Hina Khan (2400304)

Exploring Monetization Options for a Digital Platform offering a Gamified Solution on Climate-Wise Housing

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Author: Hina Khan (2400304)
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ABSTRACT:

Climate change is one of the major concerns in the present era and gamified digital platforms are considered as a promising approach to increase engagement and adoption of sustainable measures among citizens. This study is based on a gamified digital platform that offers climate-wise housing solutions and explores effective monetization strategies for a gamified digital platform and how different monetization strategies affect user willingness to pay and their engagement towards a monetized gamified platform that offers climate-wise housing solutions.

This study was carried out in Helsinki and Vaasa in Finland and among homeowners of detached houses who make their own decisions about home maintenance and energy consumption. This study followed a purposive sampling approach for data collection and in total 12 homeowners were approached and interviewed through semi-structured interviews. Through abductive thematic analysis and with the help of the Technology Acceptance Model and Innovation Diffusion Theory, this study explores users' willingness to pay and their engagement towards the monetized version of a gamified digital platform that offers climate-wise housing solutions. Themes were developed by using NVivo 15 and by considering factors such as risk, value, ease, usefulness, intention to use, relative advantage, compatibility, complexity, trialability, and observability.

The findings of this study suggest that value for money and usefulness of the platform is a central part of acceptance of monetization strategies and users are willing to pay for the digital platform when it provides enough value. Moreover, users require clear prices and show concerns about data sharing. The results also showed environmental and social alignments of the monetized version of the platform. Furthermore, participants are interested in freemium, monthly subscriptions, advertising, and strongly reject Pay-Per-Use model. Participants also accepted and focused highly on free trials and peer influence. The study concludes that effective monetization strategies in sustainability-oriented platforms need transparent and clear approaches for user engagement and their willingness to pay. The study has practical implications for developers and providers of monetized sustainability platforms. It proposes that monetization should be based on provable value that paid content should deliver valuable information in contrast to free versions. Moreover, the study is also a beneficial addition to the literature of gamification and monetization of digital platforms.

KEYWORDS: Gamification, platform monetization, monetization strategies, digital platform, climate-wise housing.

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Abbreviations

IDT: Innovation Diffusion Theory

TAM: Technology Acceptance Model

PU: Perceived usefulness

PEOU: Perceived ease of use

WTP: Willingness to pay

PWA: Progressive web applications

1 Introduction

1.1 Background of the research

Climate change and environmental damage have become a prominent concern in current societies. There is a crucial requirement of sustainable housing as housing and construction hold 30-40% of energy usage and carbon emissions (Nielsen & Farrelly, 2019; Shahzad et al., 2023). Moreover, with global challenges and lack of resources, innovative strategies are required for behavioral change. To adopt developed solutions and strategies for these concerns, engagement of citizens with climate-related changes and knowledge is very important for driving sustainability (Galeote et al., 2021). One of the strategies is to increase user engagement through gamification, which is combining game elements in a non-game context (Deterding et al., 2011). Features of games help in transforming passive learning into active participation through motivation (Koivisto & Hamari, 2019), social interaction (Powell & Kalina, 2009), and immediate feedback (Plass et al., 2015). In this regard, gamification results in user engagement, as it brings gamified and motivational elements into digital platforms (Flood et al., 2018; Hamari et al., 2016; Koivisto & Hamari, 2019).

In parallel, the development of digital technologies has produced a collaborative foundation where one can exchange information through digital platforms (Schilirò, 2023). A widely used definition of digital platforms is multi-sided platforms which facilitate direct transactions between different groups of consumers (Gawer & Cusumano, 2014; Schilirò, 2023). Digital platforms are at the heart of innovation, and digitalization has opened up new revenue opportunities by integrating digital technologies (Mohammadi Begum, 2017). Moreover, innovative businesses are vigorously emerging areas in present era and with increasing awareness and competition among business communities the selection of the correct monetization strategy for digital platforms is very essential (Golmgrein, 2023). It is also important for a project or business continuation because overall progress is not only limited to generating revenue, but they also need to ensure that they can operate and grow continuously (Markopoulos, 2018).

Therefore, considering these opportunities, this study is based on exploring effective monetization strategies for gamified digital platforms that offer sustainable solutions for climate-wise housing. This study also explores user willingness to pay (WTP) and the effect of monetization strategies on user engagement by forming a comprehensive framework to support the design of financially sustainable and user-centered gamified platforms for climate-wise housing.

1.2 Research gaps

In recent years, discussions about climate-wise housing, digital platforms, and gamification have gained visible consideration. Moreover, interactive methods and innovation play an important role in adopting sustainability in everyday life, and the use of digital technologies (such as mobile application) has gained the attention of practitioners and scholars (Brauer et al., 2016; Ouariachi et al., 2020). Previous studies related to digital platforms which offers sustainability solutions have focused on how platforms and gamification can promote pro-environmental behavior (Ixmeier & Kranz, 2024) and citizenship behavior (Dárco & Marino, 2022). However, these studies only focus on how sustainability offering digital platforms affect behavioral outcomes with less attention given to explaining how these systems can be financially sustained through monetization strategies.

Since digital platforms have played an important role in promoting sustainable behavioral change, at the same time gamification in digital platforms is gaining consideration as well nowadays. Gamification includes game elements such as challenges, rewards, and leaderboards for enhancing motivation and user engagement (Deterding et al., 2011). Gamification is also used to help people learn, particularly the topics of climate, energy saving, transport, waste, and water management (Douglas & Brauer, 2021). Another study describes how game-based technologies are being used to address climate action and challenges, improve environmental literacy, and promote user reflection (Galeote et al., 2021). Previously, gamification was explored in the

perspective of engagement, education, and sustainability; however, the exploration of gamification in the domain of climate-wise housing and its monetization leaves a critical void in the literature.

A central concern that arises from this discussion is monetization. Recent studies have extensively focused on the monetization of digital platforms and especially on mobile games (Denoo et al., 2023; Markopoulos et al., 2020). However, there is a lack of discussion related to digital platforms that use gamification in the context of climate-wise housing. Existing studies explain various monetization strategies such as freemium (Ascarza et al., 2025), subscriptions (Markopoulos, 2018), data monetization (Bataineh et al., 2020), and ad-based strategies (Appel et al., 2020). The main objective of these models is to optimize commercial and financial success. Some digital platforms depends on project grants and they lack monetization models and revenue streams (Kitchin et al., 2015; Otis, 2023). Therefore, this creates a gap in understanding which monetization model or strategy is suitable for our case of a gamified digital platform that can offer climate-wise housing.

Additionally, users' willingness to pay for a gamified platform has also been studied previously in the literature. For example, Punwatkar & Verghese (2025) explored user buying behavior in gamified digital platforms and explains how gamification increases user engagement but their research is based on retail and e-commerce platforms. In value-driven areas such as environmental sustainability, climate resilience, and housing maintenance, exploration of WTP remains sparse. In such digital platforms, gamification may increase the awareness and behavior of users, but it is unclear whether it can transform into financial commitment. This gap presents a challenge for developers as well, who design monetization models for achieving sustainable goals. Without insights into users' WTP for climate-wise housing and gamification platforms, designers can risk engagement with users and their actual spending behavior.

