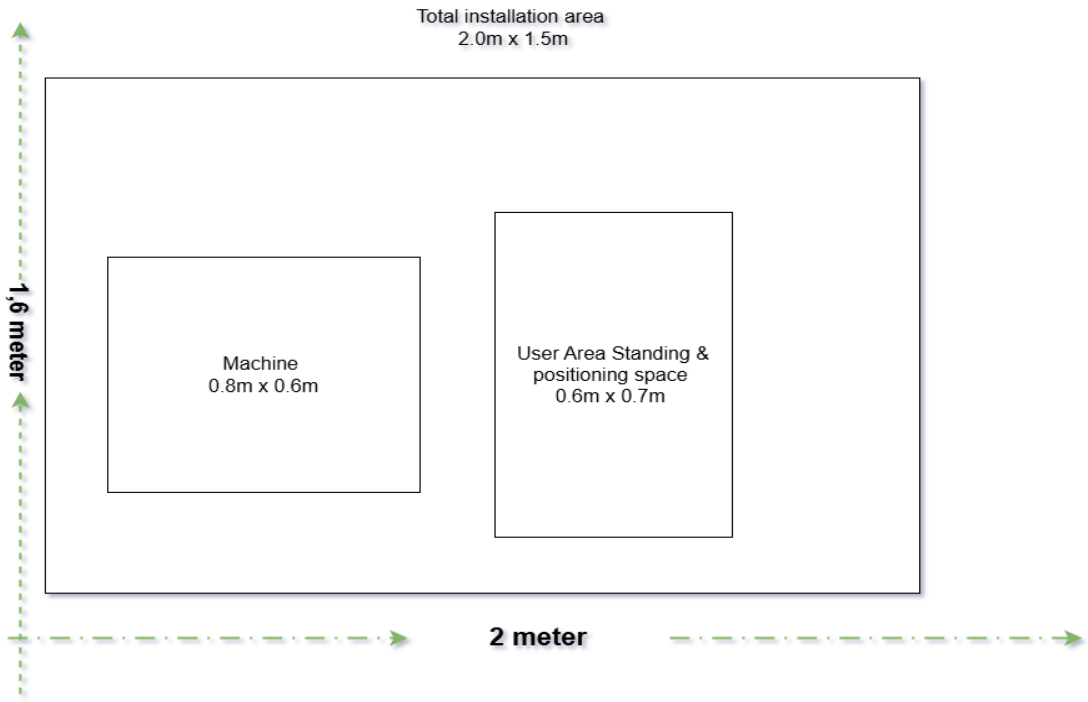


Figure 5.1 Layout of the Proposed Biometric Photo Booth (Top View)

5.2 Location Analysis

The survey results indicate that 42.5% of respondents prefer government service centers and 39.1% prefer shopping centers, together accounting for 81.6% of location preferences. Government one-stop service centers represent the highest-priority deployment environment. Citizens who visit these centers for document issuance or renewal are already in need of biometric photographs, making co-location with the administrative process highly convenient. Key locations include the State Registration General Office centers and district-level citizen service halls, which offer reliable power, indoor space, and consistent foot traffic throughout operating hours.

Shopping centers represent a complementary deployment environment. Large commercial malls in Ulaanbaatar attract high daily visitor volumes and are accessible by public transport. Placement near entrances or service floors ensures visibility. Shopping centers also offer extended opening hours that align with the 50.7% of survey respondents who indicated a preference for 24-hour or flexible availability. Secondary locations with moderate potential include embassy and visa service centers, university campuses, and transport hubs. For an initial trial phase, a deployment strategy focusing on two to three government service centers and one to two major shopping centers is recommended.

5.3 Operational Requirements

Successful operation requires attention to four main areas. Installation requires securing a space agreement with the site owner, an electrical connection, and, where applicable, an internet connection. Routine maintenance includes restocking consumables approximately every two to four weeks, cleaning, and clearing errors. Remote monitoring software allows the operator to track system status and error alerts from a central dashboard. Staffing is minimal since the booth operates autonomously; however, the finding that 67.1% of respondents have no prior experience with automated photo devices suggests that user assistance may be valuable during the initial deployment phase, either through a part-time roving assistant or clearly illustrated on-screen instructions in Mongolian. Connectivity requirements are met by the existing 5G mobile network coverage across Ulaanbaatar for locations without fixed broadband.

