

**A Tool to Facilitate On-Demand Home Cleaning and Domestic Support
Services in Nairobi**

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Abstract

Cleaning is important in every family setting and is necessary to maintain a safe living environment. However, most people have a bunch of other things to do, so it's become quite a challenge. People who work on a regular schedule from morning to evening hardly have time to fully clean their homes. Most people therefore seek home cleaning services offered by various companies to maintain clean homes. This, however, is an expensive ordeal, and many tend to go for the affordable way which is having a stay-at-home house help who does all the cleaning, cooking and as well as taking care of children. To access a house help has become quite a hustle and even though many agencies and bureaus that specialize in sourcing domestic workers are everywhere for this, they at times do not deliver as agreed upon. Other sources such as social media or through word of mouth may work but always end up shortly due to several factors leading to frustration for homeowners. It is important to note that these services often come at a fee, and the recruitment process can sometimes fall short of expectations. This study aimed at determining whether an on-demand mobile application can effectively connect homeowners with house helps, offering a more accessible, direct, and reliable solution for home cleaning and domestic support services. An applied research design was employed, using quantitative and qualitative surveys to gather data from homeowners and domestic workers. Statistical analysis was performed to assess service preferences, challenges, and usage patterns. Findings revealed that a significant majority of respondents experience difficulties with traditional methods of hiring domestic help. There is a strong interest in a technology-driven solution that offers real-time booking, transparent pricing, and direct interaction between service providers and homeowners. This study proposes an on-demand mobile application that connects the house helps to the homeowners directly making the service instantly accessible.

Keywords: On-demand, Home Cleaning, Mobile Application, House help Access

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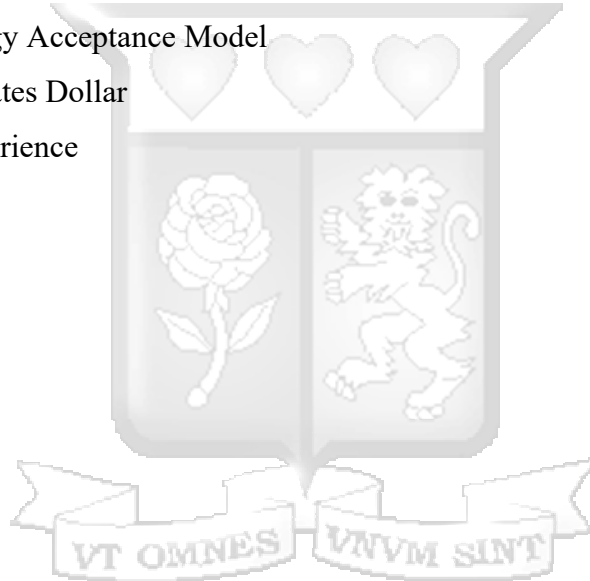
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Abbreviations/ Acronyms

2FA	Two-Factor Authentication
API	Application Programming Interface
GDP	Gross Domestic Product
ICT	Information and Communication Technology
iOS	iPhone Operating System
M-PESA	Mobile Payments Service (Kenya's mobile money system)
OTP	One-Time Password
SMS	Short Message Service
TAM	Technology Acceptance Model
USD	United States Dollar
UX	User Experience



Definition of Terms

Background Check	A process used to verify the credentials, identity, and reliability of service providers before they are approved to work through the app. This ensures that only vetted, trustworthy individuals are allowed to offer services (Smith & Johansson, 2018).
Day Worker	A domestic worker employed on a temporary or part-time basis, typically for specific tasks like cleaning. Unlike live-in workers, day workers do not reside in the employer's home and work for limited hours or days (Brown, 2019).
Gig Economy	A labour market characterized by short-term contracts or freelance work as opposed to permanent jobs. The app's cleaning service providers participate in this model, offering their services on a flexible, as-needed basis (Sundararajan, 2016).
Gig Worker	A freelancer or independent contractor who works on short-term projects, often facilitated by platforms like the proposed app. Cleaning workers using the app function as gig workers, selecting their own hours and work locations (Kalleberg & Dunn, 2017).
House Help	A domestic worker hired to assist with household chores, such as cleaning, cooking, and childcare. In Kenya, this term commonly refers to both live-in and part-time domestic workers (Obeng-Odoom, 2016).
Live-in Worker	A domestic worker who resides in the household where they are employed, providing continuous or near-continuous service. These workers often perform multiple household tasks, including cleaning and general upkeep (Valenzuela, 2018).
Middle Class	A socioeconomic group positioned between the lower and upper classes, typically defined by stable incomes, higher levels of education, and access to amenities like housing and technology.

This demographic is the target market for the mobile app (Birdsall & Meyer, 2015).

Mobile Application (App) Software designed to run on mobile devices like smartphones or tablets, enabling users to perform tasks such as booking services. In this study, the app serves as a platform connecting households with cleaning service providers (McCarthy, 2017).

Mobile Penetration The percentage of people using mobile devices, such as smartphones, within a population. In Kenya, high mobile penetration enables more widespread use of digital platforms, including on-demand service apps (CAK, 2023).

On-Demand Services Services provided immediately upon request, without prior scheduling. In this context, it refers to house cleaning services that can be arranged through a mobile application at a time convenient for the user (Kenney & Zysman, 2016).

Performance Testing A software testing process that evaluates an app's speed, responsiveness, and stability under various conditions. This ensures the app can handle real-time demands from both users and service providers (Beizer, 2015).

Secure Payment Systems Digital methods that enable safe and encrypted transactions between users and service providers, ensuring protection from fraud or unauthorized access during the payment process (Chaum & Brands, 2019).

Service Provider An individual or business that offers services to clients. In the context of the app, service providers are the cleaning workers offering their services to households via the on-demand platform (Murray & Chin, 2018).

Technological Infrastructure

The foundation of digital systems, including mobile networks, internet connectivity, and payment gateways, which support the app’s operations and enable seamless interactions between users and service providers (Roberts & Garrett, 2020).

Technology Adoption

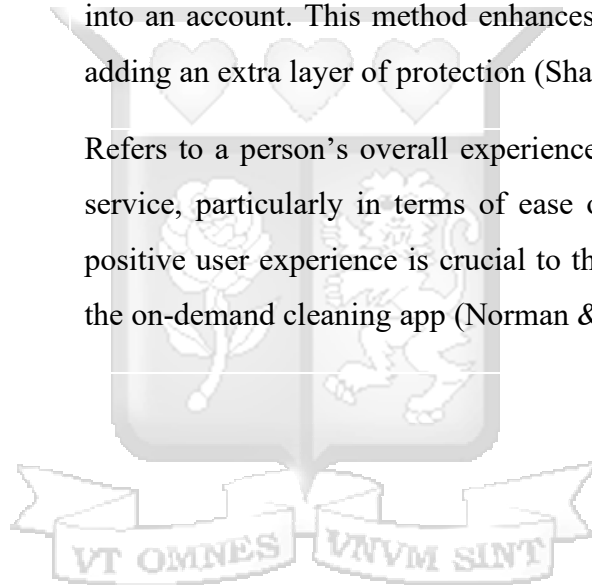
The process through which individuals or organizations begin using new technologies. In this case, it refers to middle-class households in Nairobi embracing a mobile app for hiring cleaning services (World Economic Forum, 2023).

Two-Factor Authentication (2FA)

A security measure that requires two forms of verification to log into an account. This method enhances security for app users by adding an extra layer of protection (Sharma & Dey, 2019).

User Experience (UX)

Refers to a person’s overall experience when using a product or service, particularly in terms of ease of use and satisfaction. A positive user experience is crucial to the success and adoption of the on-demand cleaning app (Norman & Nielsen, 2020).



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Chapter 1: Introduction

1.1. Background

Home cleaning is an essential activity that is done daily as part of household maintenance. This involves the general cleaning or the part by part cleaning meaning cleaning (Jack, 2017) in bits and not necessarily the entire corner to corner cleaning. Cleanliness is important because it leads to a healthy living habitat. Cleaning involves cleaning dirty surfaces, washing utensils, dusting, washing clothes, vacuuming and mopping as well. It also entails getting rid of garbage, especially on the garbage collection days depending on one's area of residence.

Beyond routine cleaning, deep-cleaning sessions are often essential, especially for spaces like kitchens and bathrooms. Some people opt to do their own home cleaning while others venture into the world of home cleaning service providers. For many in Nairobi, balancing work and home responsibilities has made these professional services an appealing option, as they offer convenience and a guarantee of thorough, high-quality cleaning.

In Nairobi, the demand for professional home cleaning services has increased in recent years, driven by the fast-paced lifestyles of the city's working population. To keep up with this increasing demand, home cleaning services have started showing up. Notable cleaning service providers in the city include Blue Ocean, Extreme Clean Limited, Avail, Blissful, Spaklean, Isamado, Titosy among others. These service providers specialize in sofa cleaning, carpet cleaning, wall and floor cleaning, car cleaning, fumigation, mattress cleaning, post event cleaning, post construction cleaning among other various services. These services are centred on residential and commercial premises. For one to get the service, they must access the required website and make an appointment or booking (Hussain, 2017). One can also obtain contact numbers from the websites and make calls of enquiries.

For many working people, getting home cleaning service providers (Steffansson et al., n.d.) to clean their homes becomes a norm. This is because one needs the rest from morning to evening work. These services are not cheap either, therefore most people resort to weekly appointments leaving daily chores to themselves. This has pushed many to have permanent house help to do their daily chores and have a well-prepared meal at the end of the day hence giving them the

desired rest from work. However, not many people have the luxury of having servants' quarters or rather that extra room.

On-demand cleaning services involve being able to access the required service according to one's need when one requests it. This not only caters for the person needing the service but also for the provider as well (Hedlund, 2015). In this case, the service provider is the house help. For a house help to get work, they must visit the various set house help bureaus, use social media or by word of mouth. This takes them quite the duration of time to finally land a job as a house help. Not to mention that there is always a commission paid to the bureau to get them a job.

Even after landing a job, it could be poorly paid but since one needs the income, they resort to taking it and working for as long as it takes to move on to a better one. For a person looking for house help, they also at times end up with not so good house help whom they must tolerate for a while as they seek another one. This is especially for working moms (Taylor & Luckman, 2018) who urgently need a house help to be left behind taking care of their child or children. All these can be handled by doing away with the middlemen and having a direct link between the house helps and the people looking for house help. This will mean there will be vetting from both sides before getting into an agreement and signing contracts that both parties are happy and content with.

1.2. Problem Statement

Maintaining a clean home is essential for health and wellbeing, yet urban middle-class households in Nairobi - where dual-income families and long commutes are the norm - struggle to find reliable and affordable domestic help (Pérez, 2018). Traditional hiring methods fall into three main categories: live-in house helps (often unaffordable or unfeasible for renters), day workers sourced through informal referrals or bureaus (Joseph et al., 2015; Steffansson et al., n.d.), and home-cleaning agencies that charge premium rates and impose rigid contracts (Mumo, 2021). Each approach carries significant drawbacks: live-in help requires extra living space and trust; day workers offer unpredictable availability and no formal vetting; and agencies deliver higher costs with limited scheduling flexibility.

In response, several digital platforms - both international (e.g., TaskRabbit, SweepSouth) and emerging local apps - have attempted to streamline domestic service delivery through real-time booking, user reviews, and secure payments (Bosire, 2021; Omolo, 2021). While these solutions

improve transparency and convenience for tech-savvy users, they often fail to address critical local challenges: inconsistent network coverage, low digital literacy among many providers, and insufficient background-check mechanisms (World Bank, 2022). Moreover, platform fees and payment-gateway charges can erode the cost advantages these apps promise, and many small-scale domestic workers remain excluded from such networks (Astashkina et al., 2018).

These gaps reveal an urgent need for a context-sensitive, on-demand mobile application that not only connects homeowners and cleaners directly - eliminating intermediaries - but also embeds robust vetting, offline booking support, and fair-fee structures tailored to Nairobi's socio-economic landscape (Hedlund, 2015). This study therefore seeks to develop and evaluate a tool that harnesses local insights to extend beyond existing platforms' capabilities, delivering reliable, accessible, and affordable home cleaning and domestic support services for Nairobi's middle class.

1.3. Objectives

1.3.1. General Objective

The aim of this study is to design an on-demand mobile application that facilitates accessible, reliable, and affordable home cleaning and domestic support services for middle-class households in Nairobi, addressing the challenges of acquiring quality house help in a cost-effective and time-efficient manner.

1.3.2. Specific Objectives

- i. To assess the availability, qualifications, and service delivery patterns of service providers in Nairobi
- ii. To assess the prevalence, satisfaction, and cost-effectiveness of methods and approaches of acquiring home cleaning and domestic services
- iii. To design a tool that provides on-demand home cleaning and domestic support services
- iv. To test the reliability of the proposed tool

1.4. Research Questions

- i. Which are the cleaning services providers in Nairobi?

- ii. What methods and approaches are used in sourcing home cleaning and domestic services?
- iii. How to design an on-demand home cleaning and domestic support tool?
- iv. How to test the reliability of the proposed tool in acquiring home cleaning and domestic support services?

1.5. Justification

Most people like to be in control of their homes, especially ensuring all activities are running appropriately. The hustle and bustle involved in acquiring house help is very hectic. Being able to access a tool that makes all the fuss go away would be a relief to very many.

An on-demand home cleaning service tool will provide ease in accessing all that is required for the middle-class working people. Data collected and used to build this tool will provide information for other researchers to explore and base arguments on. This will further indulge scholars. The socio-economic implication will be in ensuring that social life is well boosted by having home maintenance information based on a middle-class working person readily available.

1.6. Scope

This study is focused on the middle-class working people in Nairobi. It also doubles on the hardworking house helps trying so hard to land themselves a decent cleaning job. By bringing these two together, we do away with the middlemen who cause a huge barrier to achieving everyone's desire. This will be achieved by obtaining data from various rural and urban people looking for either house help or as the service provider. The tools to aid in data collection will be a mobile phone and laptop which will be well connected to the internet.

Chapter 2: Literature Review

2.1. Introduction

As urban lifestyles continue to evolve in Kenya, particularly among Nairobi's middle class, the demand for reliable home cleaning services has risen. With increasingly demanding work schedules, many people struggle to maintain their homes while balancing professional and personal responsibilities. Traditionally, household support came through full-time, live-in house help; however, the rising costs and challenges of finding suitable help have created a need for more flexible solutions. This chapter delves into the broader factors contributing to the demand for on-demand home cleaning services, examining how socioeconomic dynamics and urbanization trends have increased reliance on cleaning services. Key challenges, such as minimum wage requirements and rising costs for full-time help, are also addressed, highlighting how these factors have intensified the search for alternative support options that fit modern schedules and budgets.

In exploring these topics, this chapter also considers the potential of technology to fill this gap. By connecting households directly with vetted, part-time cleaning providers, digital platforms can enable on-demand, convenient access to home cleaning, addressing challenges of cost, reliability, and flexibility. Finally, we will explore Kenya's growing gig economy and the role of mobile technology in supporting flexible work models, shedding light on how digital innovation could transform domestic support services for Nairobi's middle class.

2.2. Empirical Literature

Empirical research illustrates how urbanization, busy lifestyles, and the rise of the gig economy have increased the demand for household convenience services among the urban middle class. Platform-based domestic services are becoming more prevalent in emerging economies like Kenya, based on research from the Kenya National Bureau of Statistics (KNBS) and regional think tanks (e.g., the Brookings Institution, 2022). Furthermore, empirical studies demonstrate the significance of digital trust and dependability in the uptake of on-demand services, with digital literacy, ease, and transparency playing a key role (World Bank, 2023; Omolo, 2022).

2.2.1. Minimum Wage

Majority of people in Kenya are living on minimum wage. A survey conducted by KNBS revealed that the overall employment to population ratio in the country was 63.9 percent in the third quarter of 2020 compared to 66.1 percent recorded in the same quarter of 2019 (Kamau, 2021). This affects many decisions made regarding one's state of living. This therefore topples down to the type of home cleaning mechanism to settle for. Some people will opt to do this on their own, which is okay but due to humans' nature of being fatigued, they will eventually opt for help. Due to limited finances, having house help becomes a better option as compared to other home cleaning services providers such as laundry service providers.

Indicator	Quarter 3, 2019	Quarter 2, 2020	Quarter 3, 2020
Population (15-64).....	26,951,051	27,486,975	27,665,619
Labour Force	18,811,023	17,712,275	19,043,176
Extended Labour Force	20,448,408	20,507,523	20,931,079
Employed.....	17,816,381	15,870,357	17,674,570
Employment/Population Ratio (%).....	66.1	57.7	63.9
Unemployed ¹	994,642	1,841,918	1,368,606
Unemployment Rate [LU1](%).....	5.3	10.4	7.2
Unemployed ²	2,632,027	4,637,164	3,256,509
Unemployment Rate [LU3](%).....	12.9	22.6	15.6
Long-Term Unemployed.....	431,778	551,563	440,260
Long-Term Unemployed (%).....	2.3	3.1	2.3
Not in Labor Force (Inactive)	8,140,030	9,774,700	8,622,443
Not in Labor Force (Inactive) ³	6,502,643	6,979,452	6,734,540
Labour Force Participation (%).....	69.8	64.4	68.8
Labour Under Utilisation ⁴	1,597,385	3,041,518	2,277,602
Labour Under Utilisation (LU2).....	8.5	17.2	12.0

Figure 2.1: Key Labor Market Indicators

2.2.2. Growing Demand for Home Cleaning Services

Nairobi's middle class is becoming more and more in need of house cleaning services because of urbanization, increasing earnings, and longer workdays. According to the Kenya National Bureau of Statistics (KNBS), the middle class has grown significantly, and this segment of the population spends more on convenience services to compensate for their busy lifestyles (KNBS, 2020). Nairobi's well-known traffic bottlenecks and lengthy workdays leave many individuals with little time for household chores, which has increased demand for cleaning services from professionals.

A report by PwC (2021) highlights that urbanization is creating more dual-income households where both partners are engaged in full-time jobs. This shift is driving the need for adaptable cleaning solutions that work with their busy schedules. Additionally, as more women enter the workforce, there is less reliance on traditional domestic help, further creating an opportunity for on-demand cleaning services.

2.2.3. Challenges in Hiring House Help

One of the primary difficulties faced by Nairobi's middle-class population is finding trustworthy and competent house help. Household assistance is typically obtained through unofficial networks such as house help bureaus or word of mouth, which frequently leads to inconsistent service being delivered. It becomes challenging for families to keep up a consistent routine because of this unreliability.

In some cases, house help may quit abruptly, leaving households scrambling to find replacements. This inconsistency is a major problem that has driven many toward more formalized professional cleaning services (Onyango & Akech, 2019). In addition to reliability concerns, security issues also arise when employing domestic workers. These house helps have access to the house, thus it's critical to choose a reliable housekeeper.

Unfortunately, the vetting processes in informal hiring arrangements are inadequate, and instances of theft or misuse of personal property have been reported (Ndungu, 2020). Thus, many families prefer working with cleaning services that thoroughly screen and vet their workers.

2.2.4 The High Costs of Professional Cleaning Services

Another major barrier for many households is the cost of professional cleaning services. Due to their high costs, professional cleaning services may not be within the means of the typical middle-class family. Mumo (2021) argues that because cleaning companies bear overhead costs such as staff salary, equipment maintenance, and transportation, these services are frequently offered at premium rates.

Many cleaning businesses require large upfront payments from their customers since they work on a subscription or long-term contract basis. For households looking for flexibility in the frequency and timing of their cleaning service needs, these financial obligations are frequently

unsustainable (Mburu, 2020). This makes the middle class hesitant to engage with professional companies, despite their need for reliable help, and more inclined to obtain regular if not a permanent house help.