Lastly, existing studies emphasize on entertainment or transactional digital platforms in which monetization, engagement, and rewards systems are studied together significantly. For example,

a recent study describes that personalized settings in freemium games significantly increase user engagement and long-term spending by enhancing user progression and satisfaction (Ascarza et al., 2025). Similarly, hybrid reward systems such as game incentives like badges and levels, and financial rewards like coupons and discounts have increased user engagement in digital platforms (Paschmann et al., 2025). Also, in order to maintain user engagement, gamified platforms in educational settings use peer interaction, notification systems, and achievement loops (Osipov et al., 2015). Since gamification is widely studied to help enhance engagement in commercial and educational contexts and their engagement towards monetized or paid gamified digital platforms offering sustainable solutions is still unidentified. Therefore, we need more understanding regarding monetization strategies for improving user engagement in digital gamified platforms that offer climate-wise housing solutions.

In summary, since gamified digital platforms are effective for supporting value-based sustainable solutions, the literature lacks a comprehensive understanding of how these platforms can be monetized. There is scarce research on monetization strategies for such platforms, limited knowledge about user WTP, and few insights on how monetization strategies affect user engagement in this unique context. These gaps create limitations in both theoretical and practical implementations and provoke the exploration of the current study that is based on monetization strategies for gamified climate-wise housing digital platforms, user WTP, and the influence of monetization approaches on user engagement.

1.3 Research problems, objectives, and questions

Problem statement

Gamification has emerged as an effective solution in the health, education, and energy sectors for engagement and encouraging positive behaviors (Johnson et al., 2016; Li et al., 2024; Smiderle et al., 2020). There is a prominent and growing interest in the usage of digital platforms for promoting sustainable and environmental solutions, especially as communities and governments

seek to reduce the impact of emissions through behavioral changes. Generally, sustainability offering digital platforms developed for sustainability information are short-term projects and are based on limited-duration grants or research funding (Kanninen et al., 2024). Therefore, their long-term engagement remains constrained without viable strategies for sustaining these digital platforms.

Therefore, the above discussion illustrates that there is a significant challenge for gamified digital platforms offering sustainable solutions because such platforms should also achieve financial achievements and maintain the engagement of users as well. While there are many monetization models for digital platforms but their suitability in the case of value-based platforms such as climate-wise housing remains unclear. Moreover, users' willingness to pay for such digital platforms and how monetization strategies influence user engagement are also scarce in the literature. Without exploring these questions, developers and stakeholders can face uncertainty while designing suitable monetization strategies for the platforms.

Therefore, based on above discussions, the following objectives are proposed:

1. To explore different monetization strategies for digital platforms that offer gamified solutions for climate-wise housing.
2. To understand how monetization influences user engagement in a monetized digital platform offering gamified solutions.
3. To explore user willingness to pay for a monetized digital platform offering gamified solutions.

This study aims to investigate:

1. What are the effective monetization strategies for a gamified digital platform offering climate-wise housing solutions?
2. How do different monetization strategies affect user willingness to pay and engagement towards a monetized gamified digital platform offering climate-wise housing solutions?

This study is based on three main objectives, which are identifying monetization strategies for digital platforms offering climate-wise housing solutions, understanding user willingness to pay, and evaluating user engagement towards monetization strategies. Through the results of these insights, this study will contribute to the growing field of sustainability-driven platforms and digital engagement. It will also offer insights for policymakers, developers, and entrepreneurs, especially those who are investigating and seeking to drive users' engagement in climate-wise housing.

1.4 Research design and contribution

This study aims to develop an understanding of establishing effective monetization strategies while focusing on users' perspectives. The study also explores different monetization strategies and their influence on users' engagement and their WTP through qualitative inquiry. The framework for this purpose is developed on the theoretical perspectives of the Technology Acceptance Model (TAM) and Innovation Diffusion Theory (IDT), which offer relevant frameworks for exploring user adoption and engagement of digital platforms. This study was performed on a limited users who were given information about the specifications of a digital platform offering climate-wise housing solutions and who own detached houses in Helsinki and Vaasa in Finland. Semi-structured interviews are used to investigate the study which provides a detailed understanding of users' preferences. The analysis is carried out using thematic coding aligned with theoretical principles, and the exploration provides a deeper understanding of users' attitudes towards a sustainability-driven digital platform.

The findings of this dissertation are a valuable contribution to the literature of gamification, digital platforms, platform monetization, climate-wise housing and user WTP. Moreover, this study makes theoretical contribution to Technology Acceptance Model and Innovation Diffusion Theory within domain of monetized and gamified digital platforms. The study addresses a prominent gap by exploring how monetization can be applied to gamified and monetized platforms that offer sustainable solutions. The study also helps digital platform designers, sustainability experts, and

organizations that are interested in introducing digital platforms offering gamified sustainable solutions. The insights also help to form monetization models that allow digital platforms to grow without compromising the trust or motivation of users. The findings are also helpful for business startups and educational purposes that focus on value-based platforms.

1.5 Structure of the Study

This dissertation consists of six chapters. The first chapter starts with the background of the research and research gaps. It also includes research objectives and research questions of the study. Moreover, this chapter addresses the research design and procedure involved in the exploration of the study. The next chapter includes a theoretical background, including main theories and literature. It examines prior work in each field, considering gaps that this study aims to address. The third chapter presents methodology of the study which includes the procedures and methods, as well as design adopted in this study. Moreover, the relevance, selection of methods, and quality are significant parts of this section. The fourth section presents the analysis and results of the study, where key themes are presented based on interviews. The fifth chapter included discussion and implications of the study. It describes a theoretical contribution by addressing each research question through the lens of selected theories and relevant literature. Furthermore, this section is followed by implications, limitations, and future directions. Finally, the last section summarizes the study by presenting main conclusions and findings of the study.

2 Literature Review

2.1 Conceptual Foundations of Climate-Wise Housing

Climate change is known to be one of the most prominent threats which affects the environment and societies (Poushter & Huang, 2019). Previous research and scientific assessments highlight that climate change increases risks of heavy rainfall, harsh temperatures, and droughts (IPCC, 2018). Therefore, many legislative bodies and governments have declared a climate emergency as a sign of need for mobilization of policy action and resources ("Climate Emergency Declarations," 2020). Even if this top-down initiatives are significant, scholars suggest that in order to control climate-change bottom-up engagement from citizens is also required, which can be achieved by reducing carbon emissions and conserving energy (Hart & Feldman, 2016).

Existing studies show that the awareness of positive actions among citizens towards climate change is significantly increasing (Valkengoed & Steg, 2019). Previous studies were based on information deficit models for communication with citizens regarding climate change were highly encouraged until it was found that knowledge is not enough to direct human behavior (Gifford, 2011; Moser & Dilling, 2011; Whitmarsh et al., 2011). Therefore, scholars emphasize more from "public understanding of science" to "public engagement in science" (Wibeck, 2014). Societal and economic engagement strategies altogether motivate even those citizens who do not believe that climate change can be caused by human actions (Bain et al., 2012). Houses are at the center of climate impact as one-third of carbon emissions directly come from material production and residential usage (Global Status Report, 2021; Lähtinen et al., 2024).