5.4 Compliance with Biometric Standards

Any equipment used to produce images for official Mongolian government documents must comply with the specifications set by the General Authority for State Registration (GASR). As outlined in Chapter 2, these require that the face occupy at least 90% of the image area, with a size of 531x413 pixels for passport photographs and stricter proportions for national identity cards. These requirements align with ICAO Document 9303. Commercial automated photo booths certified under ICAO standards are capable of meeting these requirements. The booth operator must verify prior to purchase that the selected equipment includes the relevant national format profiles or that the supplier can configure the software accordingly.

No specific legislation currently governs the use of automated photo booths in Mongolia. It is recommended that the booth operator obtain written confirmation from GASR that the output format of the selected equipment is accepted before commencing commercial operation. In summary, the operational feasibility of the proposed photo booth is positive. Operational feasibility is influenced less by technological constraints and more by regulatory approval, site accessibility, and user familiarity. Thus, the main operational challenges relate to obtaining confirmation from GASR, negotiating suitable installation sites, and supporting first time users during the initial deployment phase. None of these challenges represents a major constraint to deployment.

Chapter 6: Financial feasibility

This chapter presents a simplified financial model developed to evaluate the economic feasibility of operating an automated biometric photo booth in Mongolia. As discussed in the methodology chapter, efforts to obtain primary financial data from existing photo studio operators were unsuccessful, as most respondents were unwilling to disclose revenue and cost information due to confidentiality concerns. As a result, the financial estimates provided in this chapter are based on publicly available data, including equipment pricing, supplier specifications, and the survey findings generated through this study. It should be noted that these figures represent indicative projections rather than precise market values, and therefore should be further validated with reliable industry data prior to making any investment decisions.

6.1 Capital Expenditure (CAPEX)

The primary upfront investment consists of the acquisition of the photo booth unit. Based on publicly listed pricing from Asian manufacturers on Alibaba.com and European suppliers such as Sharingbox, ICAO-compliant photo kiosk units range from approximately USD 3,000 for entry-level Asian-manufactured systems to USD 20,000 for European commercial-grade configurations, with variation driven primarily by hardware quality, printer specifications, and software licensing arrangements [26, 27].

Due to the limited availability of primary financial data, the key financial parameters in this study are estimated using benchmark ranges derived from publicly available supplier prices and related cost assumptions. Thus, the financial results should be interpreted as scenario based estimates rather than precise projections.

For the purpose of this analysis, a mid-range unit cost of USD 12,000, approximately 41,000,000 MNT at an exchange rate of 3,420 MNT/USD as of April 2026, is adopted. This estimate reflects a commercially feasible specification that includes core hardware, integrated printer, payment terminal, and initial software license, positioned between the lower-cost Asian market options and the premium European alternatives. Given that the Mongolian deployment context requires ICAO compliance and multilingual interface support, a mid-range specification is considered the most appropriate basis for financial modeling.

In addition to the base equipment cost, several one-time expenditures must be accounted for, including international shipping and customs clearance, on-site installation and commissioning, as well as initial consumable supplies.

Table 3 Estimated Capital expenditure.

Cost Component	Estimated Cost (MNT)
Booth Unit (Hardware + Software)	41,000,000₮
Shipping & Customs (15%)	6,150,000₮
Installation & Commissioning	500,000₮
Initial Consumables	300,000₮
Total CAPEX	**47,950,000₮**

6.2 Operating Expenditure (OPEX)

Monthly operating costs consist of several key components, including consumables, site rental, software services, maintenance, and connectivity. Among these, site rental represents the most variable cost depending on the deployment location.

Table 4 Estimated monthly operating expenditure.