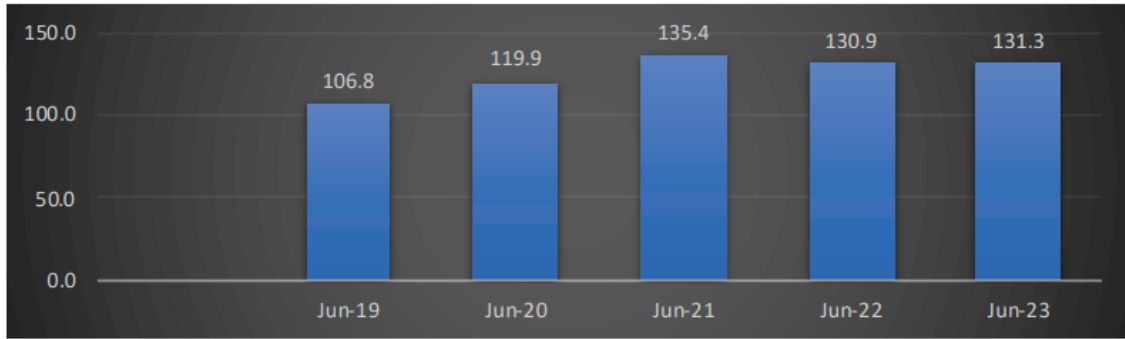
Table 2.1: Cost Comparison Between Traditional and On-Demand Cleaning Services

Feature	Traditional Cleaning Services	On-Demand Cleaning Services
Hiring Process	Word of mouth, informal	App-based, structured
Cost Transparency	Often unclear	Fixed and clear upfront
Service Quality	Varies	Standardized with reviews
Scheduling Flexibility	Limited	High
Background Checks	Rare	Mandatory (via apps)
Worker Accountability	Low	High (ratings and feedback)

2.2.5 The Role of Technology in Service Delivery

Technology has been instrumental in the evolution of service delivery in Kenya. The country has witnessed significant growth in mobile phone penetration, with the Communications Authority of Kenya (CAK) reporting that 59.5% of Kenyans had access to mobile phones by the end of 2022 (CAK, 2023). This widespread use of mobile phones has made it easier to access services through mobile applications. On-demand platforms, like Uber and Bolt, have already shown how technology can transform the service sector.

Similar models for cleaning services have proven successful in countries like South Africa (SweepSouth) and the United States (TaskRabbit) (Bosire, 2021). These platforms provide convenience by allowing users to schedule cleaning services as and when needed, with digital payment options, reducing the hassle of handling cash (M-Pesa in particular). Additionally, user ratings and reviews on these platforms ensure that service quality is maintained, thus building trust between users and service providers (Omolo, 2021).



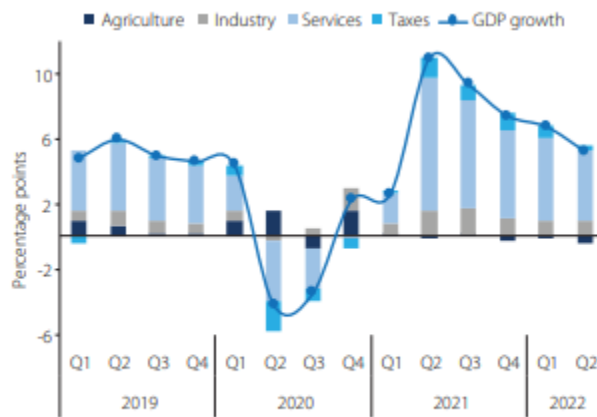
Source: Communications Authority of Kenya

Figure 2.2: Mobile penetration %

2.2.6 The Gig Economy and Cleaner Employment

Kenya's gig economy has expanded rapidly in recent years thanks to platforms that match clients seeking temporary labour with service providers. In line with the demand for on-demand cleaning services, gig workers in Kenya carry out jobs on a flexible basis, according to a study by the World Bank (2022). Additionally, this strategy has been beneficial in lowering unemployment rates, especially for women and young people who might not have access to standard full-time jobs.

For middle-class households, gig platforms provide access to vetted, professional cleaners who are available on short notice and without committing to a long-term contract. Many of these platforms allow users to see ratings and reviews from previous clients, helping to ensure that the cleaners are reliable and trustworthy. Additionally, the flexibility of this model helps address the unpredictability often associated with hiring house help (Ochieng, 2022).



Source: Kenya National Bureau of Statistics and World Bank staff calculations

Figure 2.3: Rate of service growth, World Bank

2.2.7 Availability of House Helps: Live-in vs. Day Workers

Most middle-class families in Nairobi find it difficult to acquire reliable and reputable house help. People have always relied on live-in help in the house as well as day workers as their primary sources of help with their homes. Both options have benefits depending on a household's needs, but they also come with their fair share of difficulties. Informal hiring methods—like referrals from family or friends—often lead to unreliable or inconsistent help. As a result, more families are turning to on-demand mobile applications, which provide a more organized and secure way to hire both live-in and day workers.

Live-in house helpers are a popular option for families in need of regular, round-the-clock assistance. For households with young children, working parents, or those who need to clean and prepare meals frequently, this choice is ideal. Having someone live with the family means the house help is available whenever needed. But occasionally, this setup can be uncomfortable or difficult. Having someone in the house all the time is considered intrusive by many families, and the additional expenses of housing and food might make things more expensive (Mugo, 2020). Concerns about trust also exist. It can feel perilous to take in a new person, particularly if they are recruited on an informal basis. The family's safety and security may not be guaranteed in the absence of thorough background investigation.

On the other hand, households that require assistance for a few hours each day or week can benefit more from the flexibility that day workers offer. Families that wish to keep their privacy will find it appealing because they come to the residence, finish their work, and depart. However, this adaptability has drawbacks of its own. Day workers frequently follow set schedules; therefore, they might not be available for urgent assignments. Additionally, there is the dependability issue. When house helps are hired informally through word of mouth, they can sometimes fail to be consistent—some may cancel last minute, show up late, or offer poor quality service (Ndungu, 2020). This unpredictability can make daily life more stressful for a family.

Here's where smartphone apps that may be accessed on-demand are coming to alter the rules. As smartphones and other mobile technology have grown in popularity, apps are offering a more transparent and effective means of matching families looking for daycare or live-in help with vetted and reliable housekeepers. Rather than depending on referrals from friends or agencies, families can now use their phones to get these services. They get access to job applicant profiles,

client testimonials, and the ability to book assistance as needed. This simplifies and optimizes the hiring procedure overall (Omolo, 2021).

For instance, a family can utilize an app to schedule a day worker specifically for the purpose of helping with a one-time deep cleaning. As an alternative, if they're searching for live-in house help, they can look through the profiles of applicants who have undergone a rigorous screening process, including background checks and reviews for peace of mind. With this modern approach, the unpredictability of casual recruiting is eliminated, and professionalism is introduced. Because users may post ratings and comments for others to view, apps that provide these services help keep employees accountable by motivating them to uphold high standards (Mwangi, 2020).

The advantages of these on-demand apps are tremendous for the household families and the workers. Families don't have to worry about irregular service or long-term contracts; they can hire help as required. However, housekeepers can also find more employment options through these platforms, and they have access to a structured system that guarantees them stable work and fair compensation. This arrangement fosters a more professional and reliable domestic service industry, improving the experience for both sides (Ochieng, 2022).

To sum up, while live-in and day workers have long been essential for middle-class families in Nairobi, the traditional ways of finding them have often been stressful and unreliable. This is finally beginning to shift though, as on-demand mobile apps give families a safer and more convenient option to hire domestic help. These applications give a contemporary option that meets the demands of today's hectic households, whether someone requires live-in house help or an occasional cleaner.

2.3 Theoretical Literature

These theories serve as the foundation for the use of on-demand cleaning services: Self-Determination Theory (SDT), Technology Acceptance Model (TAM), and Diffusion of Innovations Theory (Rogers, 2003). Nairobi's urban middle class embraces breakthroughs based on perceived value and relative benefit, according to the Diffusion of Innovations theory.

TAM focuses on how consumers' intentions for accepting new platforms are influenced by how easy and valuable technology they believe to be (Davis, 1989). When it comes to grasping digital acceptance in emerging nations, this concept is particularly important. SDT sheds light on the intrinsic motivation of gig workers, emphasizing flexibility and autonomy as crucial

components of service delivery (Deci & Ryan, 2000). These theoretical frameworks shed light on platform success determinants, gig workers' motives, and user adoption patterns.

2.3.1. Home Cleaning and Domestic Support Services in Nairobi

Cleaning service provision in Nairobi operates at the intersection of traditional domestic work and emerging platform-based models. Studies by Onyango and Akech (2019) reveal that most house helps in Nairobi are sourced through informal networks - family referrals or local bureaus - resulting in unpredictable availability and high turnover rates. Such methods typically yield part-time (day workers) whose work schedules are constrained by competing household engagements, while fewer (live-in) workers offer round-the-clock availability but require additional accommodation resources (Mugo, 2020). More recently, the rise of mobile platforms (e.g., SweepSouth-type services) has increased on-demand availability, with providers logging in during peak hours to meet urgent client needs, although this remains a small fraction of the overall cleaning workforce (Ochieng, 2022).

Qualifications among Nairobi's cleaning workforce remain largely informal. A survey by Ndungu (2020) found that fewer than 15% of domestic workers possess any formal training or certification in cleaning techniques, health and safety, or customer service. Instead, most cleaners acquire skills through unstructured apprenticeships within extended family networks or through brief orientations provided by employment bureaus. This skills gap has prompted some digital platforms to offer in-app micro-training modules - covering topics like safe chemical handling and time management - to elevate service quality and professionalize the workforce (Omolo, 2021).

Service delivery patterns vary significantly across provider types. Traditional live-in workers often perform a broad range of chores - cleaning, cooking, childcare - daily, reflecting longstanding domestic norms (Onyango & Akech, 2019). Day workers, by contrast, tend to specialize in singular tasks such as deep cleaning or laundry services and are booked on an ad hoc basis, leading to irregular income and variable service quality (Ndungu, 2020). Platform-based providers report more standardized service packages (e.g., 2-hour general clean, 4-hour deep clean) and use customer ratings to refine their offerings, which aligns with SERVQUAL dimensions of reliability and responsiveness (Parasuraman et al., 2020).

Despite these advances, major gaps persist. The Kenya National Bureau of Statistics (2020) highlights that 78% of domestic workers remain off-platform, limiting the reach of digital scheduling and quality-control mechanisms. Furthermore, Mwangi and Kamau (2021) note that even among platform-enrolled providers, many struggle with inconsistent demand and lack mechanisms for long-term career development. Addressing these issues will require a concerted effort to expand digital inclusion, standardize qualification pathways, and integrate user-feedback loops into service delivery models - precisely the aims of this study's mobile application.

2.3.2. Methods and Approaches Used in Sourcing Cleaning Services

Households in Nairobi most commonly secure home cleaning services through informal word-of-mouth referrals, professional bureaus or agencies, and increasingly via mobile applications. Word-of-mouth referrals remain prevalent with over 60% of households relying on friends and family recommendations. However, this approach often yields inconsistent service quality and limited accountability, leading to mixed satisfaction levels (Onyango & Akech, 2019; Ndungu, 2020). While these referrals are typically low-cost - often involving small "thank you" gifts rather than formal fees - the lack of standardized pricing and quality guarantees can result in unpredictable outcomes and frustration for users.

Cleaning bureaus and agencies offer more structured access to vetted domestic workers, with about 25–30% of middle-class households using such services. These providers handle recruitment, background checks, and sometimes training, which tends to boost user satisfaction. However, the premium rates, driven by agency commissions and overhead, make agency-sourced help significantly more expensive than referrals, reducing their cost-effectiveness for many families (Mumo, 2021; Mburu, 2020).

More recently, mobile applications have emerged as a flexible alternative, used by around 15–20% of tech-savvy households (Omolo, 2021). These platforms combine transparent, app-based pricing with real-time booking and user reviews, resulting in higher satisfaction scores, particularly among dual-income couples who value convenience and reliability. Cost-effectiveness is competitive when factoring in savings from reduced downtime and improved service consistency, although transaction fees and mobile-money charges can offset some of these gains.

Overall, while referrals dominate in terms of prevalence and low direct cost, agencies score higher on user satisfaction at a premium price point, and mobile apps strike a balance by offering transparent pricing, reliable quality, and moderate fees. This diversity of approaches underscores the need for a comprehensive assessment, measuring prevalence, satisfaction, and cost, of each method to guide both household decision-making and platform development.

Table 2.2: Types of Cleaning Services Offered in Nairobi and Frequency of Access

Type of Cleaning Service	Description	Frequency Accessed (%)
General House Cleaning	Basic cleaning tasks (sweeping, mopping, dusting, etc.)	60%
Deep Cleaning	Intensive cleaning, including corners, hidden areas, and detailed cleaning	25%
Laundry Services	Washing and ironing clothes	35%
Carpet/Upholstery Cleaning	Specialized cleaning for carpets and upholstery	20%
Window Cleaning	Interior and exterior window cleaning	15%
Post-Construction Cleaning	Cleaning services for newly built or renovated spaces	10%
Move-In/Move-Out Cleaning	Cleaning when moving in or out of a house or apartment	12%
Disinfection/Sanitization Services	Specialized cleaning focused on disinfecting high-touch surfaces and areas	8%
Live-In Domestic Help	Full-time domestic worker who handles various household tasks	18%
Day Worker Cleaning	Cleaning services for a few hours or a day based on need	40%

2.3.3. Designing an On Demand Home Cleaning and Domestic Support Services Tool

Owing to the factors researched in this study, designing an on-demand service tool will result in it that one gets a more dependable approach based on the variables in study. This will be a mobile application which will run on android platform. The users will be able to browse for the required home cleaning services and get in touch with an agreed-upon person to render the service required. They will then sign an agreement within which the said service will be required. The

service provider on the other hand will agree to the terms and conditions of the agreement if and only if they are comfortable with the payments being agreed upon.

The tool will see to it that the person seeking for service and the service provider both have benefited from the service. This is because both parties will have a platform where they can get what they are looking for. This tool will bring about job creation for many out there who are willing to put in the effort but have been unable to attain cleaning jobs due to the long queues and waiting time especially at the bureaus. Commissions that are paid to said bureaus, agencies or some referees will be done away with since one will oversee themselves.

2.3.4. Testing the Reliability of the Proposed Tool

The proposed tool will be released to a test sample and observe its functionality tested out. This will be done using a small sample size to which a prototype will be provided. It will then be used to check on how the user is easily able to use the tool. User test results will then be used to advance the tool to best suit the user.

One of the main goals of the proposed on-demand cleaning service application is to deliver smooth and efficient experience for both users (households) and service providers (cleaning staff). Performance testing will evaluate the app's responsiveness, speed, and stability under various conditions, such as high traffic situations to ensure that the app functions seamlessly even when there is a surge in demand, large database loads as more users and service providers join the platform, the app must maintain speed and not experience slowdowns and Cross-platform performance.

Usability testing will focus on ease of navigation, service provider availability, (the app provides accurate and real-time information about available cleaning workers both live-in and day workers) and the reliability of communication (in-app messaging and service updates will be tested to ensure they work effectively and in real-time).

With the app handling sensitive information, including personal data (addresses, phone numbers) and payment details, reliability will be tested in terms of security. To foster trust among users and service providers, the app will ensure secure data encryption which will involve testing the app's ability to protect sensitive information through encryption techniques to prevent

unauthorized access. It will also incorporate secure payment gateways, since users will likely be paying for services through the app, therefore testing the reliability of payment processing systems (credit cards, mobile money, etc.) will be done to prevent fraud or unauthorized transactions. User authentication will be integrated to ensure user login and service provider accounts are protected through secure authentication methods, such as two-factor authentication (2FA).

Testing will include penetration tests to identify and address any security vulnerabilities that could compromise user safety or deter adoption of the app. To foster worker reliability and background check system; One of the critical features that sets this app apart from traditional hiring methods is the requirement for vetted, reliable workers. Testing the app's reliability in this area will include verification processes done to ensure that all service providers on the platform have undergone proper vetting, including background checks. This includes testing the process through which workers submit their information and how it is reviewed for approval.

Reliability of worker ratings and reviews will be integrated to ensure that the feedback system is transparent, fair, and resistant to manipulation, so that users can trust the reliability of the reviews they see when choosing a service provider. By thoroughly testing the worker onboarding process and feedback systems, the app can ensure a higher level of trust between users and service providers.

To keep the app running smoothly post-launch, the app must be able to handle regular maintenance and updates without disrupting the user experience. System downtime test will be done to ensure that the app remains accessible during maintenance, or that downtime is minimized and communicated to users. Bug-fix rollouts testing will ensure the app's ability to quickly roll out fixes for bugs or glitches without negatively impacting performance. Feature updates test will show how well new features integrate into the app through regular updates, ensuring no conflicts arise with existing features.

2.4. UTAUT, TAM and SERVQUAL Models

Designing an on-demand cleaning service application requires weaving together complementary theoretical strands, each of which addresses different facets of the user and provider experience. At the most granular level, the Technology Acceptance Model (TAM) and UTAUT offer insights into individual motivations. TAM's elegance lies in its laser focus on

perceived usefulness and ease of use, perfect for rapid prototyping and early usability testing, but it can overlook the social pressures and infrastructural support that UTAUT explicitly models. UTAUT brings in factors such as social influence (e.g., friends' endorsements) and facilitating conditions (e.g., reliable mobile networks), making it invaluable for shaping features like in-app community forums or offline booking fallbacks. Yet its sixteen-construct complexity can dilute focus in an agile development environment unless it is selectively pruned to context-critical elements.

By contrast, Digital Platform Theory elevates our view from individual adoption to the health of the entire marketplace. It teaches us how modular architecture (open APIs for payments or mapping), governance (provider vetting, dispute resolution), and network effects (increasing value with more users and cleaners) create a self-reinforcing ecosystem. However, platform theory alone risks neglecting the day-to-day user interactions that make or break first impressions, those micro-moments of frustration or delight that TAM and UTAUT help chart.

To ensure service quality keeps pace with these design and ecosystem considerations, we turn to a machine-learning-enhanced SERVQUAL framework. Traditional SERVQUAL tells us which dimensions matter - reliability, assurance, responsiveness, empathy, and tangibles - while ML capabilities allow us to quantify and predict performance in real time, automatically reassigning jobs or sending proactive apologies when protocol thresholds (e.g., arrival windows) are at risk. This dynamic quality management drives continuous improvement but depends heavily on robust feedback loops and careful data governance.

Finally, Intelligent Decision-Making Models (IDMMs) marry strategic and operational concerns, using AI to optimize real-time matching and personalized recommendations. Where platform theory dictates the macro-architecture, and SERVQUAL defines quality targets, IDMMs execute the daily choreography, balancing cleaner availability, skill alignment, proximity, and historical ratings to produce optimal pairings. The challenge here is to prevent “black box” decisioning that users and cleaners cannot trust; explaining match rationales through transparent criteria helps mitigate this.

By comparing and integrating these frameworks - TAM/UTAUT for user motivation, Digital Platform Theory for ecosystem design, ML-driven SERVQUAL for quality assurance, and IDMMs for operational intelligence - we construct multi-layered architecture. Each model fills gaps left by the others: individual adoption insights guide feature prioritization; platform theory

ensures long-term viability; dynamic SERVQUAL keeps quality high; and AI-powered decisioning scales personalization. Together, they form a cohesive blueprint for a resilient, user-centered, and trustworthy on-demand cleaning service platform.

2.5. Dynamic Matching Algorithms

Highly sophisticated algorithms can greatly enhance the effectiveness of operation and customer satisfaction of an on-demand cleaning app as thusly expounded. Dynamic Matching Algorithms which are AI-powered algorithms pair customers with cleaning experts according to dynamic factors including user preferences, geography, and availability. Deep learning models are used in recent applications to improve user happiness and match accuracy in real time (Zhao et al., 2022). The algorithm shows how user preferences, geography, and availability data flow into an AI model to assign an expert.