The concept of housing sustainability is associated with the United Nations Sustainable Development Goals (SDGs) that involve safe, sustainable, and resilient settlements (Lähtinen et al., 2024; Winston, 2022). In order to make houses sustainable, environmental friendly practices and solutions are required (Cherry et al., 2015; Lovell, 2004). Pickvance (2009) defines sustainable housing as housing that has fewer effects on the environment and one that adheres to the overall principles of sustainable construction. The housing and construction sectors are increasingly

becoming the focus of residents and the research community, and due to the increasing concerns about sustainability, they are among the key contributors to carbon emissions globally (Berg, 2020; Iyer-Raniga et al., 2021; Jackson & Druckman, 2016; Kääntä et al., 2024; Koteyko, 2012; Scrucca et al., 2023).

In addition to environmental aspects, housing has now been recognized as a fundamental human rights and an important component of social welfare (Ruíz & Mack-Vergara, 2023). Housing is also a crucial phenomenon in urbanization, social inclusion, and economic inclusion (Daude et al., 2017). But the rate of urbanization has increased the burden on cities. The big threats to the quality of life include environmental degradation, inadequate planning, inadequate infrastructure, pollution, and vulnerability to climate change (Bank et al., 2019; UN-Habitat, 2011). This situation constructs the need to create a resilient, adaptive, and sustainable city building and housing system even more urgently. According to experts, the fundamental change should start with the housing that is the most basic unit of urban development (Kääntä et al., 2024; UN-Habitat, 2022).

Researchers have come to the agreement that human activities contribute greatly to climate change. According to the 5th Assessment Report by the IPCC, the greenhouse gas emissions caused by people are the highest in history (IPCC, 2014). Cities supply the majority of the global emissions: in 2020, consumption emissions in cities were approximately 67-72 percent of all global carbon emissions (IPCC, 2021). It is estimated that by 2030, 60 percent of the population in every part of the world will reside in urban places, and 80 percent of that growth will be in the developing nations (Wendel et al., 2012). The impacts of climate are already making people more mobile. For instance, 32.6 million people moved in 2022 due to climate disasters such as heavy floods and storms (IDMC, 2023). These issues suggest that there is a need to make people less vulnerable through the enhancement of houses, and new strategies should be developed for overcoming these issues (Wendel et al., 2012).

2.2 Towards a Gamified Digital Platform for Climate-Wise Housing

Digital technologies have created many opportunities for citizens to engage in activities related to climate change and sustainable homes. For example, according to Wibeck (2014) digital technologies help to support the interaction of immersive environments through 3D visualizations and help individuals to learn and engage with climate change decisions. One of the promising methods to engage users or citizens in these activities is implementing gamification in digital platforms, which is known as adding game components into non-game contexts (Hamari, 2019). Previously, gamification has been employed in a number of fields, such as language applications, the education sector, and the health sector (Koivisto & Hamari, 2019). It is observed that people have shown interest in gamification recently (Li et al., 2024; Punwatkar & Verghese, 2025; Shahzad et al., 2023), but useful or serious games have existed back to centuries (Hilgers, 2012). This tradition has increased significantly in the recent past due to the usage of gamification in areas where individuals tend to lack motivation, which include schools, medical care, and energy conservation (Johnson et al., 2016; Li et al., 2024; Smiderle et al., 2020).

Gamification and simulations in climate studies have a history of nearly forty years (Robinson & Ausubel, 1983) and are being studied a lot in research (Reckien & Eisenack, 2013). The gamification elements focus on a wide variety of learning objectives, including teaching as well as motivating user behaviors (Flood et al., 2018; Rajanen & Rajanen, 2017). Gamification enhances motivation because it builds up interesting experiences that attract the complete attention of a user (Hamari et al., 2016; Koivisto & Hamari, 2019). These experiences fulfill psychological needs of capability and relatedness (Rigby & Ryan, 2011) which subsequently facilitate learning, which is significant in climate action within and outside the game world. Moreover, based on Piaget theories and the broader perspective of learning as a process of accumulating knowledge, learning would occur when individuals incorporate new information in their experiences (Powell & Kalina, 2009).

Gamification also makes users to communicate, collaborate, learn, and perceive concepts (Monroe et al., 2019; Powell & Kalina, 2009). It often consists of social components, such as

playing with others, collaborative work, or dialogue with virtual characters, which makes people feel connected and provides them with a secure environment to investigate the effects of climate (Rigby & Ryan, 2011; Wouters et al., 2013). Gamified elements are important because of pictures and graphics. They provide you with the sense that you are playing and making it look like a reality, allow you to see your progress and simplify the hard environmental data (Flood et al., 2018; O'Neill & Smith, 2014). Good visuals can assist individuals to think and make better decisions (Burch et al., 2010). This is particularly beneficial to individuals who are considering energy-efficient homes, since they require clear and easy information regarding how their homes consume energy and its impacts to the environment.

Various types of games can be considered as gamification, and they can teach physics, engineering, business, and social issues. These games can be frequently employed to assist individuals in acquiring some significant skills and tackling real problems (Ahlqvist & Schlieder, 2018; Kosmadoudi et al., 2013; McGonigal, 2011; Scholten, 2017). Research indicates that gamification is increasing in non-business learning environments and particularly in co-learning settings (Wanick & Bitelo, 2017). It allows designers to get the user feedback quicker (Kirriemuir & Mcfarlane, 2004) and allows users to participate in the creatorship themselves (Khaled & Vasalou, 2014). There are also community and city projects that use gamification, where people involve themselves in planning and making group decisions (Karabinus & Atherton, 2019).

In the last decade, one of the most common practices has been gamification (Deterding et al., 2011; Hamari & Lehdonvirta, 2010; Huotari & Hamari, 2012) in order to retain the user interest and to encourage sustainable behavior and improved performance (Hamari, 2013). The association to these results is the naturally motivating gameful experiences (Hamari et al., 2014; Huotari & Hamari, 2012; Ryan & Deci, 2000). Gamification has emerged as a marketing tool (Zichermann & Cunningham, 2011), and the game-like elements are supposed to be implemented in innovation management by businesses (Gartner, 2011). Many startups are designing their entire service with gamified experiences (such as Codecademy), whereas others assist traditional companies to embrace gamification (such as Badgeville). Due to this upsurge, the academic field

of study has shown an increase, and the literature on gamification is on the steady rise (Hamari et al., 2014).

In summary, gamification is a method of motivating individuals with the use of game elements. It allows individuals to learn, share and receive feedback. Digital platforms that are gamified enable individuals to participate, learn, and receive feedback. and participate. Therefore, gamified digital platforms are highly valuable in climate-oriented digital innovation, as they can allow people to perceive and take action in regard to sustainable housing.

2.3 Monetization Strategies in Digital Platforms

The digital economy has transformed in many ways, and in particular, through monetization and value creation. For example, data sharing has become an increasingly popular method that companies employ to generate new income by selling the insights to other businesses or utilizing the data that they gather to enhance their core products or services (Subramanian, 2025). Ethical and regulatory concerns about this augmentation of monetization through platforms have been raised, which compel companies to balance emerging opportunities, need to safeguard user rights, and data security (Bataineh et al., 2020; Brown et al., 2011; Subramanian, 2025). Monetizing platforms are frequently based on network effects, which implies that a platform gets more productive and valuable the more people use it (Subramanian, 2025). The examples of Amazon and Airbnb demonstrate how numerous sources of revenue exist. They get a profit on payment fees, subscriptions, and additional services, and they attempt to make the users exultant and continue earning money (Parker et al., 2016). These concepts demonstrate why there is a need to find ways to create value on how to monetize the platforms (Subramanian, 2025).