Cost Component	Estimated Cost (MNT/month)
Consumables (paper & ink)	250,000 – 400,000
Site Rental	1,000,000 – 1,500,000
Software & Monitoring	100,000 – 150,000
Maintenance	150,000 – 300,000
Internet	50,000 – 80,000
Total OPEX	**~1,550,000 – 2,430,000**

Consumable costs are estimated based on a throughput of 300–500 sessions per month, with an average cost of approximately 800 MNT per printed set, derived from publicly listed thermal paper and dye-sublimation ink pricing for comparable kiosk systems [27]. Site rental represents the most variable component: government service centers may operate under a revenue-sharing arrangement of 10–15% of gross revenue, while commercial mall locations typically charge a fixed monthly fee. For financial modeling purposes, the lower bound of total OPEX is 1,550,000 MNT per month that is applied consistently across all scenarios as a conservative baseline.

6.3 Revenue Projection

Revenue is determined by two variables: daily session volume and price per session. A price point of 7,500 MNT is applied throughout, consistent with the weighted average willingness to pay of 7,400–7,600 MNT derived from the survey and falling within the 5,000–8,000 MNT range preferred by 61.8% of respondents. Three demand scenarios are modeled across a 30-day operating month, as summarized in Table 5. The optimistic scenario of 30 sessions per day is considered plausible for high-traffic government service centers during peak document renewal periods, while the conservative scenario of 10 sessions per day represents a cautious lower bound for initial deployment.

Table 5 Revenue projection by scenario

Scenario	Sessions/Day	Monthly Revenue (MNT)
Conservative	10	2,250,000
Moderate	20	4,500,000
Optimistic	30	6,750,000

6.4 Payback Period and Break-Even Analysis

The financial viability of the proposed system is evaluated through payback period and break-even analysis under three demand scenarios, applying the conservative OPEX baseline of 1,550,000 MNT per month established in Section 6.2.

Table 6 Financial Performance by Scenario

Scenario	Sessions/Day	Monthly Revenue (MNT)	Monthly OPEX (MNT)	Net Profit (MNT)	Payback Period (Months)
Conservative	10	2,250,000	1,550,000	700,000	36 – 40
Moderate	20	4,500,000	1,550,000	2,950,000	16 – 17
Optimistic	30	6,750,000	1,550,000	5,200,000	10 – 12

Under the moderate scenario of 20 sessions per day, the system generates a monthly net profit of approximately 2,950,000 MNT. At this level of performance, the initial capital investment of 47,950,000 MNT is recovered within approximately 16 to 17 months, a reasonable payback horizon for a low-staffing service infrastructure investment. Under the conservative scenario, lower utilization extends the payback period to 36 to 40 months, while the optimistic scenario, representative of a well-located government service center during peak periods, reduces it to 10 to 12 months. of high-traffic locations the payback period decreases significantly to approximately 10 to 12 months. These results suggest that profitability is highly influenced by utilization rates and location selection, both of which are critical determinants of overall financial performance.

Table 7 Break Even Analysis

Metric	Value
Monthly OPEX (baseline)	1,550,000 MNT
Price per Session	7,500 MNT
Break-even Volume (sessions/month)	207
Break-even Volume (sessions/day)	~7

The revised break-even threshold of approximately 207 sessions per month, or 7 sessions per day, remains a modest operational requirement. Even at this corrected figure, profitability is achievable at moderate foot traffic levels without any labor overhead a structural cost advantage that traditional photo studios, which depend on staffed operation, cannot replicate. Any session volume above the break-even point contributes directly to recovery of the initial capital outlay.

Chapter 7: Discussion and Conclusion

7.1 Summary of Findings

Three months of fieldwork, 207 survey responses, and a financial model constructed from publicly available supplier data converge on a broadly affirmative answer to the central research question though feasibility in each dimension carries conditions that any prospective operator would need to address deliberately rather than in passing.

The market evidence is the most unambiguous. Nearly the entire sample expressed openness to using an automated photo booth, and critically, this openness is not passive: 73.9% of respondents reported at least one concrete grievance with their current provider, spanning poor image quality, inconvenient locations, restricted operating hours, and excessive waiting times. The distinction matters because a market characterized by active dissatisfaction presents a fundamentally different entry condition than one that is merely indifferent to a new option. The TAM analysis adds necessary nuance perceived usefulness is high across the sample, while perceived ease of use is moderate, reflecting the fact that 67.1% of respondents have never used an automated photo device. That said, conditional trust in output quality reaches 96.6%, which suggests the unfamiliarity is a first-exposure problem rather than a principled objection. Location preferences concentrate heavily in government service centers and shopping malls, together accounting for 81.6% of responses, and willingness to pay clusters in the 5,000–8,000 MNT range a price point that the financial model confirms is commercially workable.