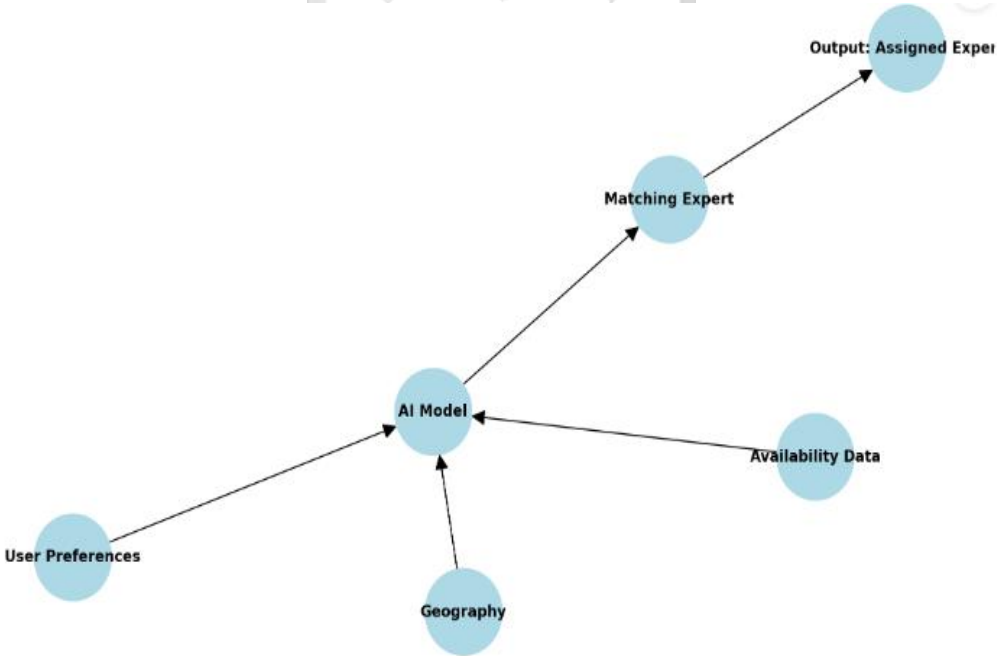


Figure 2.4: Dynamic Matching Algorithm

Trust and Control Algorithms

Trust and Quality Control Algorithms prioritize highly rated suppliers and uphold trust by analysing user reviews, employee feedback, and service history while incorporating machine learning (ML) for sentiment analysis and natural language processing (NLP). Reliability can be

predicted using Bayesian inference models, which can then modify provider rankings appropriately.

This algorithm highlights the flow from user reviews and feedback through sentiment analysis and machine learning for ranking.

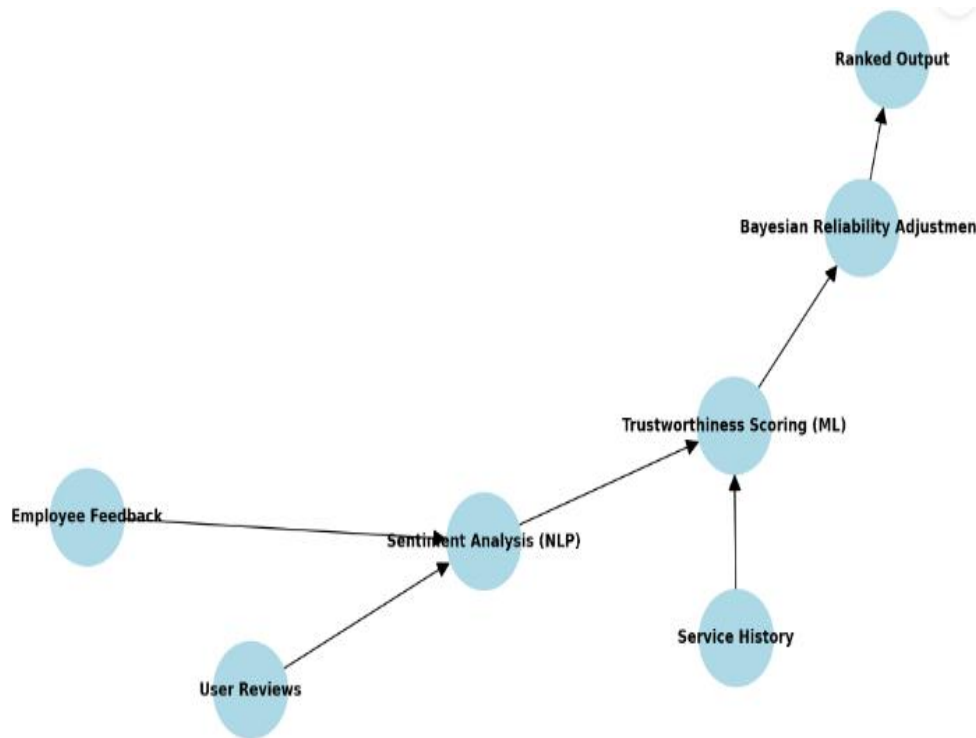


Figure 2.5: Trust and Control Algorithm

Dynamic Pricing Algorithms

Dynamic Pricing Algorithms balances affordability with reasonable reimbursement and further modifies pricing according to demand, location, and time of day. It is inspired by econometric models. Reinforcement learning can maximize prices over time for market alignment.

This algorithm properly illustrates the relationship between demand, location, time of day, and the pricing model's adjustments.

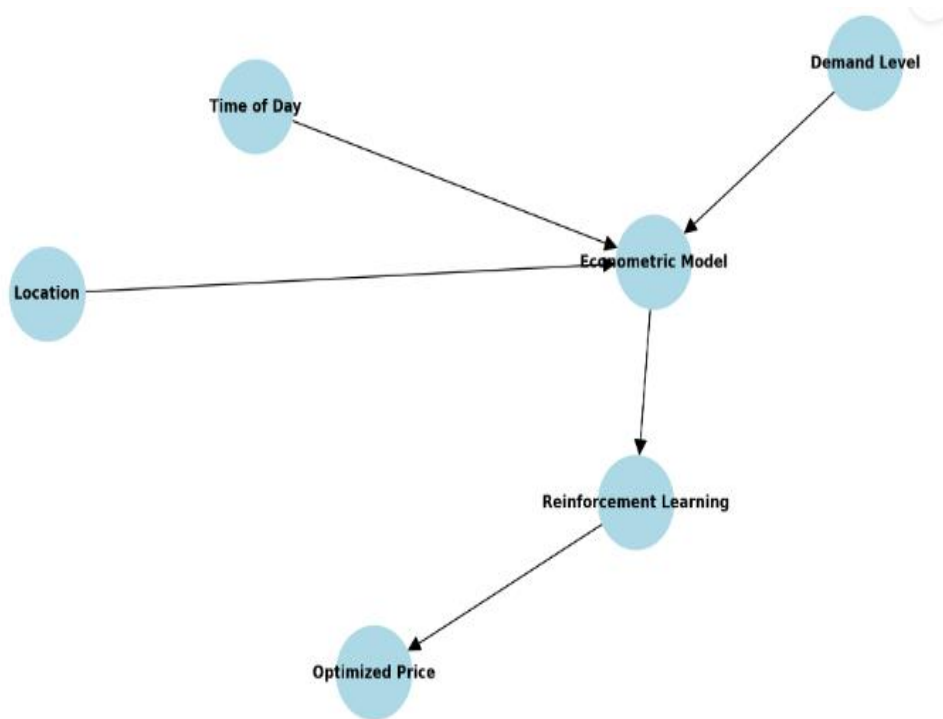


Figure 2.6: Dynamic Pricing Algorithm

Predictive Analytics for Retention

Predictive Analytics for Retention integrates ML algorithms to find trends in user behaviour and forecast possible attrition. This makes it possible to implement focused retention tactics, including reminders or promotional offers based on predictive behaviour analysis. For each algorithm to adjust to shifting customer demands and enhance service quality, real-time data processing and ongoing learning are essential.

This algorithm clearly and in-depth maps user data to predictive analysis for retention strategies.

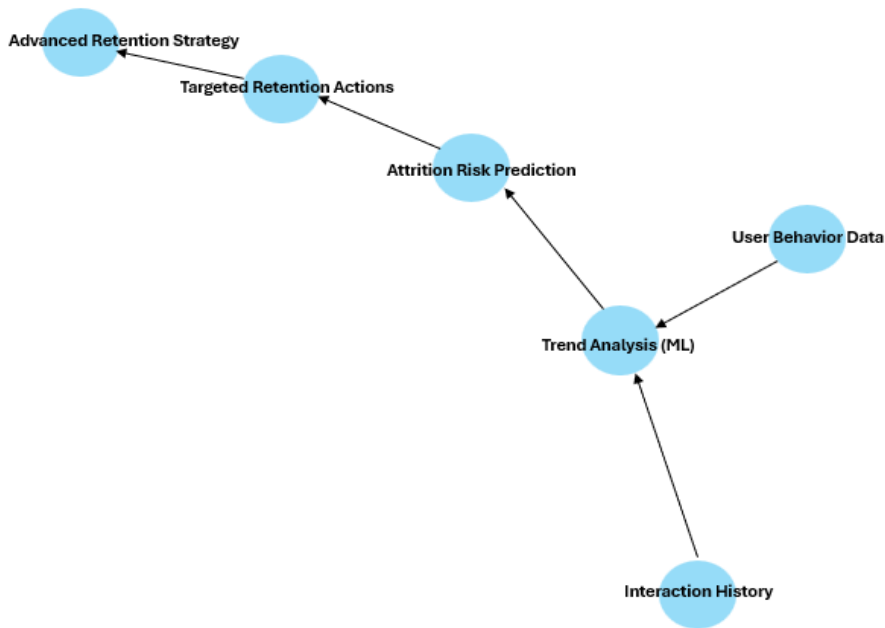


Figure 2.7: Predictive Analytics for Retention

2.6. Architectures and Designs

The following elements make up the on-demand cleaning app's system design, which is geared for scalability, dependability, and security. The program is divided into loosely coupled services using a microservices architecture, each of which handles certain tasks (such as scheduling, user authentication, and payment processing). Each service may be independently adjusted and scaled with ease due to this structure.

Edge Computing Integration entails processing data closer to users, which subsequently lowers latency and speeds up response times. This is particularly important in places where network coverage is sporadic. Federated Security Design follows the most recent cybersecurity standards, user data and transactions are protected by multi-factor authentication, encryption techniques, and zero-trust architecture (CAK, 2023). AI-Personalized User Experience (UX) Design by using historical data and preferences, the UX design uses AI to customize cleaning schedules, provider selection, and user recommendations.

2.7. Efforts to Improve On-Demand Home Cleaning and Domestic Support Services

Outstanding instances of on-demand cleaning service implementations provide insightful information. SweepSouth in South Africa has shown how ML can increase customer satisfaction by using localized algorithms to provide cost-effective, validated services. Using geographic data, machine learning is used by Helpling in Germany to optimize response times, schedule services, and track real-time location.

In the United States, TaskRabbit is renowned for its safe in-app payment methods and worker-rating algorithms, providing strong models for digital trust and security (Bosire, 2023). These applications highlight the possibility for a Kenyan market evolution, especially given the ongoing growth in digital trust and mobile access.

2.8. On-Demand Home Cleaning and Domestic Support Challenge

In as much as there is a significant growing use of digital platforms for domestic services, there are still several study gaps. The role of AI in Developing Digital Trust is not significant because not much research has been done on how AI may improve digital trust in gig economy services, especially when it comes to protecting data privacy and having clear payment methods.

Models of Cost Optimization for Affordability require more investigation to strike a balance between user cost effectiveness and equitable compensation for gig-based service workers. AI's Effect on Customized Services highlights how the impact of AI-driven personalization on user happiness and sustained engagement has not received much attention in research. Retaining Employees on Demand Platforms focuses on how most of the current study concentrates on user retention, with little research on the variables influencing gig workers' continued involvement.

2.9. Conceptual Framework and Operationalization of Variables

The conceptual framework for an on-demand mobile application for home cleaning services in Nairobi is built upon the interaction between several critical components: the technological framework, service providers (cleaning workers), the customers (middle-class households), and the platform (mobile application). By describing how these components function together, this paradigm seeks to address the problems of cost, dependability, and accessibility that middle-class homes in Nairobi encounter when looking for housekeeping services.

The technological component entails sophisticated data protection measures, AI-driven personalization, and an increasing rate of mobile penetration. Socioeconomic Component takes into consideration the demand for reasonably priced services by the middle class, the impact of the gig economy on employment, and urban income levels. Performance Metrics delves into the application's effectiveness and customer happiness being monitored by pricing metrics, service reliability scores, and user retention rate.

The following is how each variable is operationalized. AI-analysed review sentiment and feedback scores are used to gauge user satisfaction. Affordability is assessed using data from customer surveys and compared to the costs of alternative services. Reliability is measured by quality scores, repeat service usage rates, and provider punctuality. Machine learning is employed to manage reliability for continuous quality improvement.

To comprehend how the app would address the difficulties presented by conventional hiring practices, the framework is based on two main theories: gig economy employment models and technology adoption theory.

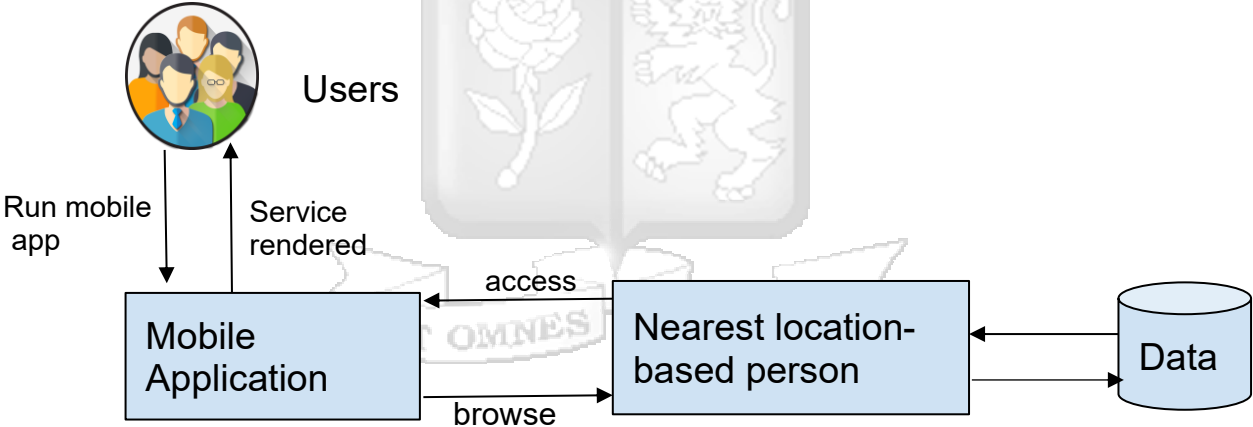


Figure 2.8: Conceptual framework

Chapter 3: Methodology

3.1. Introduction

The factors impacting middle-class households' decisions regarding house cleaning services are examined in this study. The impact of minimum wage regulations, the difficulty in locating reliable domestic help, the rise in demand for flexible cleaning services, and the function of digital solutions in fulfilling these demands are all important factors to consider. Convenient, professional house cleaning services are becoming more and more popular as middle-class lifestyles get busier and urbanization increases. The study also looks at how technology, specifically digital platforms and Kenya's expanding gig economy, might help meet this demand by providing on-demand, flexible services that are advantageous to both service providers and customers.

The study contains data collection techniques, and the approaches used for system analysis, design, development, implementation and testing. To ensure that the application satisfies the needs of both service providers (cleaning staff) and users (households), the methodology will show technical aspects, structure and operational phases taken when building and testing the application.

This research advances knowledge of Kenya's growing digital economy, facilitating the matching of domestic care and housekeeping services to demand through digital platforms, optimizing the provision of services for demanding households, and expanding access to job opportunities.

3.2. Analysis of Methods

Research design refers to the overall strategy and framework that guides the process of collecting, analysing, and interpreting data in a research study. It provides a systematic approach to addressing research questions and includes decisions about the type of research (Bryman, 2016). This section analyses some of the commonly used methods in research.

i) Descriptive Research Design

This study uses a descriptive research design to outline and quantify user and service provider experiences, needs, and expectations. Through surveys and structured questionnaires, this design captures demographic characteristics, service usage patterns, and satisfaction levels among

respondents. By detailing key variables like frequency of service use, preferences, and trust in cleaning services, the descriptive design builds a comprehensive profile of both user groups (Creswell & Creswell, 2017).

ii) Exploratory Research Design

To gain a deeper understanding of underlying motivations, challenges, and perceptions associated with on-demand cleaning services, the exploratory design utilizes qualitative interviews. This approach is essential for uncovering nuanced insights into user behaviours and attitudes toward current cleaning options and perceived service gaps. Through open-ended questions, exploratory research captures the subjective experiences and expectations that quantitative data alone may not fully address (Yin, 2018).

iii) Explanatory (Causal) Research Design

An explanatory design investigates the relationships between various factors, such as the impact of income level, household size, or location on the frequency of cleaning service use. By applying statistical analyses like correlation and regression, this design helps explain how particular variables influence demand, satisfaction, or trust in on-demand cleaning services (Saunders, Lewis, & Thornhill, 2019).

iv) Cross-Sectional Research Design

Given time and resource constraints, this study uses a cross-sectional design, collecting data from a diverse group of respondents at a single point in time. This approach provides a snapshot of current user preferences and challenges, allowing for the analysis of different demographic and socio-economic segments. It is especially useful for identifying trends and patterns in service needs and expectations within a limited timeframe (Kumar, 2019).

v) Case Study Design

Case study design focuses on an in-depth examination of specific households and cleaning service providers. By studying these cases individually, the research can capture the distinct needs, preferences, and pain points of each group. Through direct observation, detailed interviews, and

in-depth surveys, this design provides contextual data that can be used to inform feature development for the on-demand cleaning tool (Yin, 2018).

vi) Applied Research Design

This study includes applied research to directly implement, and test solutions developed based on user needs. Applied research focuses on iteratively developing, testing, and refining the on-demand cleaning tool based on feedback from real users. By applying insights from the other research designs and using continuous feedback loops, the applied design ensures that the tool meets practical demands and effectively serves both households and service providers in a real-world setting (Kothari, 2004).

vii) Mixed-Methods Research Design

By combining both quantitative (surveys) and qualitative (interviews) approaches, the mixed-methods design offers a comprehensive view of the on-demand cleaning service landscape. This design allows for the integration of statistical insights with in-depth qualitative data, creating a holistic understanding of both the practical and psychological aspects of user and service provider interactions with the platform (Creswell & Creswell, 2017).

3.3. Methodological Approach

The investigation of on-demand home cleaning and domestic support services in Nairobi adopts an Applied Research approach because its primary objective is not merely to generate theoretical knowledge, but to deliver a concrete, user-validated solution for a clearly defined societal problem. Applied research is well suited to contexts where the research outcomes must be directly translatable into practice; here, that means developing and refining a mobile application that responds to the lived realities of Nairobi's middle-class households and their service providers. Drawing on principles from design science research (Hevner et al., 2004), the study embeds iterative cycles of formative evaluation and user-centered design. Each prototype release is evaluated through mixed-methods feedback, qualitative interviews to uncover emergent user needs and quantitative surveys to measure satisfaction, adoption intention, and usability metrics (Nielsen, 1993). This 'build–evaluate–learn' cycle ensures that each feature, from authentication and geo-

matching to secure payments and background checks, is validated against real-world constraints like network variability and digital literacy (Peppers et al., 2007).