The monetization strategy has been described as the approach through which a company earns money on the value creation by a number of various revenue streams, and their general profitability (Tyrväinen & Karjaluoto, 2024). However, monetization commonly means selling goods or services, it is correspondingly accurate that monetization can be used to refer to

charging of previously free services, imposing a fee on digital features or even trying to monetize assets. The digital sector is characterized by such approaches used by companies like microtransactions, subscriptions, crowdfunding and events to gain an income flow that is not necessarily based on direct product sales (Markopoulos, 2018). Selecting the correct monetization model is thus crucial to financial sustainability and long-term operational sustainability (Subramanian, 2025).

In gamified platforms, the method of monetization must meet user expectations and preferences, and only after that, companies can have a chance to ensure revenue generation (Parker et al., 2016). Thus, companies often gather information on user behavior to find the best model of payment that suits their target audience. For example, mobile gamers usually favor free access to a product and accept microtransactions even if they interfere with gameplay (Markopoulos, 2018). Flack suggested that there is no advantage to the search for universal or "off-the-shelf" templates of monetization strategies; instead, monetization must be specific to the unique characteristics of each product and developer strategy. For companies with solid monetization strategies, profitability can occur through creative mechanisms beyond direct sales of products (Killström, 2024).

Therefore, the above discussion concludes that in our case, for a gamified and sustainable solutions offering platforms, the trick is to develop monetization strategies that maintain the trust of users, provide clear benefits, and keep them engaged. Gamified digital platforms designed to help users to take energy-efficient action, make climate-safe choices, and adopt sustainable home practices should balance strategies with user behavior. To be successful, platforms need to know what users want, be transparent about cost, and provide options that create a better experience for people and the environment.

2.4 Funding Models in Native and Web-Based Applications

Native and web-based applications usually rely on similar funding models, such as subscriptions, freemium, paid downloads, and advertising. However, their technical constraints can vary (Charland & Leroux, 2011). Native apps are distributed through app stores such as Apple App Store and Google Play where the developer must adopt business models supported by the store billing system (i.e. paid apps, in-app purchases, auto renewable subscriptions) and share revenue with the platform owner (Apple Inc, 2025; Google Play, 2025). Apple's own documentation highlights four key options for monetization which are free apps, freemium with in-app purchases, subscriptions, and paid apps, emphasizing that successful apps operate as services which are continually updated to maintain subscribers and paying users (Apple Inc, 2025).

Reports from industry, research, and developers suggest that freemium apps and subscriptions bring more revenue from native mobile apps. Apps that users purchase only once, however, bring small revenue (Dogtiev, 2025). The app design makes these patterns stronger. Native Apps get help from discovery, ratings, and built-in billing, but the revenue has to go through store approval, and the store takes a commission (Charland & Leroux, 2011). In contrast, web applications and Progressive Web Applications (PWAs) are not restricted to app stores and are accessed through web browsers. This allows providers to design a huge variety of ways to get revenue and to handle payments. PWAs are cheaper than native apps as the same web code can run on many devices and revenue can be generated in many ways, like subscription, pay per use, or online ads (Fortunato & Bernardino, 2018). Recent guides claim web apps are often easier to monetized because they can use built-in browser payment tools, as well as link to other payment services, and they can try out new billing methods without having to pay app-store commissions (Crew, 2025; *Mobile App vs Web App*, 2025). But this freedom implies that developers will have to develop and maintain their own billing systems, tax systems, help, and security systems rather than the ones that come built-in with the app store (Charland & Leroux, 2011).

In general, native and web apps can take advantage of the same kinds of monetization methods, as the difference lies in the way they are governed and implemented. Native apps usually earn

through mechanisms set by app stores, such as freemium, subscriptions, and in-app purchases while web apps use similar methods but through their own subscription system, ads, or charging per transaction (Crew, 2025; *Mobile App vs Web App*, 2025). Hybrid and PWAs, on the other hand, run on many platforms, i.e. same service can be used in web and app stores. This allows developers to combine web-based earnings with store-based purchases (Fortunato & Bernardino, 2018; Smutný, 2012).

2.4.1 Rationale for chosen strategies

The monetization strategies used and analyzed in this study (freemium, subscriptions, hard paywalls, pay per use, advertising, referral, rewards, and data-driven models) have been selected because they are frequently applied in native mobile apps as well as on web-based platforms. This makes them technically relevant, whether the platform is a mobile app, website, or PWA. The freemium and subscription models are the most common in the app stores and web-based ecosystems and they allows platforms to earn through continuous subscriptions or premium tier options (Apple Inc, 2025; Dogtiev, 2025; Nair et al., 2023). In case of pay-per-use model, it attracts serious users and lowers the entry for occasional users, and this model can also be used in all mentioned ecosystems (Bocken et al., 2018; Weinman, 2018a). Moreover, both hard paywalls and subscriptions can be configured using app stores and web ecosystems (Apple Inc, 2025; Fortunato & Bernardino, 2018; Mobile App vs Web App, 2025). Referrals, bonuses, and rewards are also effective in any channel and help to keep users engaged and increase the number of users (Dogtiev, 2025; Hamari, 2017).

Furthermore, advertising-based monetization and data-driven monetization are included because they also work on many different platform ecosystems. Contextual advertising helps in revenue generation through both app stores and web applications. Research has shown that advertisements that are relevant to the content get more clicks and are accepted easily (Fan & Chang, 2010; Wu et al., 2013). Data-driven monetization, via anonymized and aggregated data on consumption, is technically platform-agnostic and in line with public-sector interest regarding

energy planning and sustainability (Wixom & Ross, 2017). Overall, the choice of monetization models that work effectively on both a native and a web ecosystem ensures that the platform is technologically flexible and supports financial sustainability, user engagement, and the overall goal of enabling climate-wise housing behavior.

2.5 Monetization Models

2.5.1 Freemium

Digital platforms have changed the way companies generate revenue, and freemium models are among the best ways to accomplish that while still allowing enough people to use the service. Freemium is the model in which some services are free and revenue is generated from paid extras. This notion began back in the 1980s (Hamari et al., 2020; Wagner et al., 2014). Since then, it is used by many online services, including music played on Spotify, cloud storage, games such as Pokémon Go, and networking sites such as LinkedIn (Hamari et al., 2019; Trenz et al., 2019; Vock et al., 2013; Wagner et al., 2014). The strength of the freemium model is that it can attract many users without spending on high marketing expenses, and thus allows companies to convert some free users to paying users (Kumar, 2014). But the model is highly reliant upon the effectiveness of premium conversions. If the free part is limiting or not valuable, people resist to upgrade (Gu et al., 2018).

Gamification factors in freemium can increase WTP in some cases (Mantymaki et al., 2020; Mantymaki & Salo, 2013) but reduce it in others (Hamari, 2015; Hamari et al., 2020). Social benefits are also mixed (Hamari, 2015; Mantymaki & Salo, 2013). These differences indicate that we must know which kinds of value are most significant in freemium settings especially when designing free levels which lead to premium levels (Tyrvainen & Karjaluoto, 2024). Studies on user engagement in freemium settings is visibly based on value perceptions. In the literature of freemium strategy, researchers suggest that things that are valuable, fair, and in which users are emotionally attached are the factors on which users make a decision whether they will pay or

not. In some cases addictive patterns are also being observed. For example in case of freemium purchases in mobile games (Subramanian, 2025).