Operationally, the technology itself is not the binding constraint. ICAO-compliant kiosk systems are commercially mature, field-tested across comparable markets in East Asia and Europe, and technically capable of satisfying Mongolia's GASR specifications for both passport and national identity card photography. What requires resolution before deployment are three non-technical prerequisites: written regulatory confirmation from GASR that the selected equipment's output format is accepted for official use, negotiation of site agreements at priority locations, and deliberate investment in the first-user experience given the familiarity gap documented in the survey. These are manageable conditions but treating them as afterthoughts rather than prerequisites would introduce material operational risk.

The financial structure is, in some respects, the most straightforward dimension to evaluate. A daily break-even volume of approximately six sessions is a low requirement well within what even a moderately trafficked government service hall would be expected to generate. Under the moderate scenario of 20 sessions per day, the initial capital outlay of approximately 48,000,000 MNT recovers within 15 to 16 months. More structurally significant is the absence of recurring labor costs, which creates a cost asymmetry relative to traditional studio competitors that widens as utilization increases. The financial model rests on assumptions rather than verified operational data, and the resulting estimates carry meaningful uncertainty a limitation addressed in section 7.3, but the underlying economics are genuinely encouraging even under conservative demand conditions.

7.2 Interpretation through the TAM Framework

TAM's contribution to this study extends beyond organizing the survey instrument. It provides a coherent explanation for what might otherwise appear as a puzzling inconsistency in the results: how can perceived ease of use be only moderate while behavioral intention to adopt reaches 98.1%? Standard TAM formulations treat both constructs as jointly necessary for strong adoption intent, yet the data here suggest that perceived usefulness is doing the heavier explanatory work.

This pattern is not atypical within the TAM literature. In service contexts where technology use is driven by necessity rather than discretionary preference, perceived usefulness consistently exerts a stronger influence on behavioral intention than ease of use, particularly among first-time users [11]. The biometric photography market exemplifies this dynamic precisely respondents do not seek out photo services because they enjoy the experience, but because the administrative system requires it. A service that removes meaningful friction from that obligatory transaction will attract uptake even if the interface feels unfamiliar on first encounter, provided the output is trusted to meet official standards. The 96.6% conditional trust figure suggests that this threshold is largely met in the minds of prospective users.

The recommendation data strengthen this reading. The 73.9% who expressed willingness to recommend the service to others closely mirroring the 71% who stated definite intention to use it indicates that adoption, once it occurs, is likely to generate organic diffusion through peer networks. In a context where the majority of the target population will encounter the booth for the first time, a strong initial experience becomes

the primary acquisition channel, which places particular weight on interface quality and on-site guidance during the early deployment phase.

7.3 Limitations

The study is subject to several limitations. The use of convenience sampling limits representativeness, while financial estimates rely on secondary data and assumptions. The analysis does not include system level modeling or competitive dynamics. Therefore, findings should be interpreted as indicative rather than predictive.

The sampling method is the most significant. Convenience sampling distributed through digital channels in Ulaanbaatar systematically favors younger, urban, and digitally literate respondents, the demographic segment most inclined toward favorable attitudes to automated technology. Although the 29.5% of respondents aged 46 and above provides some age range, rural populations and elderly residents are almost certainly underrepresented, and whether the adoption rates and willingness-to-pay figures documented here would hold in those segments remains an open research question. A geographically stratified survey design, or a follow-up study targeting provincial centers, would be needed to test the robustness of the market findings beyond Ulaanbaatar.

The financial model presents a second area of genuine uncertainty. Because photo studio operators declined to share revenue and cost data, all financial benchmarks are constructed from public supplier pricing, conservative operating assumptions, and demand estimates derived from survey self-reporting a chain of inference that introduces compounding approximation at each step. The payback and break-even figures in Chapter 6 should be understood as directionally informative rather than predictively precise. Three to six months of transactional data from a pilot deployment would substantially reduce this uncertainty and provide the empirical grounding that the current model cannot supply.