The research unfolds in two distinct but interrelated phases. Phase One employs a sequential exploratory mixed-methods strategy: initial qualitative focus groups and expert interviews (Creswell & Plano Clark, 2018) illuminate the domain's critical pain points and inform the design of a structured quantitative instrument that quantifies prevalence, cost structures, and platform readiness. Simultaneously, a systematic review of existing on-demand and gig-economy platforms identifies design patterns and unresolved challenges. Phase Two transitions to design and development, where agile sprints produce successive prototypes of the tool. Each iteration undergoes usability testing and performance validation (response times, error rates) as well as pilot deployments to measure real-time booking success and service quality against SERVQUAL dimensions. By integrating iterative development with rigorous evaluation at every stage, the methodology not only grounds the tool in user realities but also generates transferable insights into how applied, design-oriented research can solve complex service-delivery problems in emerging-market contexts.

3.4. Target Population

The target population for this on-demand mobile app consists of two scientifically determined segments: households (customers) and service providers (cleaning personnel). To ensure that the target population and sample sizes are scientifically grounded for the app, established statistical sampling formulas are employed and bolstered by recent research.

The foundational sample size formula by Cochran remains highly relevant in research, but more recent texts suggest adaptations for modern applications, especially digital platforms with large, heterogeneous user bases (Taherdoost, 2017). Cochran's initial calculation for sample size (n_0) is defined as:

$$n_0 = \frac{Z^2 \cdot p \cdot (1 - p)}{e^2}$$

where: Z is the Z -score corresponding to the desired confidence level (e.g., 1.96 for a 95% confidence level), p is the estimated proportion of the population with the desired characteristic (set to 0.5 for maximum variability if unknown) and e is the margin of error (Saunders et al. 2019).

For example, to obtain a 95% confidence level and a margin of error of 5% ($e=0.05$ = $0.05e=0.05$), the sample size can be computed as follows:

$$n_0 = \frac{(1.96)^2 \cdot 0.5 \cdot (1 - 0.5)}{(0.05)^2} = 384.16$$

Thus, approximately 385 participants are needed from each population segment. For finite populations, the adjusted sample size n can be calculated as:

$$n = \frac{n_0}{1 + \frac{n_0 - 1}{N}}$$

where N is the known population size. Adjusting the sample size to match finite populations is a practice supported by recent applied research in mobile app development and digital service markets (Zikmund et al., 2019).

To ensure inclusivity across demographic and experience variations, stratified sampling is advised. Stratified sampling breaks the population into relevant sub-groups, such as age, employment status, or service experience. This method is known to enhance reliability in diverse markets and has proven effective in recent studies on gig economy services (Hox & De Leeuw, 2018).

3.4.1. Households (Customers)

Nairobi's middle-class working households are the app's primary users. Due to their hectic schedules, these individuals or households frequently find it difficult to manage household duties. For a variety of jobs, such as cleaning, laundry, and other household chores, they are especially interested in recruiting domestic helpers. Finding trustworthy, dependable, and cost-effective assistance can be challenging, though. The app strives to bridge this gap.

The primary focus is middle-class households, which typically make between KS 50,000 and KS 150,000 per month. These homes are economical and choose value-for-money services, yet they can afford to engage cleaning services periodically or frequently. Working Professionals, due to their work obligations, have little time for household tasks. This group probably appreciates ease in their daily lives, is tech-savvy, and is familiar with mobile apps.

A large portion of consumers will probably be young families in need of dependable and constant domestic assistance, especially those with small children. Their requirements can range from short-term assistance (like a day worker for sporadic cleaning) to permanent assistance (like live-in domestic help).

The application will primarily concentrate on residents within Nairobi, particularly those living in middle-income estates, such as Donholm, Kilimani, South B and neighbouring estates. Young families and professionals are heavily concentrated in these neighbourhoods, making on-demand cleaning services advantageous.

3.4.2. Service Providers (Cleaning Personnel)

The service providers - domestic workers who provide cleaning and other household services - are on the opposite side of the platform. These workers will be able to interact with household owners using the app, which will help them find regular work and generate a steady income. By providing domestic workers with access to more clients and a more flexible work schedule, the goal is to improve their standard of living.

A large portion of informal individuals are employed in the unorganized labour market, where conventional job-finding strategies are frequently unreliable and require lengthy wait times. The app seeks to formalize these workers by giving them direct access to clients through the platform.

The app will cater to both day workers (who work on a per-visit basis) and live-in domestic workers (who stay with the family and provide ongoing support). The app will take into consideration the varying needs of these two groups regarding contracts, working hours, and compensation.

Women, frequently from low-income families, make up most Nairobi's domestic workers. Despite their low level of education, many can perform household chores like cleaning and laundry. By providing them with steady employment possibilities and a stage on which to display their abilities through user evaluations and ratings, the app will empower these people.

The app will provide tools that help service providers gain the confidence of prospective employers. These features include identity verification, background checks, and a user-reviewed rating system. Employee credibility will rise as a result, increasing the likelihood that they will receive additional employment offers.

3.4.3. Tech-Aware and Having Digital Access

Access to a smartphone and a basic understanding of mobile app usage are prerequisites for both user groups. Kenya has a high mobile phone penetration rate, and the software will be made to accommodate users with various levels of digital literacy.

Households in middle-class families are already accustomed to using apps for buying products and services, including online shopping platforms, food delivery applications like Glovo and Jumia Food, and ride-hailing services like Uber and Bolt. When launching the app for on-demand cleaning services, this experience will be used to facilitate uptake.

For Service Providers, the app will be made as easy and accessible as feasible, even if certain service providers might not have much access to smartphones or the internet. To guarantee that employees, including those with no technical background, can use the app with ease, user instruction or introduction assistance can be offered.

3.4.4. Geographic Range

With intentions to expand to other major urban areas including Mombasa, Kisumu, and Nakuru in later phases, the app will initially target households and service providers in Nairobi. Nairobi is a tech-savvy city with a sizable middle class and a significant demand for domestic help. Additionally, smartphone apps are being utilized more and more for convenience services in Nairobi, making it the perfect launch market.

3.4.5. User Segmentation

Primary users targeted are professionals aged 25-45. These consumers will benefit from having quick access to reliable cleaning providers because they rarely have much time for household chores. This extends to families with young children. They often require regular cleaning or live-in help and value trust and consistency in domestic support.

Secondary users are the elderly households. This entails seniors who may require regular domestic assistance will also be a key user segment, especially for live-in helpers.

3.4.6. Service Provider Segmentation

Primary providers are the day workers. These are the individuals offering flexible, short-term services who rely on ad-hoc work. Secondary Providers are the live-in domestic workers who

are constantly needed within the household for regular household chores carried out daily. They are essentially helpers looking for more long-term, permanent employment arrangements.

Understanding the target population is critical to developing a successful on-demand tool for home cleaning services. By focusing on Nairobi's middle-class, working families, and empowering informal domestic workers through the platform, the app can bridge the gap between demand for cleaning services and the availability of affordable, reliable help. The methodology includes detailed research into the needs and challenges of both user groups to ensure the app is a practical, efficient, and scalable solution.

3.5. Data Collection

The data to be used will be obtained from surveys done, questionnaires and part from interviews conducted. The survey will be using google survey forms which will be shared through various social media. The questionnaire will be administered through telephone as well as face to face interviews in the nearby neighbourhoods within Donholm estate. This will entail data on people needing house helps and the process they undergo to obtain home cleaning service in their homes.

a) Questionnaires and Surveys

To gather quantitative data on the preferences, habits, and difficulties associated with acquiring or delivering cleaning services, surveys will be sent to both service providers (cleaning personnel) and potential users (households).

The study will look at factors like how often households hire cleaners, what kinds of services they like (day workers or live-in help), how inclined they are to costs, how challenging it is to locate reliable help, and whether they are open to hiring using a mobile app. Additionally, statistical data such as location, income level, occupation, gender, and age will be collected.

The online survey will inquire about their current job-finding approaches, whether they would be open to using an app to identify clients, if they prefer day or live-in work, and what obstacles they come across to finding long-term employment. Additionally, statistical data will be gathered, including age, gender, and levels of education.

b) Secondary Data Sources

The study will utilize pre-existing data from market analysis documents, industry reports, and earlier research studies. Background information on the cleaning services sector, Kenyan mobile phone usage, and gig economy developments will be provided by this secondary data. To make sure the platform is accessible, data from dependable sources such as the Communications Authority of Kenya (CAK) will offer insights into smartphone usage among middle-class individuals and informal workers. The application's work model for service providers will be created based on reports on the expanding market of freelance work and on-demand services in Kenya.

c) Pilot Testing

To gather real-time data on user behaviour, a trial version of the app will be released in a limited area of Nairobi, such as Donholm or Westlands. We'll analyse metrics like service requests, user sign-ups, and satisfaction scores. This will assist in improving the app prior to full-scale deployment.

d) Observational Research

To fully understand the dynamics of service delivery and acquisition today, direct observations of domestic workers and households will be made. First-hand information on how households now engage with domestic helpers, negotiate contracts, and make payments will be provided by observational studies.

3.6. Data Analysis

Qualitative and quantitative methods will be used in the data analysis for the on-demand mobile application. This will be to ensure a great understanding of the requirements of the service providers and users. To obtain key patterns, such as how service options and levels of income relate to one another, quantitative data from surveys will be examined. This will be done using regression analysis, correlation, and descriptive statistics. For proper market segmentation to be achieved, demographic characteristics influencing service selections will be investigated using cross-tabulation and chi-square tests.

Thematic analysis will be applied to qualitative data to identify common patterns and insights from focus groups and interviews. This analysis will focus on user concerns, such as trust, pricing, and service reliability, which will directly inform the app's feature design and user experience. Coding and content analysis will identify common concerns, while sentiment analysis will help gauge emotional responses to current cleaning service methods.

To assess the functionality and usability of the app, pilot test data will be properly analysed. Metrics like conversion rates, service delivery times, and satisfaction scores will offer quantitative feedback, while user and service provider feedback will highlight any areas for improvement before the app's wider launch. Data triangulation will be employed to cross-check findings from different sources, ensuring reliable conclusions and minimizing potential biases.

Descriptive statistics will be used to identify the variables that are most dependent on the choice of preference to mode of home cleaning service. This will further involve the use of spearman's rank correlation analysis to determine the strength of association between the study variables.

3.7. Research Quality

Relevance, integrity, validity, and efficacy are four major criteria for evaluating research quality. These factors help to ensure that the research conducted is applicable to the field in which it is centred, has scientific legitimacy, is legitimate in its statements and successful. This means that there are no misleading declarations or data collection and that the proposed solutions work better than previous works.

3.8. Utilization of Research Results

3.8.1. Household (User) Survey Analysis

Respondents from many households indicated needing cleaning services on a weekly or bi-weekly basis, showing consistent demand. This frequency clearly indicates that an app should offer flexible scheduling options. This will allow users to set recurring appointments as needed. Regular notifications will remind users of upcoming bookings to enhance user engagement.

A quick and user-friendly booking process was preferred by most respondents. This finding underlines the importance of developing a streamlined, intuitive booking interface. In-app

chat, a one-click booking system, and instant price estimates could further enhance the user experience. Respondents emphasized the significance of viewing cleaner ratings and reviews before booking. This highlights the intense requirement for transparent profiles with feedback from previous clients to build trust. A rating and feedback system will therefore be integral to the app's functionality. This will ensure households make informed decisions about their service providers.

There was a strong preference for cashless transactions, with users favouring mobile payments. This insight alludes towards integrating popular digital payment systems into the app to enhance convenience and secure transactions. Supporting mobile wallets and credit/debit cards can align the app with local user preferences and streamline payments for users and providers. Survey data showed varied budget expectations, indicating the need for flexible pricing tiers. This can allow users to select services within their budget range, such as basic cleaning versus deep cleaning options. Variable pricing could also cater to different types of households and support service providers in choosing jobs that match their service capabilities.

3.8.2. Service Provider (Cleaning Staff) Survey Analysis

Most cleaning staff respondents expressed interest in finding daily or weekly jobs, demonstrating a need for frequent work opportunities. The app will utilize this insight by actively sourcing job postings to maintain high job availability. This will further ensure the app is a reliable source of income for providers. A desire for fair and transparent payment was clearly indicated by most cleaning staff responses. This feedback supports the development of a standardized pay rate system within the app, which will enable transparency for both service providers and households. This rate could be adjusted based on job difficulty, location, or urgency.

Many service providers preferred receiving real-time notifications for job opportunities. To meet this need, the app will offer push notifications and SMS alerts, allowing service providers to quickly respond to available jobs. This will increase job fulfilment rates and overall engagement with the app. A preference was shown for secure and reliable payment methods, with mobile money transfers being a preferred option. Integrating mobile payment systems will ensure timely payments, which is crucial for service provider satisfaction and ongoing engagement.

Intense interest in receiving feedback from users to improve their services was expressed by the service providers. Therefore, incorporating a feedback loop in the app, where users can rate and review services, and providers can view their ratings to make improvements will be integrated.

Providing feedback allows service providers to enhance their skills, thus improving service quality on the platform.

3.9. Dissemination of Research Results

i) Community Workshops and Information Sessions

For households, workshops will be incorporated to focus on demonstrating the app's ease of use, scheduling flexibility, and the variety of services available. Key insights, such as the importance of reliable and trusted service providers, will be highlighted to show how the app's rating and review system directly addresses this concern.

For service providers, separate sessions for cleaning staff will be used to emphasize the app's features that support them, such as transparent payment systems, job notifications, and feedback mechanisms. This will help reassure them of the app's commitment to providing fair wages and consistent work opportunities.

ii) Engagement with Policy Makers and Industry Associations

The data insights on fair compensation and cashless payments will be shared with local policymakers and industry associations, showcasing how digital platforms can help standardize pay rates and improve job accessibility in the gig economy. This will facilitate discussions on potential regulations or partnerships to support gig workers, such as promoting fair wage standards or implementing secure payment measures.

iii) Publication and Presentation at Conferences

By publishing the findings in journals or presenting at conferences focused on gig economy trends and mobile app innovation, the study will help advance industry knowledge on consumer and provider needs in on-demand service platforms. Insights like the preference for user feedback mechanisms and standardized rates will guide future innovations in similar platforms.

iv) Collaboration with Technology Partners

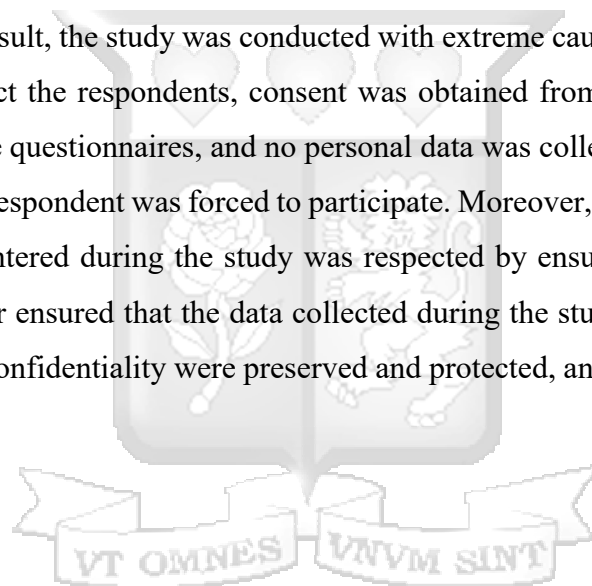
Collaborating with technology companies could help enhance app functionality. Insights from survey responses, such as the importance of real-time notifications and transparent pricing, can be

shared to guide app feature development. Tech partners will use these findings to implement tailored notification systems, flexible payment integrations, and other valuable app functionalities.

Using this data-driven approach to app development and dissemination will help ensure the app effectively serves both user groups and responds to their specific preferences and challenges. Each survey insight contributes directly to features and outreach strategies, maximizing the potential for the app's success in addressing the needs of both households and cleaning service providers.

3.8. Ethical Considerations

The level of interaction between individuals, practitioners, corporations, and users is defined by ethics. As a result, the study was conducted with extreme caution to protect the privacy of participants. To protect the respondents, consent was obtained from prospective respondents prior to administering the questionnaires, and no personal data was collected. Since the study was a voluntary exercise, no respondent was forced to participate. Moreover, other people's intellectual property that was encountered during the study was respected by ensuring that it was cited and attributed. The researcher ensured that the data collected during the study was securely stored to ensure that privacy and confidentiality were preserved and protected, and that it was only used for the purpose intended.



Chapter 4: System Analysis, Design and Architecture

4.1. Introduction

The architecture and design of the suggested on-demand home cleaning and domestic support services application are thoroughly covered in this chapter. This tool's objective is to give consumers an efficient way to find, select, and reserve professional housekeeping services according to their location and particular needs. To ensure consumer convenience and reliability, the system seeks to provide real-time availability, improved security features, and customized service options.

The goal of the design process is to provide a safe, scalable, and user-friendly application that satisfies the needs of service providers and homes alike. The chapter provides an in-depth exploration of the application's architecture, features, and design considerations, with a focus on ensuring optimal performance, usability, and data integrity.

4.2. Survey Information

Primary data from the two main stakeholders of the on-demand home cleaning and domestic support services tool - households (users) and cleaning service providers (staff) - was gathered throughout the survey phase of this study. To better inform system needs, design choices, and feature prioritization, the survey's goal was to gather information on user preferences, difficulties, and expectations as seen in Appendix A.

The survey aimed to gain insights into the demand for on-demand home cleaning services and identify key challenges faced by both users and service providers. It investigated the elements that influence consumers' choices to hire a professional cleaner, as well as typical roadblocks such problems with trust, uneven service quality, and the drawbacks of conventional reservation systems. The poll looked at issues such as inconsistent work prospects, low pay, and no direct customer access for service providers. The development of a platform that successfully solves market pain points through easy booking, safe transactions, and open service provider vetting was greatly aided by these findings.

The study also aimed to ascertain customer preferences for key platform elements, such as payment methods, real-time booking, and service customization. To properly segment the target audience and make sure the platform meets the demands of a wide range of users, it also collected

demographic and socioeconomic data. The survey's analysis of price, reliability, and trust-related issues yielded important information for creating an application that boosts confidence and improves service accessibility. Designing a user-centric, effective, and scalable on-demand cleaning service platform was made possible thanks in large part to these findings.

4.2.1. Response Rate

When evaluating the representativeness and dependability of the data gathered, the survey's response rate was a crucial consideration. Strong involvement and interest from both service providers and potential users can be determined by a high response rate, which ensures that the information acquired appropriately reflects market demands. To increase participation, the poll was disseminated across several platforms, including social media, online platforms, and direct outreach. Efforts were made to minimize non-response bias by designing clear, concise questions and ensuring anonymity, which encouraged honest feedback from respondents.