In summary, the key to success for freemium is to offer enough value in the free version to attract people and to make the premium features sufficiently better to give them a valuable, useful, or enjoyable platform. As the literature suggests that conversion of users is increased by having better usefulness, emotional engagement, or social relevance through premium tools (Hamari, 2015; Hamari et al., 2020; Mäntymäki & Salo, 2013).

2.5.2 Subscriptions

The subscription model is one of the widely used strategies in the digital economy. It allows users to pay on a regular basis for content, products or services. This is giving creators and companies a steady revenue (Koppovich, 2015). Subscriptions are best used with products or services that require regular updates, such as education, software, entertainment, or utilities. Good subscription services require good quality products or services to retain users. Through the example of Spotify, we can understand how a subscription works. Spotify has different plans and offers ad-free music, offline access, and better sound which helps to make revenue stable and grow users. But creating high quality subscriptions is very expensive in terms of investment and advertising, and it requires planning in order to keep them running (Golmgrein, 2023).

Subscription model is a method that charges customers or users for ongoing access to a product or a service rather than a complete purchase. This change from one-time sales to recurring revenues allows for the relationship with customers over time as well as helps foster brand loyalty (Stefan, 2014). Subscription models are therefore effective for use in cases where continuous engagement is paramount and the tracking of users who are subscribed or unsubscribed is needed. Their financial strength is gained from giving organizations the "almost constant flow of income", particularly when the subscription price can be low enough for users to hesitate to cancel their subscription or possibly forget about it in the first place (Killström, 2024; Tassi,

2014). However, higher priced services for example in fitness centers or print magazines, faster cancelations is observed when users consider the fee too burdensome (DellaVigna & Malmendier, 2006).

For the digital platforms, subscription strategies put the platform itself at the center of transactional relationships. Users pay to access the entire platform, meaning that the features of the platform have direct effects on user perceptions, user engagement and decision on continued subscriptions (Aral & Dhillon, 2020; Shivendu & Zhang, 2020). Along with subscribing strategies, advertising is one of the most common monetization mechanisms. Platforms like Google and Facebook use a lot of user data in order to provide relevant advertisements. Researchers suggest that subscriptions provide steady revenue, create better customer loyalty, and create opportunities to make hybrid models along with other strategies such as the freemium model (Subramanian, 2025). But as the market becomes crowded, customers are tired of a lot of subscriptions. Sustaining users requires giving them valuable products or services and numerous purchase options (Brij, 2025).

Subscription services are beneficial for companies in numerous ways. It generates predictable income for companies, helps in customer engagement, and offers lower customer acquisition costs. Companies can personalize their offerings and develop new features with the help of information about user preferences and user behavior. Subscription models also help with constant engagement through building loyalty over the long term (Roy & Ortiz, 2023). It also offers bundled pricing, ease of budgeting and automated payments, availability of exclusive content, ease of regular service delivery, and the capacity to use products without ownership costs. Besides these advantages, subscription models also help to ensure that you always have access to updated versions and improved features (Nair et al., 2023).

Even though in many aspects people use subscriptions, there are problems when there are too many subscriptions. Too many subscriptions can be overwhelming for people and can lead them to get tired of paying. Customers look at new content, price, quality, and other choices to judge

the value. They want group discounts, longer access, and easier bills (Chandra, 2025). In order to be successful, companies must provide personalized marketing, fair prices, and value all the time. Those which match what the users want and maintain good quality to keep their subscribers.

2.5.3 Monthly vs. Yearly Subscription Preferences

Subscription models are essentially based on the temporal framing, in which consumers consider possible benefit and cost over varying periods of time depending on the way the payment plan is organized (Basu & Ng, 2021; Gourville, 2003). These temporal frames are usually for two types, which are monthly (periodic) and yearly (aggregated) payments. It is observed that even if monthly and yearly plans are economically equivalent, for example, ten dollars per month and 120 dollars per year, they can still have a great impact on user choice (Basu & Ng, 2021; Johnson et al., 2012; Minguez & Sese, 2023). Previous studies suggest that monthly subscriptions are successful when users' focus is towards perceived costs because they think that monthly payments do not put a burden on them (Atlas & Bartels, 2018; Hershfield et al., 2020). However, annual subscriptions are successful in cases when users prefer perceived benefits and perceive the yearly plan to be more economical or convenient (Burson et al., 2009; Goldstein et al., 2016).

Choices and financial factors of users play a prominent role in decision-making and users prefer monthly subscriptions rather than going for yearly payments (Roy & Ortiz, 2023). Studies reveal that pricing reinforces the importance of the availability of monthly and annual plans because users favor to split their expenses evenly and prefer flexibility. For instance, a study showed that participants were equally favorable between monthly and annual subscriptions which means users place value on having a choice in how they deal with recurring payments (Jagani & Raj, 2025).

Besides the significance of subscription models, it can also cause subscription fatigue due to its complexity. A study on consumer behavior in Helsinki and Hanoi shows that even when subscriptions are easy to use, their usage over time can cause emotional strain and financial stress

(Nguyen, 2025). Few studies of behavioral economics reveal that users face difficulties with commitment to subscriptions and sometimes act impulsively by having too many services and by cancelling them abruptly (S. S. Iyengar & Lepper, 2000). Users also tend to value the loss of money on recurring charges more than the benefits they gain, which leads to irrational decision-making and unbalanced financial discipline (Nguyen, 2025).

Additional studies regarding loyalty systems that are based on subscription show that economic values significantly influence the purchasing behavior as compared to the psychological and interactional values, which influence them with a lesser intensity. The tendency to look for gains such as rewards is highly prevalent among users, so it is important to make sure to use pricing strategies and timing of rewards during the development of subscriptions (Anjaria & Patel, 2025). The price sensitivity is a major aspect when making a subscription choice. A study on Netflix as an annual subscription reported that the perceived value serves as the major driver to subscription intent, and marketers, therefore, need to maximize pricing systems and offer stable quality of service as it encourages to subscribe and renew (Srivastava et al., 2025).

The platforms should use value effectively to reduce subscription fatigue, keep the prices transparent, and offer meaningful features that can encourage and engage users (Nguyen, 2025). In this way, the subscription models will help to reaffirm the users in their sense of control, perceived value, and financial comfort, which is critical to the successful monetization of climate-wise gamified platforms. In the case of a gamified platform that offers climate-wise housing solutions, monthly and annual payments is not just about pricing decisions; it have a direct impact on the user trust and adoption. Monthly payments are likely to be attractive to those customers who choose flexibility, less financial risk, and short-term requirements. In particular, house owners could be uncertain whether to spend in the long run. Annual subscriptions, however, appeal to those who choose them due to cost savings and need engagement with advanced features, such as renovation advice, estimation of costs, and maintenance planning (in case of the selected gamified platform for this study.

2.5.4 Hard paywall

Digital paywalls have become a key mechanism to monetize online content as advertising revenues have proven volatile and insufficient for many traditional platforms. The move of users to digital media has diminished WTP, so paywalls have become a route for firms to explore direct revenue of monetization in addition to revenue generated through advertising (Thompson, 2013). At the same time, content providers are looking for stable revenue streams and they limit access through digital paywalls, as the margins for online advertising are small and competition from aggregators and social platforms has become fierce (Russell et al., 2020).