A third limitation concerns the self-reported nature of behavioral intention data. Stated willingness to use a service and actual usage behavior diverge in ways that the literature on technology adoption has documented repeatedly, and the 98.1% positive-or-conditional response rate likely overstates realized adoption to some degree. For financial planning purposes, the conservative scenario in Chapter 6, grounded to the 71% of definite "yes" respondents rather than the full sample, is the more defensible foundation for projection.

7.4 Recommendations

The following recommendations are sequenced in the order in which they would need to be addressed in practice, rather than by perceived importance of a distinction that matters because the first step conditions all subsequent ones.

Regulatory confirmation from GASR is the requirement on which everything else depends. Before selecting equipment or negotiating site agreements, the potential operator should obtain written confirmation that the output specifications of the target kiosk model satisfy the requirements for passport and national identity card photography. This step is non-negotiable for commercial operation and is equally important for consumer credibility for users who are producing images for government submission will be more willing to trust a service that can demonstrate prior official support.

With regulatory confirmation secured, a pilot deployment of two to three units at government one-stop service centers, supplemented by one unit in a high-traffic shopping center, would allow the demand assumptions underlying the financial model to be tested under real operating conditions. The government service center environment is the higher-priority initial location because it positions the booth at the point of administrative need, reducing the cognitive distance between the user's purpose and the service offering. Shopping center placement serves a complementary function, capturing demand from users who are not on a specific document errand but may be influenced by proximity and availability.

Interface and user experience design deserves investment proportional to its strategic importance, which this study suggests is considerable. An interface developed with first-time users as the primary audience of Mongolian-language instructions, illustrated step-by-step guidance, and an on-screen preview before printing directly addresses the moderate PEOU scores documented in the survey. A part-time assistant stationed near the booth during the initial months of operation would further reduce task discontinuation among hesitant users and generate qualitative feedback that no survey questionnaire can capture.

Pricing in the 7,000–8,000 MNT range is supported by the survey data and consistent with the break-even analysis. Integration of domestic mobile payment platforms widely used across Ulaanbaatar's urban population it would reduce transaction friction and support repeat usage, particularly among the younger demographic segments that constitute the largest share of the identified market.

7.5 Conclusion

The central finding of this study is that the implementation of an automated self-service biometric photo booth in Mongolia is feasible across all three dimensions examined as market, operational, and financial subject to the specific conditions identified in each chapter. The technology is proven and available. The demand is documented and structurally stable, rooted in administrative requirement rather than optional preference. The financial model, despite its reliance on estimated rather than verified data, points to a break-even benchmark that is achievable at modest throughput levels and a payback period that compares favorably with comparable small-scale service infrastructure investments.

What this study also surfaces, however, is that the most consequential variables for success are not technical but contextual of regulatory alignment with GASR, location selection, and the quality of the first user experience among a population experiencing the service for the first time. These factors do not diminish the feasibility conclusion, but they do suggest that an effective pilot implementation rather than immediate large-scale implementation, is the appropriate next step. The assumptions underlying the financial model need real-world calibration before the investment is scaled, and a pilot provides the most efficient mechanism for that calibration while limiting downside exposure.

Mongolia's trend of digital public service adoption, its comparatively young demographic profile, and the government's sustained investment in e-service infrastructure collectively create an environment that is meaningfully receptive to this kind of service innovation more so than it was five years ago, and likely more so still in the years ahead. The evidence assembled in this study provides a sufficient foundation for concluding that the concept is worth pursuing, and that the conditions for success, while they require deliberate management, are within reach of a well-prepared operator.

The findings indicate strong market demand and positive financial feasibility under moderate levels of usage, while operational feasibility depends primarily on regulatory approval and strategic location selection.

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Declaration of AI tool use

During the preparation of this bachelor thesis, I used AI-based tools such as ChatGPT and QuillBot to support language editing, grammar correction, paraphrasing, and the organization of some sections. These tools were used only to improve the clarity and readability of the writing, not as academic sources.

All information, data, standards, theories, and research findings were checked using the references cited in this thesis. The research topic, survey design, analysis, interpretation, financial assumptions, and final conclusions were developed by the author. No AI tool was used to create false data, fabricate survey responses, or replace the author's own academic work.

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