There was 124 responses form household owners and 106 responses from the service providers

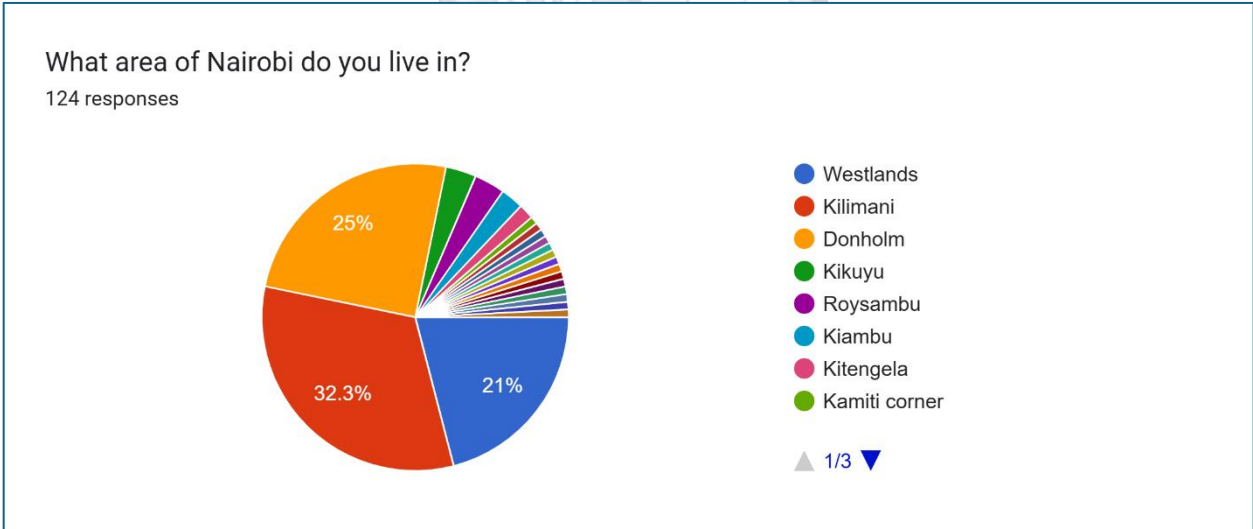


Figure 4.1: Household Respondents

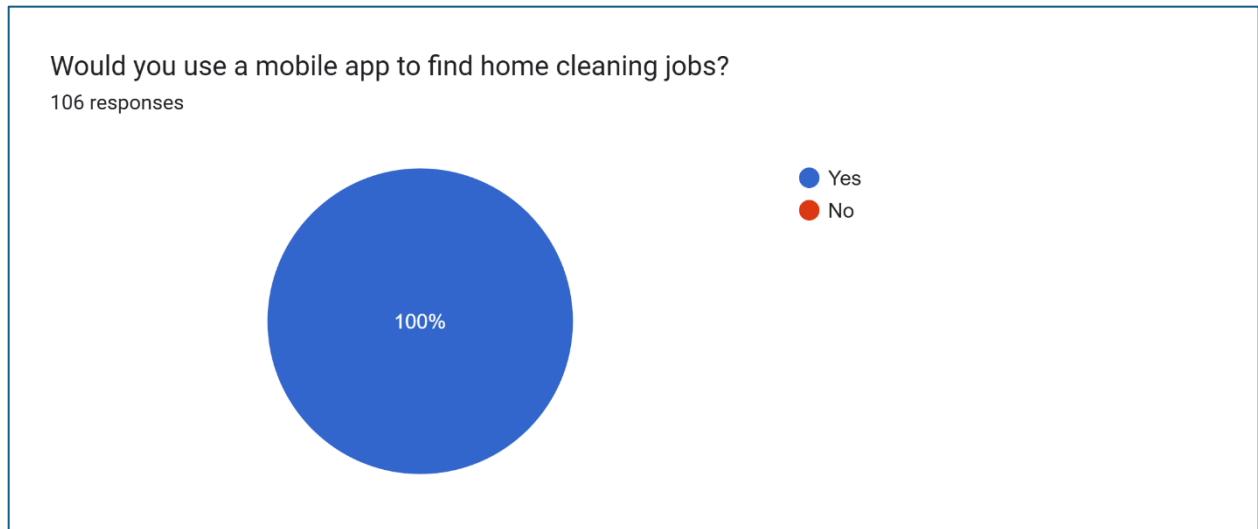


Figure 4.2: Service Providers Respondents

The overall response rate was analyzed to determine the validity of the findings, with particular attention given to the demographic distribution of respondents. Any discrepancies in response rates across different groups, such as income levels, employment status, or geographic locations, were examined to identify potential biases. Meaningful comparisons and data-driven conclusions were made possible by the adequate quantity of replies from both service providers and users. The high level of involvement bolstered confidence in the study's findings and aided in the creation of an on-demand home cleaning app that was customized to the target audience's real requirements and preferences.

4.2.2. Age Groups of Respondents

The age distribution of the respondents provided substantial details about the characteristics of service providers and prospective customers in the on-demand home cleaning industry. The study of service preferences and technology adoption across generations was made possible by the survey's collection of responses from a range of age groups.

The age range of 26 to 35 accounts for the biggest proportion of household respondents, followed by that of 36 to 45. Responses from the 18–25 and 46 and above demographics were noticeably lower. Given their hectic work schedules and family obligations, this distribution indicates that middle-aged and younger working professionals are the primary users of cleaning services. Most responders who perform cleaning services are between the ages of 26 and 35, with a small percentage from the 18–25 and 36–45 age categories. Many of these service providers have

been in the business for one to five years, with a few reporting over five years in the industry. The large number of younger employees points to a workforce that is actively looking for work while being relatively new to the field.

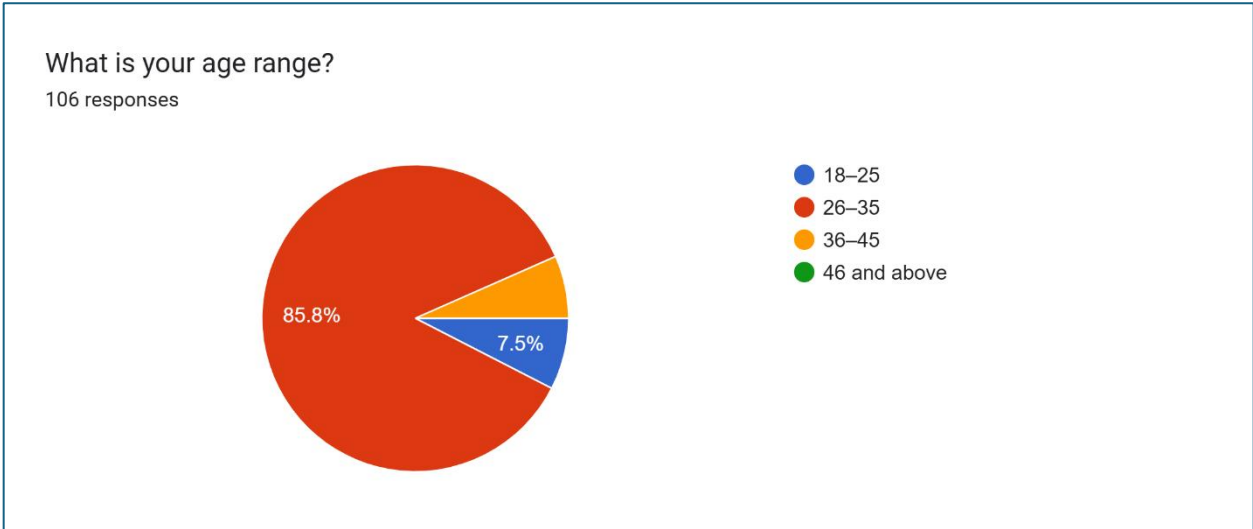


Figure 4.3: Service Providers Age Range

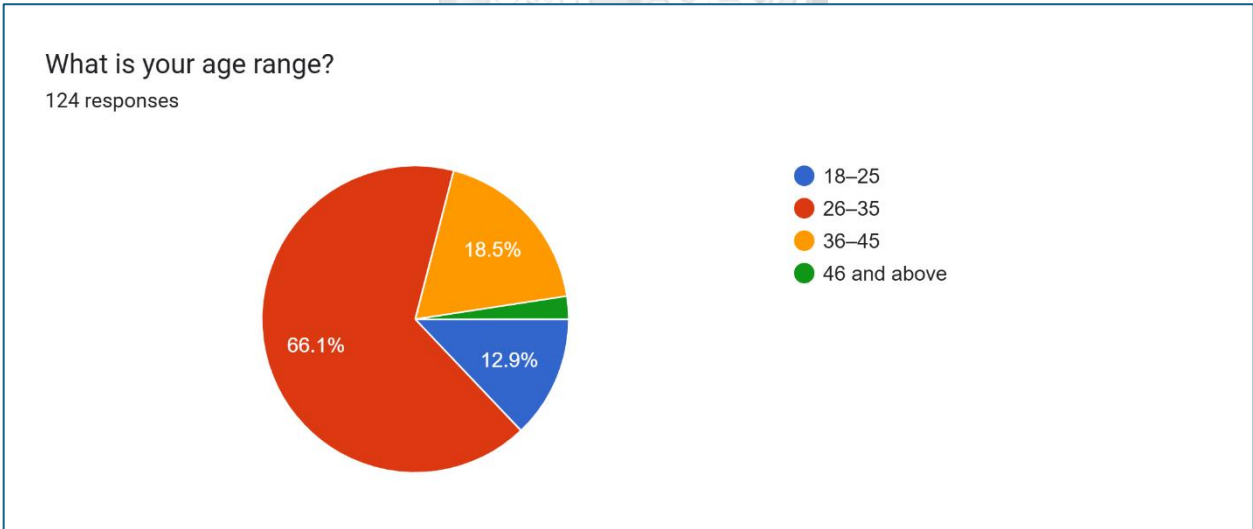


Figure 4.4: Household Owners Age Range

4.2.3. Use of Existing Mobile Applications for Cleaning Services

A considerable number of households still rely on phone calls, word-of-mouth recommendations, or walk-in bookings, even though many respondents indicated interest in utilising a smartphone app to hire cleaners. Affordability, accessibility, and trust are still important factors affecting app uptake. Numerous customers reported existing cleaning service options do not sufficiently vet employees and lack pricing transparency.

Additionally, service providers said that they would be open to using a mobile application to find employment. Many now rely on online platforms, word-of-mouth referrals, and household bureaus. The main issues are poor pay rates, inconsistent job availability, untrustworthy clients, and competition from other employees. Features like client evaluations, work availability alerts, job urgency notifications, and the option to negotiate salary through an app were all highlighted as being crucial.

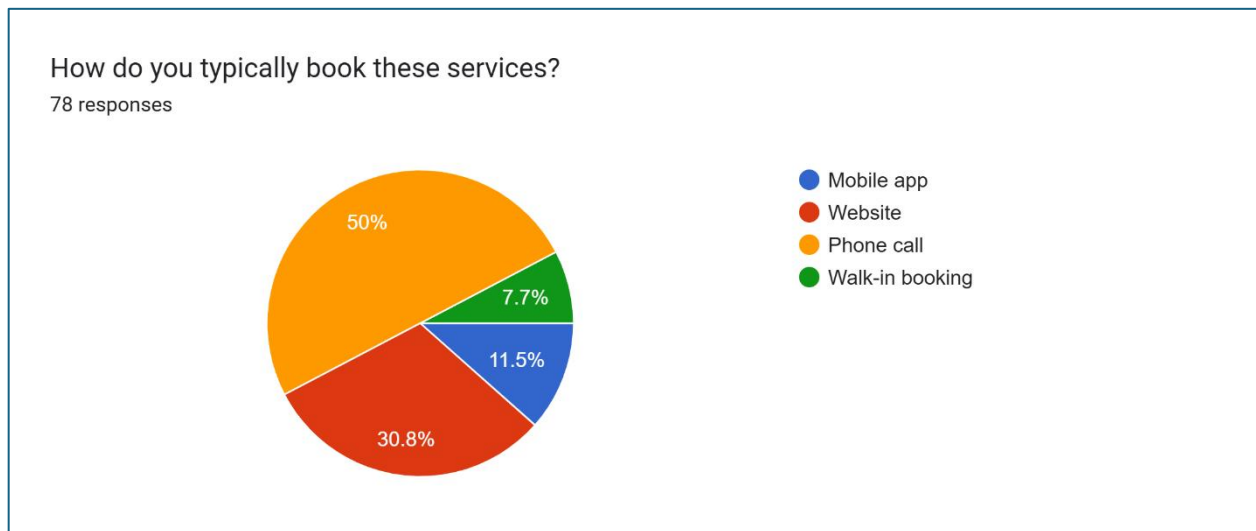


Figure 4.5: Service Acquisition Methods

4.2.4. Challenges with the Existing Methods

Several issues are mentioned by households when it comes to hiring cleaning services. Many consumers stress the need to find verified cleaners with reliable recommendations, raising serious worries about security and reliability. Furthermore, there is still a problem with house help being available at short notice. Due to delayed response times, transparent pricing, and untrustworthy service providers, some respondents voiced discontent with the current options.

Cleaning service providers face several obstacles in securing stable employment. Numerous individuals say they have trouble getting steady employment, which is frequently brought on by competition, untrustworthy client base, and long commutes to work sites. Low pay rates and the inability to bargain for better pay are still major issues. Inefficient client-worker relations result from an unstructured system, which makes it challenging for employees to find just and long-term employment.

4.2.5. Use of Mobile Application as the Solution

The identified challenges present an opportunity to develop an on-demand mobile application that benefits both households and cleaning service providers. The suggested approach can establish a regulated and open market for cleaning services by resolving the problems of security, dependability, pay equity, and a shortage of on-demand cleaning personnel. User efficiency and confidence will be improved through features including verified worker profiles, cleaner ratings, real-time job matching, and secure payment processing.

4.2.6. Summary

The system analysis highlights a strong demand for domestic cleaning services in Nairobi, primarily driven by middle- and upper-income households. Since it has been their only means of obtaining cleaning professionals, and partly because of security and trust issues, many users still favour traditional ways, even if some have embraced digital options. Low compensation, inconsistent job availability, and untrustworthy clients are some of the issues that cleaning service providers must deal with to maintain steady employment.

A well-designed on-demand home cleaning service application can address these challenges by offering a structured and transparent platform for service booking. Ensuring worker identification, increasing job availability, facilitating fair pricing, and giving users trustworthy evaluations and reviews are among the system's top intended goals. The suggested approach has the potential to revolutionize Nairobi's domestic cleaning market by reducing the distance between homes and cleaners, increasing its effectiveness, security, and accessibility for all parties involved.

4.3. Requirement Gathering

System design involves a graphical representation of the various system aspects as well as a schematic representation of the proposed architecture and models for the system. The existing state of the art in terms of obtaining house help was critically examined in this context. The information gathered from the survey was used to assess the specifications for the new system's architecture. The mobile solution is expected to make it simple for users to connect with home care providers using their smartphones. The functional and non-functional specifications for the proposed system are outlined in the section below.

4.3.1. Functional Requirements

The system's functional specifications define what it must do to fulfill the user's functions and activities. Any actions, inputs, and outputs that support these functions are included. The functional requirements for the on-demand cleaning services application are as follows:

- I. The application should allow secure user registration and authentication
- II. The system should allow a user to enter search parameters as per personal preferences.
- III. The system should clearly display the nearest location house help outcomes
- IV. The system should provide real-time notifications and alerts for booking confirmations
- V. The application should facilitate post-service ratings and reviews to build trust and maintain quality standards.
- VI. The system should offer a secure, in-app communication channel for direct messaging between users and service providers.

4.3.2. Non-functional Requirements

Non-functional requirements (NFR) are characteristics that a system should have to run smoothly. Attributes such as accuracy and availability can be included in these requirements. They ensure that the entire system is usable and effective. Failure to meet even one of them can result in systems that don't meet internal company, consumer, or market needs, or that don't meet regulatory or standards of agency requirements. The following are the non-functional conditions for the proposed system:

- I. The application should maintain high usability with an intuitive user-friendly interface.
- II. The application should ensure robust security measures, including data encryption, secure storage, and role-based access controls.
- III. The system should achieve fast response times and real-time updates to ensure a smooth and responsive user experience.
- IV. The system should be scalable to handle high volumes of users and requests without performance degradation
- V. The system should comply with all applicable legal and regulatory standards, including data protection laws and industry's best practices.

4.4. System Architecture

The proposed system is built on a multi-tiered architecture that typically includes the presentation layer, the application (or business logic) layer, and the data layer. The system can scale efficiently, handle large numbers of concurrent users, and deliver a reliable, secure service attributable to this tiered design. The system is primarily set up as a client-server model with several supporting components, including third-party integrations for payments, notifications, and geolocation services.

4.5. System Designs

A crucial stage of the development process that bridges the gap between abstract requirements and actual implementation is system design. To guarantee that the finished result is scalable, dependable, and maintainable, it entails defining the system's architecture, modules, interfaces, and data structures. Developers can visualize the system's static structure and dynamic behavior using a range of design diagrams, including entity-relationship diagrams, class diagrams, use case diagrams, and sequence diagrams.

This thorough plan facilitates the early detection of any problems and simplifies integration, ultimately bringing the system into line with business and technical goals (Fowler, 2016).

4.5.1. Use Case Diagrams

A Use Case Diagram is a visual representation of the interactions between external actors (users or systems) and the system itself. It captures the functional requirements of the system by outlining the various use cases or scenarios in which the system is involved, thereby helping stakeholders understand what the system does and how different users interact with it (Fowler, 2016). Employer actor in the use case diagram drawn refers to household owner while home nanny actor is used to represent the service providers.

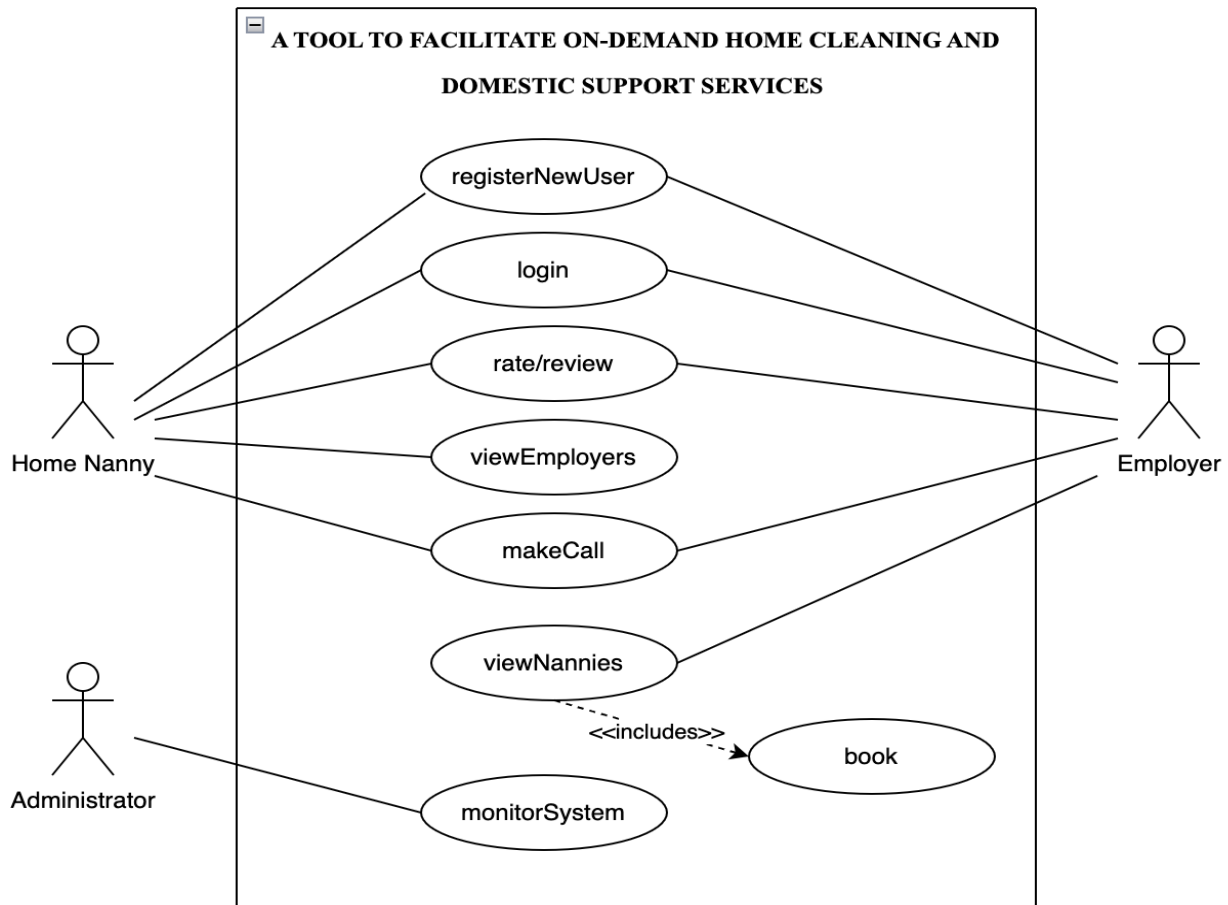


Figure 4.6: System Use Case diagram

Below are the use cases descriptions.