Paywalls are usually differentiated by the amount of free access they allow before requiring an individual to pay for some service or access. A hard paywall is a monetization strategy where users cannot access content on a digital platform or only with the purchase of a subscription, while soft paywalls have free access or a restricted amount of time before the subscription is required (Carson, 2015; Papadopoulos et al., 2020). In case of large measurements when measuring more than thousand digital platforms (particularly websites), Papadopoulos et al. (2020) report that about 15.7% of paywalled platforms use a hard paywall strategy, in which visitors are not allowed to access for free, while others use a soft paywall system prior to triggering the payment (Papadopoulos et al., 2020). In practical reasoning, a hard paywall therefore equates to a "no free trial" configuration, which means that users have to subscribe without being able to try out the service.

Previous literature reveals that digital platforms that offer heavily restricted access can decrease platform traffic and engagement. In a study by Pattabhiramaiah et al. (2018), it is noted that the number of users decreased when a hard paywall was added. It was also observed that users spent less time on the platform that can challenge the goal of user engagement through paywalls. They also reported that The Times faced a traffic drop of around 90% after setting up a hard paywall and. But at the same time, positive effects were also seen in the revenue generation through hard pay walls that offset these user losses. Pattabhiramaiah et al. (2018) indicates that the New York Times quickly gained more than 500,000 digital subscribers within eighteen months of the

introduction of a hard paywall, proving a significant new source of subscription revenue. From a business model point of view, paywall settings must be able to balance revenue generation from direct sales against lowered viewership, since setting charges for online content can help reduce traffic and decrease revenue (Russell et al., 2020).

Therefore, for monetized gamified climate-wise housing platforms, a hard paywall integration would resemble above mentioned media configurations. While literature suggests that a hard paywall can increase revenue only from users who are highly motivated, it can also reduce overall reach and engagement of users as compared to other models, which offer free trials (Papadopoulos et al., 2020; Pattabhiramaiah et al., 2018).

2.5.5 Pay Per use

Pay-per-use (PPU) is a monetization strategy in which the user pays only when they use a certain service or get a particular feature or product, rather than being restricted to a fixed or recurring subscription fee. In digital and service platforms, PPU is very common in the fact that payment should be offered to the user according to his/her actual use, lowering the barriers to potential users and reducing the amount of money needed upfront for intermittent users (Weinman, 2018b; Yun & Suk, 2022). For example, in software or cloud computing environments, usage-based pricing has become especially common, reflecting the increasing preference for models where costs are matched to levels of use, and unused capacity is not overpaid (Weinman, 2018b). Related work on access-based consumption in household services reveals a similar logic, where instead of buying a product, or the flat fee, consumers are required to pay for the service of each unit of consumption, such as a washing machine-as-a-service system, where consumers pay for each wash allowing to see the value directly as it relates to each use (Bocken et al., 2018). As digitalization is widely expanding, inherited pricing models like PPU are increasingly used in new contexts that allow users to use products without owning them and only pay when needed (Dowling et al., 2019).

Applying PPU to a gamified climate-wise housing platform would mean that users pay the money for using advanced features. Literature suggests that such models are acceptable for users who participate a lot at certain decision moments, for example, while thinking about renovations or exploring ways to improve their environment, but over prolonged periods of time (Bocken et al., 2018; Weinman, 2018b). There are also warnings about the effect of PPU on reducing spontaneous engagement if every interaction incurs an additional charge and this is particularly relevant for gamified systems based on exploration, curiosity, and playful discovery (Weinman, 2018a). If all challenges or features require an incremental payment then users may restrict their interactions to avoid accumulating fees and thus reducing the motivational or behavioral benefits of gamification (Ladas et al., 2022).

Pay-Per-Use models are currently prevalent in industries ranging from cars and insurance to software, music, film, and industrial machinery (Ladas et al., 2022). Despite this growth, there has been a trend in behavioral economics showing that users can avoid PPU options even if they are objectively cheaper. This phenomenon, sometimes called flat-rate bias, reflects people's aversion to paying variable charges because they generally prefer predictable flat fees due to their cognitive biases and aversion to uncertainty (Yun & Suk, 2022). Consumers regularly use subscription plans rather than PPU as research indicates that consumers overestimate how much they will be using a service and therefore PPU looks more expensive than it actually is (DellaVigna & Malmendier, 2006; Lambrecht & Skiera, 2006; Yun & Suk, 2022). Users also tend to assess each use under PPU as additional decision and cost, and this creates the sensation of the "meter running," which constructs psychological burden and decreases their willingness to engage (Weinman, 2018).

Studies have shown that user engagement is not reduced due to usage of PUU. For example, a study on HOMIE project reveals that PPU does not automatically reduce engagement. Although the number of times users used the service decreased, they did not abandon the usage or service, but rather that the amount of usage stabilized at a lower but consistent level (Bocken et al., 2018). This implies that PPU can be sustained if the perceived value per use is kept high.

Acceptance of PPU depends upon perceptions of fairness, transparency, communication, and benefits obtained from each use of PPU (Edbring et al., 2016; Hazée et al., 2017). HOMIE's implementation also revealed that users are more accepting when per-use fees were based on consumer surveys, clearly stated and associated with benefits such as cost savings and reduction of environmental impact (Bocken et al., 2018). Similarly, willingness to persist in PPU is highly linked to reducing psychological stress of variable charges, especially when users recurrently assess the cost of every action (Weinman, 2018).

The above studies can thus be used to create a strategy of pay-per-use in a gamified platform offering climate-wise housing solutions, as PPU might appeal to users who do not want to commit to subscriptions and who tend to engage only at particular times with the gamified platform. However, given the features of flat-rate bias and a dislike of repeated micro-payments, many users may find the perception that PPU is inconvenient and unpredictable. For a gamified platform aimed at promoting sustainable behaviors, incremental charges could prove psychologically burdensome and vicious to disengagement if not carefully managed. Therefore, the literature suggests that PPU will be more acceptable when prices are fair, benefits are clear and when there is an influence on users to repeat their decisions. In the context of a gamified platform offering climate-wise housing solutions this means that the platform should carefully balance PPU options by creating value and should also consider factors that can discourage users who already feel uncertain about sustainable activities.

2.5.6 Referrals, bonuses, and rewards

Previous literature in the economics of digital platforms reveals that monetization performance is highly dependent on the user base and their engagement. These two dominant factors help in generating long-term revenue because active people are more likely to purchase or subscribe to premium services, and participate in value generating interactions (Kumar & Shah, 2004). Engagement also increases customer lifetime value, which is the key to platform profitability. As the users are more deeply involved in a digital service, their lifetime value increases significantly,

making engagement an important mechanism of monetization (Oestreicher-Singer & Zalmanson, 2012). This gives us theoretical ground to explain why referral bonuses, badges, and reward systems are central components of gamification and can have a substantial impact on revenue results.

Referral systems are well known to be one of the best modes of economic user acquisition structures. Empirical research has shown that customers gained through referrals have a higher engagement rate, a higher chance to purchase, and have more customer lifetime value as compared to users that were attracted through normal marketing channels (Schmitt et al., 2011). From the point of view of monetization, this is significant because customer lifetime value is one of the strongest determinants of revenue in digital platforms (Kumar & Shah, 2004). Referral systems are also a great technique to reduce the customer acquisition cost, because users are more likely to convert if they have been recommended by their trusted peers. Studies show that an efficient revenue stream can be maintained through referral programs as compared to advertisements because the probability of growing users is higher in this (Biyalogorsky et al., 2025), which gives referrals an advantage in strengthening the monetization capacity.