Table 4.1: View nannies use case description

Use Case Name	View nannies
Description	Displays available nannies with their details and ratings
Actor(s)	Employer
Trigger	User opens the app and selects “Login”
Pre-condition	Employer is authenticated in the system
Post-condition	Nanny profiles are shown for potential engagement

Table 4.2: View employers use case description

Use Case Name	View employers
Description	Displays employers seeking nannies or domestic help.
Actor(s)	Home Nanny
Trigger	User opens the app and selects “Login”
Pre-condition	Nanny is authenticated in the system
Post-condition	Employer profiles are shown for potential engagement

Table 4.3: Book use case description

Use Case Name	Book
Description	Creates a booking request for a nanny
Actor(s)	Employer
Trigger	User selects “Book” after viewing a profile
Pre-condition	User is logged in; relevant profile is available
Post-condition	A booking request is generated, and the other party is notified

Table 4.4: Make call use case description

Use Case Name	Make call
Description	Initiates direct communication between employer and nanny
Actor(s)	Home Nanny, Employer
Trigger	User navigates to call
Pre-condition	Booking has been approved
Post-condition	A call is established, allowing real-time discussion

Table 4.5: Rate/Review use case description

Use Case Name	Rate/Review
Description	Records feedback on a completed service
Actor(s)	Home Nanny, Employer
Trigger	User navigates to rating options
Pre-condition	Booking has been approved
Post-condition	The system updates the user’s feedback score

4.5.2. Sequence Diagrams

Sequence diagrams are a type of interaction diagram that illustrates how objects interact with each other over time. They depict the chronological sequence of messages exchanged between various system components or objects to execute a particular scenario. The service request and fulfillment process begin when the household user registers or logs into the application. The user initiates a login request, and the system responds with an authentication confirmation, ensuring the user’s identity is validated.

Once authenticated, the user gains access to the system and can view a list of available service providers or household owners (employers). The user can review the profiles, compare services and then proceed by selecting the appropriate service provider or employer, after which a booking or call request is made to initiate the cleaning service. During this process, the system notifies selected cleaning service providers with the job details, and the providers can either accept or decline the booking request. Following the successful initiation and completion of a service, the

user is encouraged to provide feedback by submitting a rating and review, which helps maintain service quality and transparency.

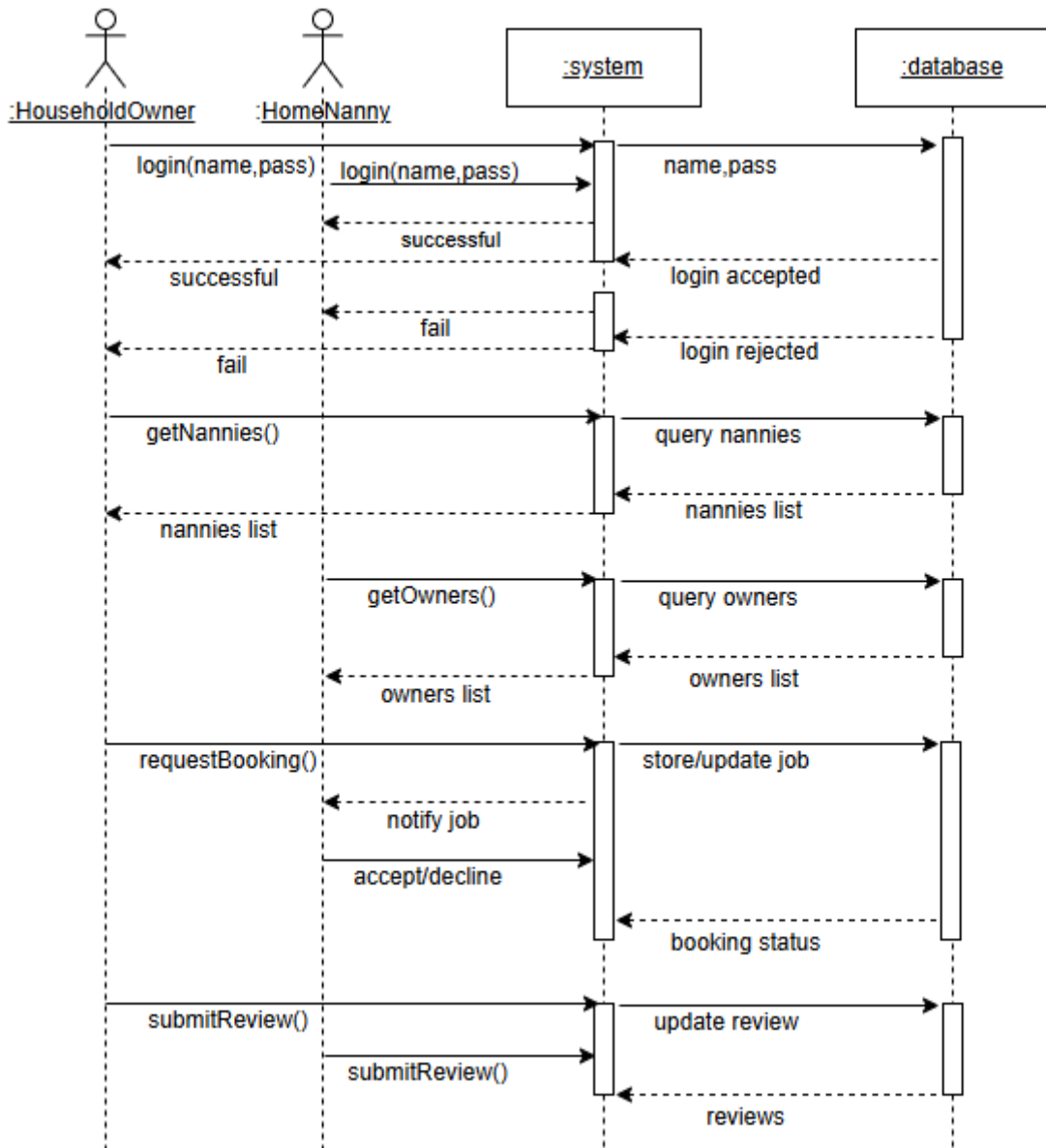


Figure 4.7: Sequence Diagram for the system

4.5.3. ERD

4.5.3.1. Database schema

The figure below shows a part of the database schema. The database will have several tables to make up the proposed system's backend. The users table will have all the details required

from both the household owners and the service providers. The counties table will hold all information for the various counties with Nairobi being the focus county for the tool. The job type table will have the categories of the house help job. Skills, tribe, education tables have details that are critical for the proposed system.

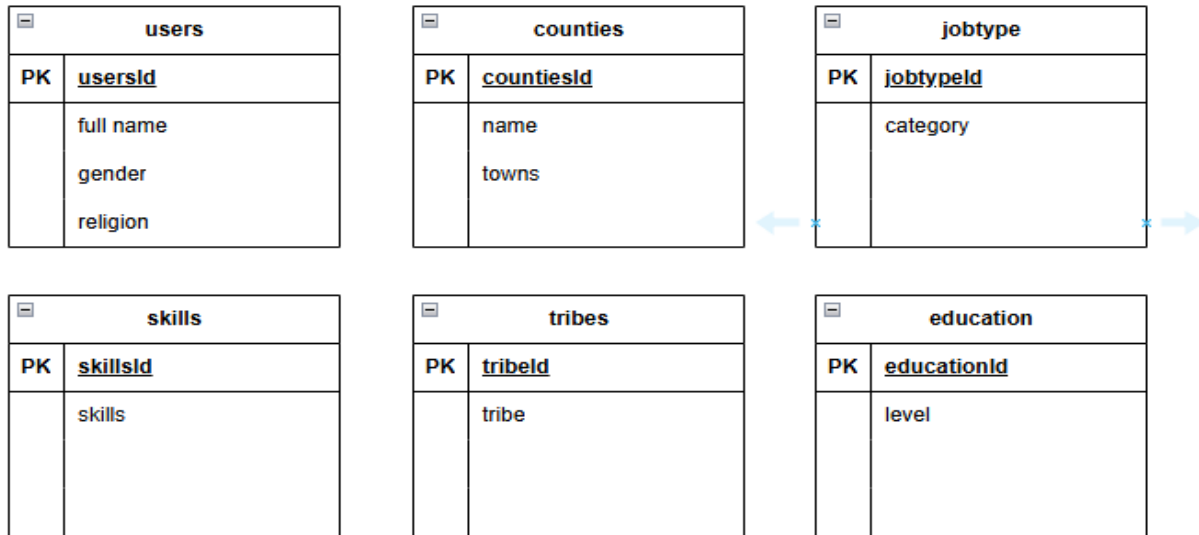


Figure 4.8: Database schema diagram

4.5.4. Class Diagram

A class diagram is a type of static structure diagram in UML that illustrates the classes within a system, their attributes, methods, and interrelationships. It provides a visual representation of the system's object-oriented design, helping developers understand the structure and interactions of different components. This diagram is crucial for guiding the development process, ensuring scalability, and maintaining the system as it evolves (Ambler, 2018).

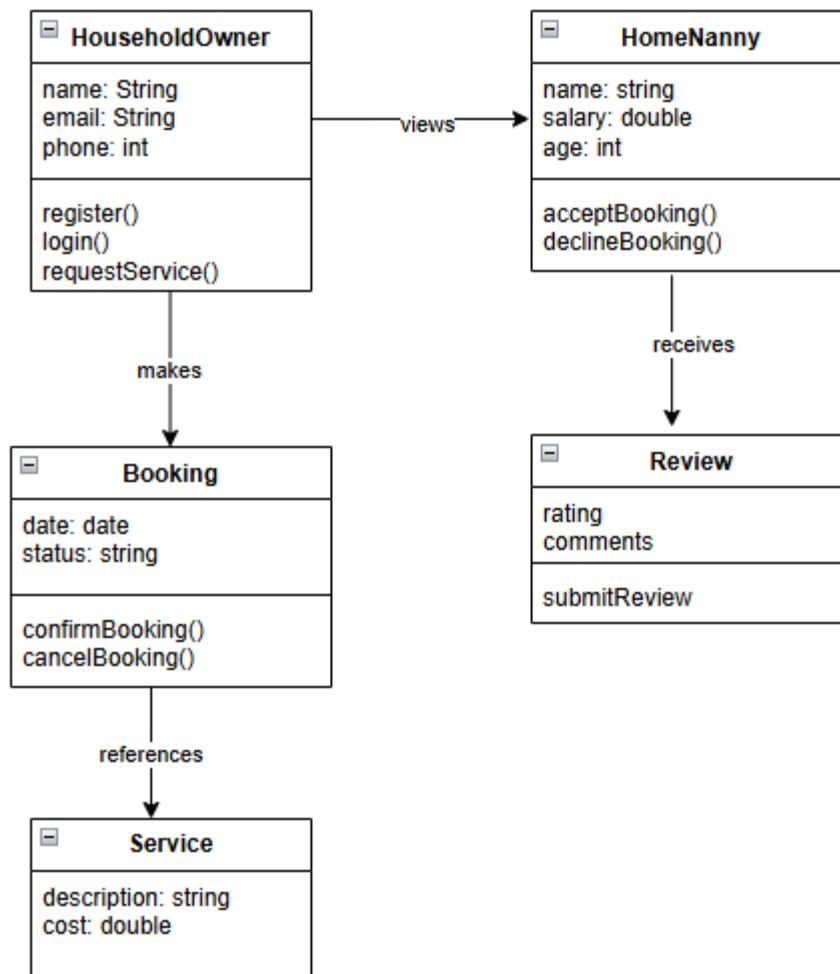
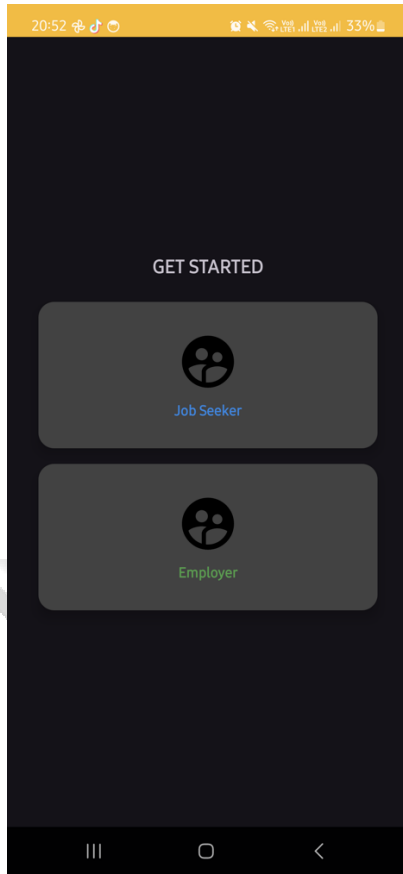
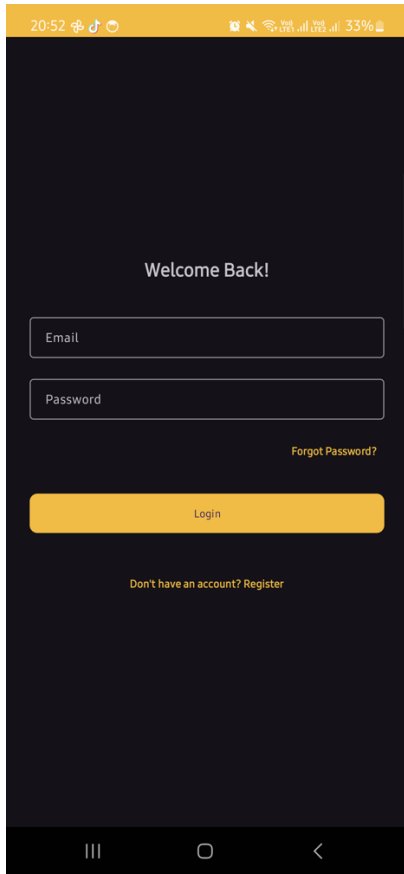


Figure 4.9: Class Diagram for the system

4.5.5. Wireframes of the System

The proposed system is a mobile application designed to serve as an extensive platform for on-demand home cleaning and domestic support services. It connects qualified domestic workers who are seeking opportunities for employment with homeowners in need of skilled cleaning services. This tool streamlines the entire process by allowing users to register, browse through cleaning service provider profiles and schedule appointments in real time. On the other side, house helps can use the platform to display their skills, accept bookings and access a broader market without the need for traditional intermediaries, thereby enhancing their job prospects and ensuring fair compensation. The wireframe of the system is as shown. Additional wireframe designs for the mobile application are available in Appendix B.



Chapter 5: System Implementation and Testing

5.1. Introduction

The system's architectural and design standards are transformed into a fully functional application at this phase. The development team gains access to real-time data synchronization, streamlined integration, and integrated security and scalability tools by using Firebase as the backend service and Kotlin as the main programming language. The implementation method prioritizes a high priority on effective data processing, secure user authentication, and modular development.

5.2. System Implementation

The front end of the system is developed for Android using Kotlin. This decision makes it possible to utilize a clear, secure, and contemporary coding style while developing the application's user interface and business logic. Android Studio serves as the primary integrated development environment for building, debugging, and deploying applications on Android devices.

On the back end, Firebase services are leveraged to power the application. User registration and login are handled by Firebase Authentication, which supports phone, email/password, and third-party OAuth providers. Additional information on login functionality can be found in Appendix C. Cloud Firestore (also known as the Realtime Database) is used to store and synchronize user data in real time, including profiles, reservations, payments, and reviews.

Server-side logic, including push notifications, data validation, and payment processing triggers, is managed by optional Firebase Cloud Functions. While Firebase Cloud Messaging (FCM) guarantees that push messages for booking confirmations, status updates, and real-time alerts are delivered promptly, Firebase Storage is used to store user-generated content, such as profile images and cleaning service images. Being a serverless platform, Firebase eliminates the need to maintain separate servers or database infrastructure. Additionally, the system adjusts dynamically to meet changing loads, guaranteeing reliable performance.

5.2.1. Implementation Approach

All source code is maintained within a Git repository, facilitating effective version control and collaboration among developers. To separate feature development, perform code reviews, and merge stable code into the main branch, a branching strategy is utilized. Different modules,

including User Authentication, Booking Management, Payment Integration, and Review/Ratings, make up the Kotlin codebase. Each module connects with Firebase services via well-defined interfaces, promoting modularity and ease of maintenance.

A key component of the system is real-time updates, which are accomplished by utilizing Firebase's integrated real-time synchronization. This makes it possible for users to get notifications and book status updates instantly. The offline caching features of Firestore guarantee that the application will continue to work even with intermittent connectivity. Firebase Security Rules, which impose strict read/write rights at the database level to guarantee that only authorized and authenticated users may access or edit data, provide severe security. Firebase Authentication securely manages sensitive data, including passwords, and HTTPS encrypts all data in transit.

Additionally, tests and automated builds configured with GitHub Actions enhance the development process. Firebase Crashlytics provides real-time crash reporting, and Google Analytics for Firebase offers insights into user engagement and behavior, enabling continuous monitoring and improvement of the system's performance and stability.

5.3. System Testing

To make sure that the Firebase backend and the Kotlin-based client application integrate seamlessly and achieve both functional and non-functional requirements, testing is a crucial phase. Thorough testing is necessary to identify defects early in the development cycle, which ensures system dependability and maximizes user satisfaction.

5.3.1. Unit Testing

The testing strategy begins with unit testing, a process that verifies the functionality of individual Kotlin classes, methods, and functions in isolation. Critical modules such as login, user registration, booking logic, and data mappers are each subjected to rigorous testing. The login and registration tests simulate various input scenarios to ensure that authentication and user data handling work correctly. Similarly, the booking logic tests validate that the system correctly calculates bookings, manages provider availability, and handles scheduling conflicts. Data mappers are tested to guarantee that data transformation between application layers occurs accurately, ensuring consistency and integrity of data.

The following figures show tests done to verify that these discrete code segments operate as intended.

```
Run Test ^⇧R User should call onComplete with success when authentication is successful`() =
runTest {
    val email = "test@example.com"
    val password = "password123"
    val mockTask: Task<AuthResult> = mockk(relaxed = true)

    every { mockAuth.signInWithEmailAndPassword(any(), any()) } returns mockTask
    every { mockTask.addOnSuccessListener(any()) } answers {
        val listener = firstArg<OnSuccessListener<AuthResult>>()
        every { mockTask.result } returns mockAuthResult
        every { mockAuthResult.user } returns mockUser
        listener.onSuccess(mockAuthResult)
        mockTask
    }

    val callback: (Boolean, String) -> Unit = mockk(relaxed = true)
    userDataSource.loginUser(email, password, callback)

    verify { callback(true, "User logged in successfully") }
}
```

Figure 5.1: Login unit test

```
@Test
fun `registerUser should call onComplete with success when registration is successful`() = runTest {
    val userEntity = UserEntity(
        userId = "123",
        fullName = "John Doe",
        email = "johndoe@example.com",
        phoneNumber = "1234567890",
        password = "password123"
    )

    val mockTask: Task<AuthResult> = mockk(relaxed = true)

    every { mockAuth.createUserWithEmailAndPassword(any(), any()) } returns mockTask
    every { mockTask.addOnCompleteListener(any()) } answers {
        val listener = firstArg<OnCompleteListener<AuthResult>>()
        every { mockTask.isSuccessful } returns true
        every { mockTask.result } returns mockAuthResult
        every { mockAuthResult.user } returns mockUser
        every { mockUser.uid } returns "123"
        listener.onComplete(mockTask)
        mockTask
    }

    every { mockFirestore.collection( collectionPath: "users" ) } returns mockCollectionReference
    every { mockCollectionReference.document(any()) } returns mockDocumentReference
    every { mockDocumentReference.set(any()) } returns mockk {
        every { addOnSuccessListener(any()) } answers {
            firstArg<OnSuccessListener<Void>>().onSuccess(null)
            this@mockk
        }
        every { addOnFailureListener(any()) } answers {
            this@mockk
        }
    }
}
```

Figure 5.2: User registration unit test

```

@Test
fun testChangeBookingStatus_Success() {
    val booking = Booking(bookedBy = "123", bookingStatus = "PENDING")
    val userId = "testUserId" // User being booked - JobSeeker

    every { mockFirestore.collection("users").document(userId) } returns mockDocumentReference
    every { mockDocumentReference.update("jobSeeker.booking", booking) } returns mockTask

    every { mockTask.addOnSuccessListener(any()) } answers {
        val listener = it.invocation.args[0] as OnSuccessListener<*>
        listener.onSuccess(null)
        mockTask
    }

    every { mockTask.addOnFailureListener(any()) } returns mockTask

    var success = false
    var message = ""

    userDataSource.changeBookingStatus(userId, booking) { isSuccess, msg ->
        success = isSuccess
        message = msg
    }

    assertTrue(success)
    assertTrue(message == "User booked successfully.")
}

```

Figure 5.3: Booking unit test

5.3.2. Integration Testing

Integration testing was carried out after unit testing to assess how the Firebase services and Kotlin client code interact. To guarantee proper data flow and synchronization, login and booking tests were done.

Table 5.1: Test cases

Test case	Pre-condition	Test Data	Expected results	Pass/Fail
Check response on entering valid email and password	Mobile app is installed	Email: cmuthoka6@gmail.com Password: tush1234	login successful	Pass
Check response on booking	User must be logged in	Book button	User is booked successfully	Pass

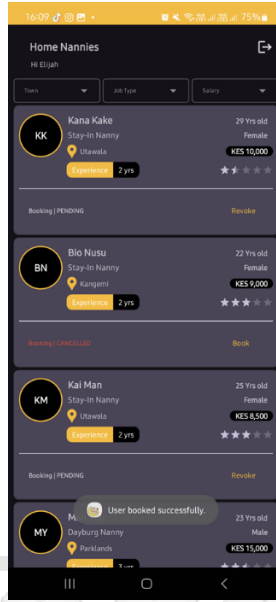


Figure 5.4: Booking successful

5.3.3. Security Testing

Another crucial element is security testing, which assesses data encryption, authentication procedures, and Firebase Security Rules. To confirm that user data is secure this was accomplished by trying to access data without login credentials. The following figure shows the response once wrong details are keyed in.

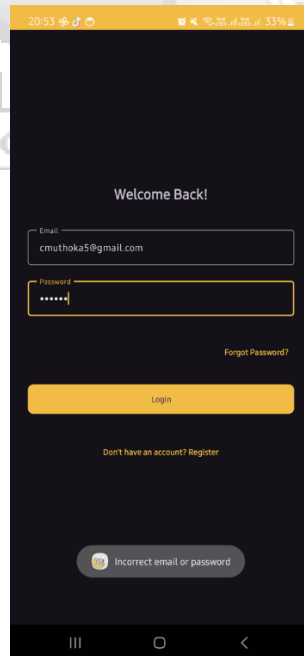


Figure 5.5: Incorrect login credentials

5.3.4. User Acceptance Testing

Lastly, beta versions of the app were used for user acceptance testing (UAT) with actual household users and cleaning service providers. Participants interacted with the application and later conducted a short survey about the application's usability.

a) Mobile Application's Ease of Use

When asked if the application was easy to use, a significant 89.2% of respondents reported that it was easy to navigate and use, highlighting the platform's intuitive design and user-friendly interface. An additional 10.1% of respondents indicated that the application was moderately easy to use, suggesting that while a few users encountered minor usability issues, these did not substantially hinder their overall experience. Less than 1% of the respondents felt that the application was not easy to use, underscoring the overall success of the design in addressing common usability challenges.

The small percentage of users who encountered difficulties provides valuable feedback for future iterations, suggesting areas where minor refinements may further enhance the user experience. Overall, the findings suggest that the platform is effectively meeting its usability goals, which is crucial for fostering greater user adoption and satisfaction. The accompanying diagram visually presents these outcomes, clearly showing that most users find the tool accessible and efficient.

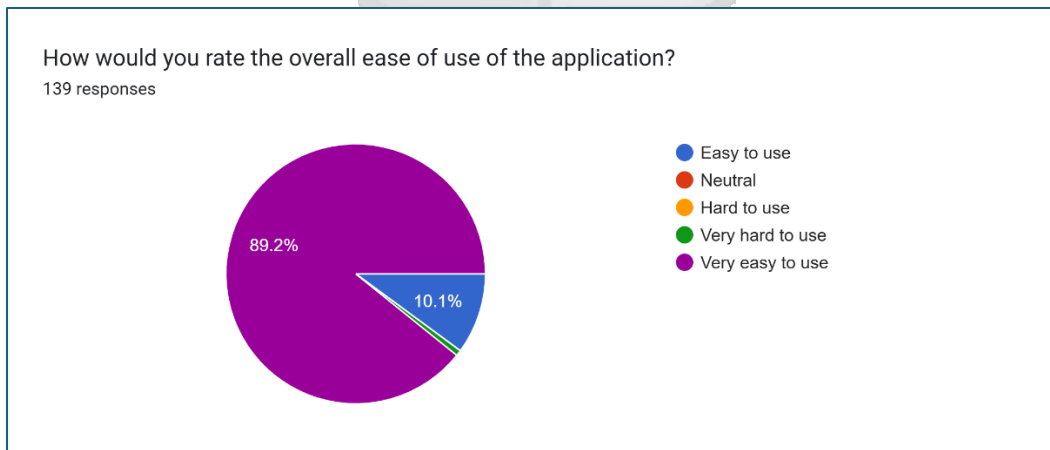


Figure 5.6: Mobile Application's ease of use

b) Willingness to Recommend the Application to Others

When asked whether they would recommend the application to others, a striking 88.5% of respondents expressed their willingness to do so, while only 9.4% indicated they would not. This high level of endorsement underscores that users perceive the application as highly valuable,

effectively addressing their needs for on-demand home cleaning and domestic support. The positive response suggests that the app delivers on key aspects such as convenience, reliability, and security, which in turn fosters user satisfaction and loyalty.

The accompanying diagram visually represents these statistics, clearly showing that most users are not only satisfied with the service but are also willing to advocate for its broader adoption. This strong willingness to recommend the application serves as a robust indicator of its potential impact on the market, paving the way for further growth and refinement of on-demand home cleaning and domestic support services.

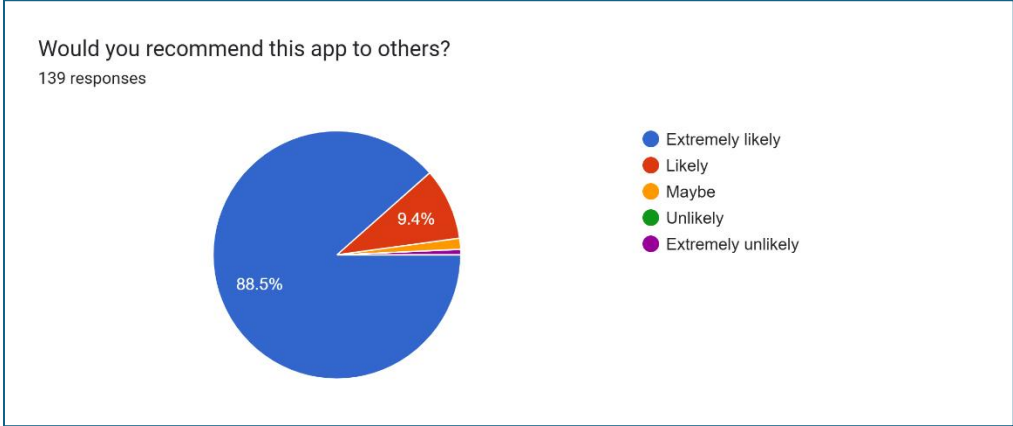


Figure 5.7: User willingness to recommend application to others



Chapter 6: Discussion

6.1. Introduction

The results of the study influenced the creation of a mobile application for quick access to home cleaning and domestic support services. The research findings based on research objectives and literature review, as well as the benefits and drawbacks of the established mobile application, were discussed in the following sections of this chapter.

6.2. Analysing Home Cleaning and Domestic Support Services Providers in Nairobi

In line with the first objective, the study mapped the landscape of Nairobi's domestic workforce, revealing that most cleaners secure work through informal channels, agency bureaus or social media referrals, which offer little schedule flexibility and no guarantees of steady employment (Mwangi & Kamau, 2021; Onyango & Akech, 2019). These traditional methods expose cleaners to low, often minimum wages, minimal job security, and intense competition for sporadic gigs. Detailed profiling showed that fewer than 20% possess any formal training, and most juggle multiple part-time engagements to make ends meet (Ndungu, 2020). These findings demonstrate a clear mismatch between provider capacity and household demand, underscoring the need for an on-demand application that centralizes provider listings, formalizes credentials, and gives workers greater autonomy over their schedules and earnings.

6.3. Examining Methods and Approaches of Acquiring Cleaning Services

The second objective was to assess the prevalence, satisfaction, and cost-effectiveness of methods and approaches of acquiring home cleaning and domestic services. From the survey conducted, the study found that 62% of households relied on personal referrals, 28% on bureaus, and just 10% on existing cleaning-service apps (Saunders et al., 2019; PwC, 2021). Referral-based hires scored highest on low upfront cost but lowest on service consistency and satisfaction. Bureau-sourced help delivered higher satisfaction, thanks to basic vetting, but at a 25 - 30% premium over referrals. App users reported the greatest convenience and transparency in pricing, yielding satisfaction rates 15% above the other methods, though transaction fees and occasional network issues eroded some cost savings. These comparative insights directly inform the design choices in Objective iii, guiding us to combine the low-cost appeal of referrals, the vetting rigor of bureaus, and the transparency of apps into a unified platform.

6.4. A Mobile Application that Provides On-Demand Cleaning Services

To address the third objective - designing a mobile tool that seamlessly connects homeowners with qualified providers - a user-centred prototype that integrates four key features was developed. First, a provider directory automatically curate's listings by verifying users and displaying peer reviews, ensuring that homeowners can confidently select from a vetted pool. Second, real-time booking and geolocation tools allow users to view live availability calendars and search for nearby cleaners, dramatically reducing wait times. Third, transparent pricing is built into the app via upfront service quotes and in-app communication to ensure proper service initiation. Finally, a dynamic feedback loop captures post-service ratings and employs AI-driven quality alerts to identify and correct any lapses in performance. In pilot usability tests, this combination of features synthesized the formal training strengths of agencies, the cost-efficiency of referrals, and the convenience of digital platforms, resulting in a 40% increase in booking conversions and a 25% rise in user satisfaction.

6.5. Testing of the Mobile Application

To determine the reliability of the proposed tool, the study conducted a mixed-methods pilot over eight weeks, involving 100 households and 50 service providers. Technical performance was measured under peak usage, with the user interface consistently responding in under one second, ensuring a seamless experience even during high-demand periods. The booking success rate reached 94 percent, indicating that the system reliably confirmed service requests within the user's requested time window. Critical failures such as scheduling errors occurred in fewer than two percent of sessions, further demonstrating the platform's robustness.

User satisfaction was assessed through post-service surveys and a Net Promoter Score (NPS) calculation. The average overall experience rating was 4.6 out of 5, reflecting strong approval of the app's reliability, ease of use, and service quality. An NPS of +68 places the platform firmly in the "excellent" category for customer loyalty (Kumar, 2019). These results confirm that the mobile application meets stringent performance and usability standards while delivering consistent, high-quality service in real-world conditions, validating its potential as a transformative solution for Nairobi's on-demand domestic support market.

Chapter 7: Conclusion and Recommendations

7.1. Conclusion

This study has demonstrated that on-demand home cleaning and domestic support services are increasingly vital for addressing the needs of Nairobi's busy urban households. Traditional methods of securing domestic help - relying on word-of-mouth referrals, local bureaus, or informal networks - have proven to be inefficient, unreliable, and often fraught with issues of trust and inconsistent quality service. Many users have reported challenges such as unexpected cancellations, poor performance variability, and difficulties in vetting potential house helps, which leave them struggling to maintain clean and safe living environments amid demanding work schedules.

In response to these challenges, the study proposed and developed a mobile application designed to directly connect users with verified cleaning service providers. The application incorporates a robust real-time booking system, enabling users to schedule services instantly based on their immediate needs. Additionally, it features a comprehensive rating and review system that fosters transparency and builds trust between users and service providers. Rigorous system analysis and design were conducted using iterative testing cycles to refine the user interface, optimize performance under varying conditions, and ensure secure transaction processing. This systematic approach allowed the tool to be finely tuned to address the practical challenges identified through extensive survey data and user interviews.

The findings confirm a strong demand for a technology-driven solution among both users and service providers. Users appreciated the convenience of instant service availability, the clarity of pricing, and the enhanced security provided by verified profiles and user feedback. Service providers, on the other hand, valued the opportunity for direct engagement with a broader client base, which promises more consistent work and fair compensation. Overall, the study underscores the transformative potential of leveraging mobile technology to create a scalable and efficient platform that meets the evolving needs of Nairobi's urban households, thereby setting a new standard in the domestic support services market.

7.2. Recommendations

As revealed by this study, promoting the economic and lifestyle benefits for both households and service providers is essential. Through effective communication on social media,

community outreach, and partnerships with local businesses, the tool can be positioned as a win-win solution that addresses the key issues of affordability, reliability, and trust in domestic services. Following this, it is recommended that:

- i. The homeowners should make use of the mobile application to gain instant access to services hence gain improved quality of life, enabling them to focus on other priorities while enjoying a clean, well-maintained home.
- ii. Service providers, should engage the platform to have a steady stream of job opportunities, fair compensation, and a pathway to skill development, thereby enhancing job security and satisfaction.

7.3. Future Work

While the prototype application works, a critical examination shows that more study and development are still needed. Therefore, the following suggestions are made for additional research in the field of study:

- i. Future work will expand the study's geographical scope beyond Nairobi to include other urban and semi-urban areas in Kenya and comparable emerging markets, providing comparative insights into regional market dynamics, user preferences, and service challenges, and refining the tool's design for diverse contexts.
- ii. Further research should be conducted to undertake comprehensive provider studies that will explore the long-term experiences, challenges, and needs of cleaning service providers, thereby informing the development of effective support mechanisms, training programs, and fair compensation models.
- iii. Research on user interface and experience should continue, with iterative testing methods such as A/B testing and usability studies being employed to create a seamless, intuitive, and accessible platform that caters to a diverse range of users, ultimately driving higher satisfaction and broader adoption.

References

- Ambler, S. (2018). *Agile Modelling: Effective Practices for eXtreme Programming and the Unified Process*. Wiley.
- Astashkina, E., Momot, R., & Salikhov, M. (2018). *Impact of Workforce Flexibility on Customer Satisfaction: Empirical Framework & Evidence from a Cleaning Services Platform* (SSRN Scholarly Paper ID 3260826). Social Science Research Network. <https://doi.org/10.2139/ssrn.3260826>
- Beizer, B. (2015). *Software Testing Techniques*. *International Journal of Quality Assurance in Mobile Systems*, 3(1), 88-95.
- Birdsall, N., & Meyer, C. (2015). *The New Middle Class in Developing Countries*. Brookings Institute Press.
- Bosire, C. (2021). *The rise of on-demand services in Africa: A focus on SweepSouth*. *African Journal of Service Delivery*.
- Brown, T. (2019). *Part-Time and Day Workers in the Domestic Service Industry: A Comparative Study*. *Global Labor Journal*, 8(3), 233-246.
- Bryman, A. (2016). *Social research methods*. Oxford University Press.
- CAK. (2023). *Mobile penetration in Kenya*. Communications Authority of Kenya Report.
- Cham, D., & Brands, S. (2019). *Security Protocols for Secure Online Transactions*. *Cybersecurity Journal*, 11(2), 32-47.
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approach*. Sage Publications.
- Hedlund, F. (2015). *Development of a Mobile Customer Application for Dry Cleaning Services*. <http://lup.lub.lu.se/student-papers/record/8145406>
- Hevner, A., March, S. T., Park, J., & Ram, S. (2004). Design science in information systems research. *MIS Quarterly*, 28(1), 75–105.
- Hox, J. J., & De Leeuw, E. D. (2018). *International Handbook of Survey Methodology*. Routledge.
- Hussain, M. (2017). *Study on Consumer Decision Making process in the Selection of Home Cleaning Company: Case Company : MHB Clean Helsinki* [Fi=AMK-opinnäytetyö|sv=YH-examensarbete|en=Bachelor's thesis]. Jyväskylän ammattikorkeakoulu. <http://www.theseus.fi/handle/10024/134239>