Referral programs not only help to grow users, but there are network effects as well, which help increase earnings. As more people are attracted towards the platform, it becomes more valuable, and therefore, engagement and revenue increase (Parker et al., 2016). Research indicates that referred users tend to stay longer because of the social relationship with their referrer, which causes them to be embedded in more activities on the platform and keeps them longer (Schmitt et al., 2011). Viral marketing literature has also clearly shown that if each user is successful at referring just a few others, the platform becomes trapped in a compounding "viral loop", which leads to exponential growth in the user base and increased potential to generate revenue from premium subscriptions, pay-per-use functionalities and advertising (Hinz et al., 2011; Lans et al., 2010). In the context of a climate-wise housing gamified platform, such acceleration would be valuable because both the platform and financial sustainability are dependent on having sufficient scale.

Badges and rewards also complement referral mechanisms in order to strengthen users' engagement, which are some strongest predictors of monetization. Research indicates that these retained users can make significant contributions to long-term profitability (Kumar & Shah, 2004). Digital badges have proven to be able to boost the level of ongoing contributions of users, which is very valuable. In an influential study of a community-based and online Q&A system, badges resulted in sustained growth and engagement of users is observed through it, which raises an exciting opportunity for reward-based systems (Li et al., 2012). Higher engagement directly translates into the monetization potential of the platform, as those users who are deeply involved in the platform are more likely to subscribe to the platform, buy premium functionality, or interact with the platform's monetizable elements (Oestreicher-Singer & Zalmanson, 2012). This is similar to what gamification research has been finding that reward mechanisms encourage repeated usage and intensify patterns of participation, leading to increased revenue possibilities (Hamari, 2017).

Rewards and badges can also be used to identify and develop worthy users on platforms. Most digital platforms depend on a large number of power users who contribute as a higher percentage of revenue and engagement (Oestreicher-Singer & Zalmanson, 2012). Moreover, reward systems are inherently appealing and retaining as some users are more dedicated and more likely to spend time and money on the service. Research indicates that reward-seeking users tend to buy premium features and perform monetizable actions, so badges can be used as an effective instrument in segmenting and targeting the user base that produces a greater economic benefit (Hamari, 2017).

In summary, the literature offers a good theoretical foundation for understanding the behavior of users towards referrals, bonuses, and rewards in the context of this study. Providing that participants perceive referrals, badges, or bonuses in a positive way, according to the previous studies, these mechanisms can greatly transform the monetizing power of a gamified climate-wise housing platform because such factors increase revenue, user acquisition, engagement, and conversion. When the gamification components are used strategically, the platform will be able

to grow its user base, enhance long-term engagement, and eventually enhance financial sustainability and promote climate-wise housing habits.

2.5.7 Advertising-Based Monetization

Monetization through advertisements is still one of the most common revenue models employed in a digital setup, in which users can get access to content or other services at no cost, provided they watch advertisements or sponsored content. According to a survey conducted by the Interactive Advertising Bureau (IAB) in the United States, the majority of users are satisfied with such value exchange. It has been estimated that an approximate of 80 percent of the users feel the websites and apps are free since there are advertisements, and almost 70 percent of the respondents believe that it is fair to see ads in exchange of free services (Lou, 2024). The same trend has been observed with streaming research, 71 percent of users did not find inconvenience in watching advertisements when it lets them see what they want without paying, and about 80 percent are using platforms that are supported by advertisements (Karrer, 2022).

Moreover, a study by Hub Research in 2025 determined that users prefer advertisement based services because it helps in reduction of subscription costs (Butts, 2025). These findings collectively suggest that many users willingly accept ads when the trade-off of lower or zero cost is clear, which is directly relevant for a gamified climate-wise housing platform considering ad-supported access. All the above findings imply that several users do not hesitate to accept advertisements when the trade-off of reduced or no cost is evident, which is directly applicable to a gamified platform service with reference to ad-based usage.

This tendency is supported by the European evidence. An IAB Europe study on personalized advertising also claims that approximately 60% of users accept the pay or consent models, in which free access is traded either by paying or by agreeing to watch advertising and data usage (“IAB Europe,” 2025). Meanwhile, the issue of invasive or excessive advertisements by users is also noticed, which is an expression that users will not accept it unconditionally, but rather on the

conditions of fairness, frequency, and user experience (Cherry et al., 2015). Research on various markets indicates that access based on ad-funding is widely tolerated when presented both as an open value exchange, though dissatisfaction with such ads can intensify rapidly when they are seen as disruptive or irrelevant (Karrer, 2022). In the case of a climate-wise housing platform, it can be said that the users can be willing to accept advertising when it gives them free access to the platform.

Studies based on the advertising model also reveal that its success depends on relevance and contextual fit. Websites like Google and Facebook depend on targeted advertising which is pushed by the analytics of user data and machine-learning optimization (Evans, 2008; Lambrecht & Skiera, 2006). Nevertheless, the ad fatigue that has risen over this model has caused the quality of the ad experience to become even more crucial in keeping the users engaged (Subramanian, 2025). In digital advertising ecosystems, publishers provide engaging content that attracts sponsors, advertisers deliver themed campaigns, and ad agencies match ads to suitable pages. It is the end-users who engage with the content of the platform and the advertisements, which create the business that sustains the ecosystem (Fan & Chang, 2010).

In this model, the process of generating revenue is normally done based on standard pricing such as cost per click, cost per thousand impressions, and cost per action. Cost per click is mainly used with contextual advertisements, in which the advertisers are only charged when users click on an advertisement. This allows platforms to help them generate revenue by enhancing the possibility of individuals clicking (Feng et al., 2003). The revenue in a cost per click system is directly proportional to the probability of users clicking the ad which itself is directly proportional to the relevance of the ad in the context that the user is viewing. The research findings always indicate that a high contextual relevance results in increased clicks (Chatterjee et al., 2003; Wang et al., 2002). Wu et al. (2013) further demonstrate that the advertisements which coincide with the overall subject of a page and the particular section in which the ad is placed receive greater click-through rates, as users start to concentrate more on the advertisement which correlates with the material they are already reading.

Contextual relevance not only increases the clicks but also enhances user experience, evaluation of ads, and brand recall, which increases revenue earned on an advertising-based platform. According to Häglund & Björklund (2024) relevant topics, emotional experience, and the degree of interest that the users take in the ad are strongly correlated with the substance of how people view ads on various digital platforms. When the ad correlates with the adjacent information, users are more ready to view the ad, which makes the ads better in terms of increased clicks, enhanced attitudes, and improved memory.

In summary, the literature is highly persuasive that advertisements are widely accepted by users when the advertisement reduces the cost to users and when the advertisement is not intrusive and matches the content that the users are reading. In case of a gamified climate-wise housing platform, these insights can indicate that the extent to which users accept advertisements and the amount of revenue the platform receives based on advertisements are highly contingent on how closely the ads are related to either sustainability, home efficiency, or improving the environment.

2.5.8 Data-driven monetization

Data-driven monetization refers to the conversion of data into money or into any form of value (Killström, 2024). With companies becoming more skilled at data analysis and having more information about users, they are seeking means to generate revenue out of customer data, therefore, data monetization has become an important aspect of digital transformation (Wixom & Ross, 2017). Data is commonly referred to as the new oil and converting it into revenue or into any form of value can add so much significance to the digital world. Many companies generate revenue through user data or by selling their anonymized data to advertisers and other companies. This is the exclusive source that causes the global market to reach approximately 12 billion annually (Keegan & Ng, 2021). These practices present two extensive approaches to using data to make money. One method is known as indirect method, in which data is used to enhance

core services or products, while the other one is a direct method, in which anonymized data is sold to earn revenue (BBVA Group et al., 2019).