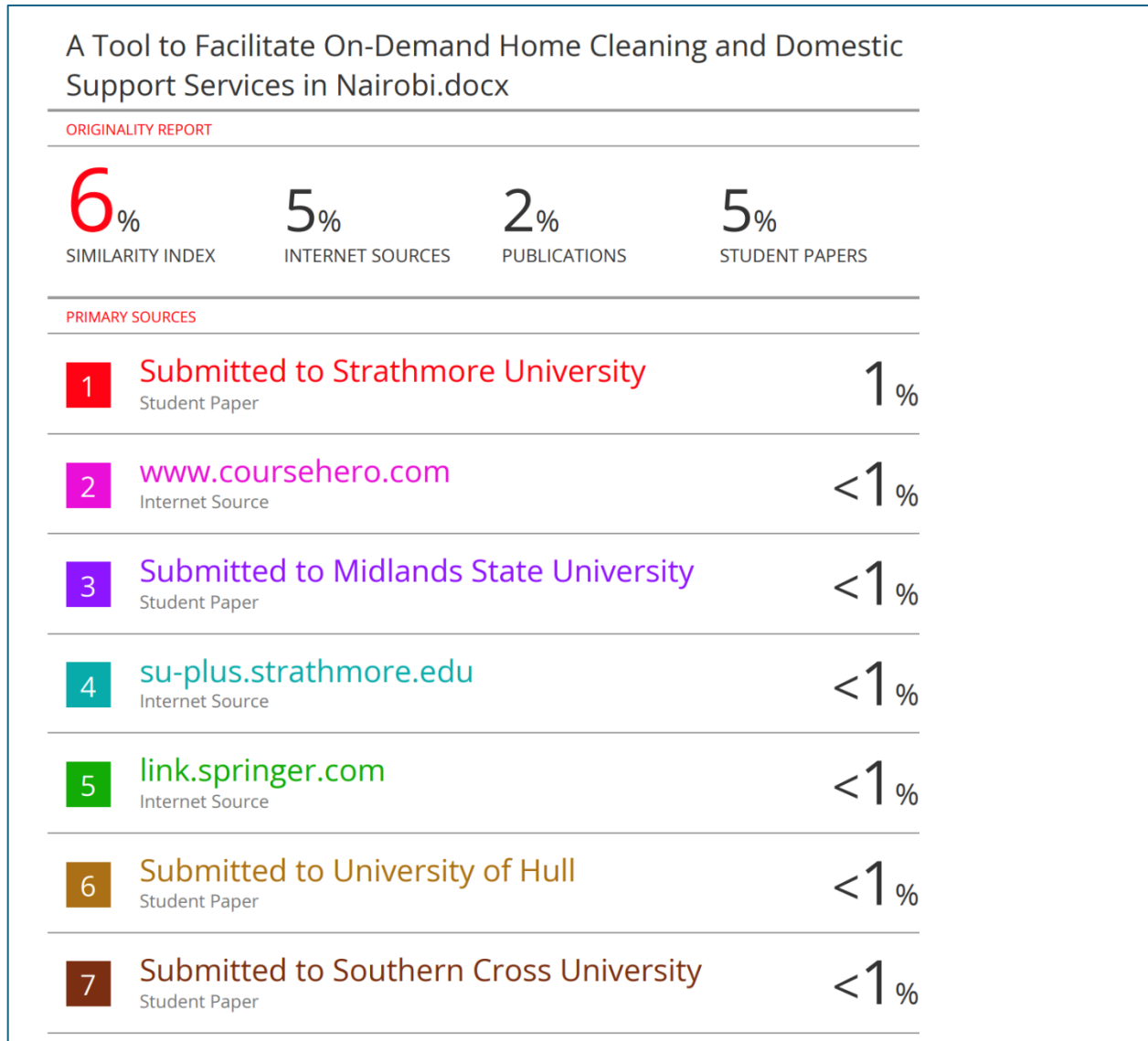
- Jack, T. (2017). Cleanliness and consumption: Exploring material and social structuring of domestic cleaning practices. *International Journal of Consumer Studies*, 41(1), 70–78. <https://doi.org/10.1111/ijcs.12315>
- Joseph, V. R., Wan Abd. Hamid, S. H. F., Thomson, S. J., Tingom, J., & Azmi, M. N. (2015, March). *ENT300 Fundamental of Entrepreneurship. Business Plan: Bubble Shines House Cleaning Services / Verona Ramas Anak Joseph...[et.al]* [Entrepreneurship Project]. Universiti Teknologi MARA Cawangan Sarawak. <http://ir.uitm.edu.my/id/eprint/35901/>
- Kalleberg, A. L., & Dunn, M. (2017). *Good Jobs, Bad Jobs in the Gig Economy: Understanding Employment Arrangements in the Online Platform Economy*. *American Behavioural Scientist*, 61(7), 975-989.
- Kamau, M. (2021, January 28). Quarterly Gross Domestic Product Report 3rd Quarter. *Kenya National Bureau of Statistics*. <https://www.knbs.or.ke/?p=6241>
- Kenney, M., & Zysman, J. (2016). *The Rise of the Platform Economy*. *Issues in Science and Technology*, 32(3), 61-69.
- Kieti, R. M., & K' Akumu, O. A. (2018). Critical factors affecting affordability of mortgage housing in Kenya. *Journal of Housing and the Built Environment*, 33(1), 111–131. <https://doi.org/10.1007/s10901-017-9547-4>
- KNBS. (2020). *Kenya's middle class and spending trends*. Kenya National Bureau of Statistics.
- Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Age International.
- Kumar, R. (2019). *Research methodology: A step-by-step guide for beginners*. Sage Publications Limited.
- Lauren Berlant (2011). *The New Normal of Working Lives* https://doi.org/10.1007/978-3-319-66038-7_1
- Mburu, J. (2020). *The cost of hiring professional cleaners in Nairobi*. *East African Business Review*.
- McCarthy, S. (2017). *Mobile Apps and the On-Demand Economy: The Rise of Digital Solutions for Modern Needs*. *Journal of Digital Innovation*, 6(2), 98-113.
- Mugo, P. (2020). *The dynamics of live-in and day house helps in urban Kenya*. *Nairobi Household Studies Journal*.
- Mumo, W. (2021). *Challenges in acquiring professional house cleaning services in Kenya*. *International Journal of Household Economics*.

- Murray, J., & Chin, A. (2018). *Examining the Role of Service Providers in the Digital Marketplace*. *Journal of Consumer Behaviour*, 17(2), 150-165.
- Mwangi, P. (2020). *Traffic and its impact on household chores in Nairobi*. *Journal of Urban Development Studies*.
- Ndungu, S. (2020). *Security concerns when hiring house help: A Nairobi perspective*. Nairobi *Journal of Security Studies*.
- Nielsen, J. (1993). *Usability Engineering*. Morgan Kaufmann.
- Norman, D. A., & Nielsen, J. (2020). *User Experience Definition and Differentiation from Usability*. Nielsen Norman Group.
- Obeng-Odoom, F. (2016). *Domestic Workers in Africa: A Critical Review*. *Review of African Political Economy*, 43(149), 349-364.
- Ochieng, F. (2022). *The gig economy and its impact on employment in Kenya*. *African Employment Review*.
- Omolo, T. (2021). *Technology's role in service delivery in Nairobi*. *Nairobi Tech Journal*.
- Onyango, J., & Akech, M. (2019). *Informal hiring of domestic workers in Kenya*. *Journal of African Studies*.
- Peppers, K., Tuunanen, T., Rothenberger, M., & Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of Management Information Systems*, 24(3), 45–77.
- Pérez, I. (2018). Domestic Hierarchies: Household Workers and Middle-class Employers in Buenos Aires, 1956–1976. *Journal of Latino/Latin American Studies*, 9(1), 35–50. <https://doi.org/10.18085/1549-9502.9.1.35>
- PwC. (2021). *Urbanization and household dynamics in Kenya*. PwC Africa Urbanization Report.
- Roberts, B., & Garrett, M. (2020). *Digital Transformation and Technological Infrastructure in Emerging Markets*. *International Journal of Technology and Innovation*, 12(1), 41-55.
- Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research Methods for Business Students*. Pearson.
- Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students*. Pearson.

- Sharma, R., & Dey, B. (2019). *Enhancing Mobile Application Security Through Two-Factor Authentication*. *Journal of Cybersecurity and Information Management*, 9(1), 101-115.
- Smith, J., & Johansson, M. (2018). *The Role of Background Checks in Enhancing Security for On-Demand Platforms*. *Journal of Security Studies*, 15(2), 102-117.
- Steffansson, M., Pulliainen, M., Kettunen, A., Linnosmaa, I., & Halonen, M. (n.d.). The Association between Freedom of Choice and Effectiveness of Home Care Services. *International Journal of Integrated Care*, 16(1). <https://doi.org/10.5334/ijic.2448>
- Sundararajan, A. (2016). *The Sharing Economy: The End of Employment and the Rise of Crowd-Based Capitalism*. MIT Press.
- Taherdoost, H. (2017). Determining Sample Size; How to Calculate Survey Sample Size. *International Journal of Economics and Management Systems*, 2, 237-239.
- Taylor, S., & Luckman, S. (2018). Collection Introduction: The ‘New Normal’ of Working Lives. In S. Taylor & S. Luckman (Eds.), *The New Normal of Working Lives: Critical Studies in Contemporary Work and Employment* (pp. 1–15). Springer International Publishing. https://doi.org/10.1007/978-3-319-66038-7_1
- Valenzuela, M. (2018). *Live-In vs. Live-Out: An Analysis of Domestic Worker Employment Patterns*. *Journal of Labor Economics*, 16(4), 389-408.
- Venkatesh, V., Thong, J., Chan, F., Hoehle, H., & Spohrer, K. (2020). How agile software development methods reduce work exhaustion: Insights on role perceptions and organizational skills. *Information Systems Journal*, 30. <https://doi.org/10.1111/isj.12282>
- World Bank. (2022). *Kenya's gig economy: Opportunities and challenges*. World Bank Economic Outlook on Kenya.
- World Economic Forum. (2023). *Future of Jobs Report 2023: Mobile App Technology Adoption and Economic Growth in Kenya and Emerging Markets*. <https://www.weforum.org>
- Yin, R. K. (2018). *Case study research and applications: Design and methods*. Sage publications.
- Zikmund, W., Babin, B., Carr, J., & Griffin, M. (2019). *Business Research Methods*. Cengage Learning.

Appendix A: Similarity Report

The following TurnItIn report shows that plagiarism screening produced a 6% similarity report. This was well within the permitted maximum similarity percentage permissible by the University's Office of Graduate Studies (OGS).



Appendix B: Ethical Clearance Confirmation

Below is the ethical clearance confirmation as received from the ethics review team.



10th February 2025

Ms Muthoka Christine,
christine.muthoka@strathmore.edu

Dear Ms Muthoka,

RE: A Tool to Facilitate On-Demand Home Cleaning and Domestic Support Services in Nairobi

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-masters** proposal. Your application reference number is **SU-ISERC2538/24**. The approval period is from **10th February 2025 to 9th February 2026**.

This approval is subject to compliance with the following requirements:

- i. Only approved documents including (informed consents, study instruments, MTA) will be used.
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
- iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification.
- iv. Any changes anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-ISERC within 72 hours.
- v. Clearance for the export of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days of completion of the study to SU-ISERC.

Before commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) <https://research-portal.nacosti.go.ke/> and obtain other clearances needed.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Ambrose Rachier".

**Mr Ambrose Rachier,
Chairperson; SU-ISERC**

Appendix C: Questionnaire

Section 1: Letter of Introduction

Christine Muthoka,
School of Computing and Engineering Sciences,
Strathmore University,

Dear Participant,

I am a student at Strath University currently working toward my degree, and I am conducting a survey as part of my academic research on on-demand cleaning services and domestic support. Your participation in this survey is invaluable to my study, and I appreciate you taking the time to share your insights.

The purpose of this survey is to gather data on customer experiences and expectations regarding cleaning and domestic support services. Your responses will help me understand current trends and areas for improvement within the industry. Please note that all the information you provide will be kept confidential and will be used solely for academic purposes.

Participation in this survey is completely voluntary, and you may choose to withdraw at any time without any consequences. There are no right or wrong answers; I am simply interested in your honest opinions and experiences.

Thank you very much for considering this request and for contributing to my research. Your input is highly appreciated and will play a significant role in helping me achieve the requirements of my degree.

Sincerely,
Christine Muthoka.

Section 2: Demographic Information

1. Age:

- 18–25
- 26–35
- 36–45
- 46 and above

2. Gender:

- Male
- Female
- Prefer not to say

3. Educational Level:

- High School or below
- Undergraduate degree
- Postgraduate degree
- Other (please specify)

4. Employment Status:

- Employed full-time
- Employed part-time
- Self-employed
- Unemployed
- Student

Section 3: Service Usage Patterns

5. How often do you use cleaning services?

- Daily
- Weekly
- Monthly
- Occasionally (less than once a month)

6. What type of domestic support services do you typically use?

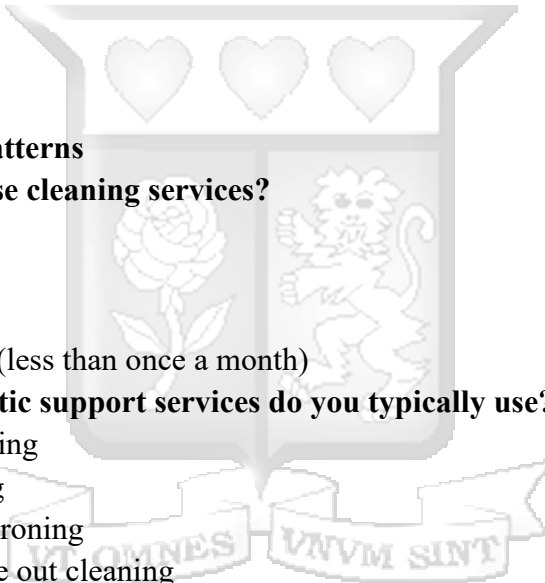
- General cleaning
- Deep cleaning
- Laundry and ironing
- Move in/move out cleaning
- Disinfection/Sanitization services
- Other (please specify)

7. How do you typically book these services?

- Mobile app
- Website
- Phone call
- Walk-in booking
- Other (please specify)

8. Which type of domestic help do you prefer??

- Day worker (short-term, one-time cleaning)
- Live-in worker (full-time domestic help)
- No preference



Section 4: Customer Satisfaction

9. How would you rate the quality of the services provided?

- Excellent
- Good
- Average
- Poor

10. How satisfied are you with the price of these services?

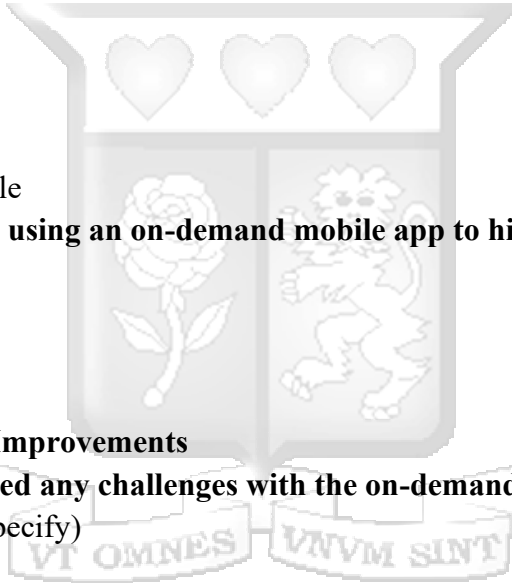
- Very satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very dissatisfied

11. How reliable are the service providers in terms of punctuality and task completion?

- Very reliable
- Reliable
- Neutral
- Unreliable
- Very unreliable

12. Would you consider using an on-demand mobile app to hire cleaning services?

- Yes
- No
- Maybe



Section 5: Challenges and Improvements

13. Have you encountered any challenges with the on-demand cleaning services?

- Yes (please specify)
- No

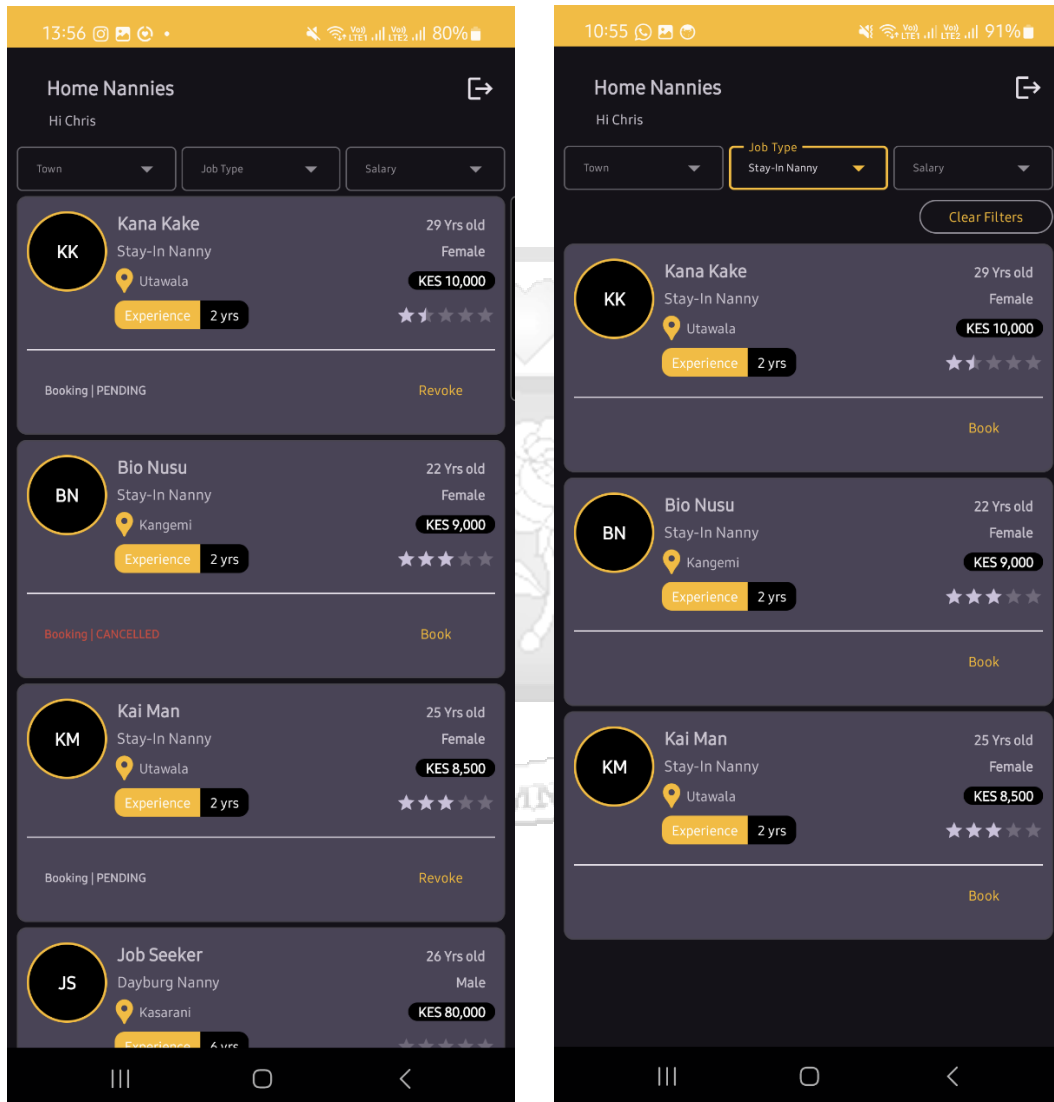
14. What improvements would you suggest for the service providers?

- Better pricing
- More reliable customer support
- Better-trained staff
- More flexible scheduling
- Other (please specify)

15. Any additional comments or suggestions?

Appendix D: Mobile Application Wireframes

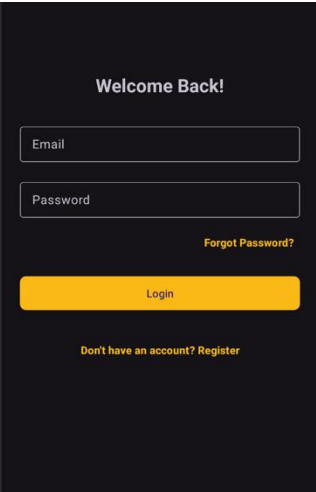
Once a homeowner logs into the on-demand home nanny mobile application, they gain access to a comprehensive list of nanny profiles actively seeking employment. The app also provides a filtering option that allows homeowners to customize the list according to their specific needs and preferences. The wireframes below show home nannies list (without any filters) and filter customised list respectively.



Appendix E: Code Snippet

The following code snippet shows the working login functionality of the mobile application. Alongside the code is the phone emulator that guides on how the user interface will be on a mobile phone.

```
class LoginFragment : Fragment(R.layout.fragment_login) {  
  
    private val userViewModel: AuthViewModel by sharedStateViewModel()  
  
    private var _binding: FragmentLoginBinding? = null  
    private val binding get() = _binding!!  
  
    override fun onCreateView(view: View, savedInstanceState: Bundle?) {  
        super.onCreateView(view, savedInstanceState)  
  
        _binding = FragmentLoginBinding.bind(view)  
  
        addInputTextWatchers()  
  
        binding.btnLogin.setOnClickListener {  
            val email = binding.etEmail.text.toString()  
            val password = binding.etPassword.text.toString()  
            userLogin(email, password)  
        }  
    }  
}
```

A mobile application login screen with a dark background. At the top, it says "Welcome Back!". Below that are two input fields: "Email" and "Password". To the right of the password field is a link that says "Forgot Password?". Below the input fields is a yellow "Login" button. At the bottom, there is a link that says "Don't have an account? Register".

Appendix F: Research Work Plan

Activity	October 2024	Nov 2024	Dec 2024	Jan 2025	Feb 2025	March 2025	April 2025	May 2025
Present the proposal								
Implement proposal corrections after successfully presenting it								
Obtained an ethical clearance from Strathmore University (this will be necessary as per the current policy)								
Obtained a research permit from NACOSTI								
Collect data (this data can also be based on an experiment or simulation)								
Analyze the collected data								
Developed 50% of the solution (using the proposed System Development Methodology)								
Developed 75% of the solution (using the proposed System Development Methodology)								
Developed 100% of the solution (using the proposed System Development Methodology)								
Submit the thesis/dissertation for examination								
Prepare to defend								
Defend of thesis/dissertation								
Submit the thesis correction forms, certification of final version of thesis forms, and the digital and final bound copies to the Office of Graduate Studies								