With the growth of digitalization, companies have shifted their hardware-centric approaches to data-centric ones, and turned their products and services into means of creating valuable data (Brown et al., 2011; Spijker, 2014). This change is also indicated in the discussions on the topic of big data, as the competitive edge as well as the potential of innovation provided by massive information resources is pointed out (Buhl et al., 2013; Chen et al., 2012). In the context of public sectors, especially cities and government agencies, data is equally important. The main reason is that users can efficiently use resources, enhance services, design policies, and respond to environmental and social concerns (Černáková, 2015; Neis, 2024). Apart from this, the user data is also used in healthcare and city planning to make better decisions and help in sustainable development (Grover et al., 2018; Monino, 2021).

While using online services, users normally share their data even if they are aware of it or not. Due to this, data is now introduced as an important currency for online interactions (Rukanova et al., 2023; Temiz et al., 2022; Trkman et al., 2023). The willingness to share data depends on many things such as how much they trust, what benefits they expect and how worried they are about privacy. The literature shows that users are comfortable with data sharing when they presume that their data will be used for useful purposes, such as in research, planning, and innovation. But they still feel fear of privacy loss and misuse of data (Howe et al., 2018). Moreover, it is observed that users or individuals are more comfortable sharing their data with governmental agencies rather than with commercial organizations, especially when data is used for solving social issues (Trein & Varone, 2024).

Previous studies on smart cities have shown that individuals share their data even if they are doubtful and upset about sharing data (Kennedy et al., 2020; Lucas & Simpson, 2025). User acceptance depends on the data owner and what type of data they are sharing. People are happy to share anonymous data for sensitive issues such as finance or health (Strategy, 2023). Keeping

the data anonymous is important because it allows people to determine whether sharing data is safe or not. Recent studies also reveal that people tend to volunteer more information when they receive encouragement from people whom they trust, and also through sustainability information, as these are easier to accept (Ziller et al., 2025). These results indicate that the intention of sharing and approval by other individuals affects the decision-making of individuals to share personal information.

In the context of a gamified climate-wise housing platform, where the platform can gather user information based on energy consumption and home improvement, privacy of users is a sensitive matter. In the context of a gamified climate-wise housing platform, where the platform can gather user information based on energy consumption and home improvement, the privacy of users is a sensitive subject. User acceptance increases when they see social benefits. On the other hand, there is the issue of concern when data sharing is seen to be commercial, non-transparent, or not anonymized. Regarding the gamified platform of climate-wise housing solutions, it implies that the information about the transparency, clear purposes, and assurances of anonymity will be crucial in order to obtain user consent to the data-sharing models.

2.6 Technology Acceptance Model and Monetization Adoption

The Technology Acceptance Model (TAM) is widely used to explain why users accept and adopt new technologies (Davis, 1989). According to this model, users embrace new technologies depending on perceived usefulness and ease of use. TAM has been developed as one of the most widely used models to comprehend why people accept or reject a technological system, with special focus on the role of cognitive beliefs in the technology use decisions (Legris et al., 2003). The core and primary elements of TAM are perceived usefulness (PU) and perceived ease of use (PEOU), which influence intention to use a system, which subsequently forecasts actual technology adoption (Davis, 1989). These perceptions mediate the impact of noticeable system attributes on user attitudes and intentions, and describe how users can consider the new digital tools prior to devoting themselves to using the technologies (Tran & Cheng, 2017).

Literature continues to indicate that TAM has been effective in many different situations which encompass marketing, banking, e-learning, and online services, and this indicates its influence as a framework that can be relied upon to explain how people can be accepting digital technologies (Marangunić & Granić, 2015). Numerous empirical studies have been able to extend the model to confirm its predictive power of user behavior, proving its usefulness in initial adoption and subsequent usage (Scherer et al., 2019).

Previously, in literature, TAM has been used to explain the reasons behind users' subscribing to digital services. The perception that most users have of a subscription-based service is that it is economical at the beginning, but they do not reconsider its continued use over the year and thus end up incurring unnecessary costs (Nguyen, 2025). Therefore, in the context of monetized digital platforms, TAM is relevant since paid or monetized features are based on the development of positive user engagement, and due to PU and PEOU, they can encourage users to use and keep using paid services. In this way, TAM provides a theoretical foundation for understanding user WTP and user engagement.

2.6.1 Perceived Usefulness

Perceived usefulness (PU) refers to the level of how people perceive that the utilization of technological systems will enhance their performance and is a fundamental belief in the TAM (Davis, 1989). This construct is informed by the fact that users judge technologies or tools by anticipated positive effects, including increased efficiency of tasks, effectiveness, or enhanced decision making (Bandura, 1982). Empirical research indicates that PU has been found to be the most powerful predictor of intention to use in numerous studies on TAM (Venkatesh & Davis, 2000).

The experience of digital service and online financial settings indicates that when users consider the technology helpful, they tend to perceive it in positive terms and use it regularly (Hassan & Wood, 2020). Research also indicates that intentions to utilize digital tools are directly influenced

by PU, even in cases where attitudes are not explicitly established, and it is important to highlight the necessity of its critical role in adoption processes (Marangunić & Granić, 2015).

In the case of a monetized gamified digital platform, PU explains how users perceive about utilization of monetized strategies, whether it will enhance their performance and their ability to make climate-wise housing decisions. As monetization acceptance depends on the perceived usefulness, users embrace paid services when they perceive that they have a definite functional advantage (Nguyen, 2025).

2.6.2 Perceived ease of use

The second major construct of TAM is the perceived ease of use (PEOU), which is the degree to which an individual believes that he or she can easily interact with a system (Davis, 1989). This construct reflects the expectations of users on how easy their learning and use of a technological system are, and TAM focuses on the fact that the PEOU directly influences the PU and intention to use the system (Marikyan & Papagiannidis, 2024b). In digital platforms, ease of use can be linked to comprehensibility of the interface, simplicity of navigation and subsequent effort needed to accomplish a task, which greatly influence the user experience and adoption (Susanti & Astuti, 2019). The empirical evidence regarding ease of use is consistent, which means that the system that is seen as easy to use results in increased rates of acceptance and decreased obstacles on the way of user adoption (Scherer et al., 2019). The research on mobile banking and online digital services shows that when the system is easy to use and user-friendly, users are more inclined to use it and find it useful (Kitsios et al., 2021).

In the case of a monetized gamified climate-wise housing platform, PEOU is a requisite since users become more inclined to purchase when the experience of purchasing (such as subscribe or buy freemium) is hassle-free and smooth. A system that helps lessen the cognitive load during its usage strengthens the acceptance of monetized gamified digital platforms by the user, in line with

the content of the TAM that ease of use promotes both PU and intention to use the system (Davis, 1993).

2.6.3 Perceived risk

Although perceived risk does not represent the original TAM, it is often included in TAM studies to clarify obstacles that disrupt the association between behavioral intention and cognitive belief (Sonia & Gunanto, 2023). Perceived risk in the digital context is the apprehension of the uncertainty, the loss of success, or the security issues and bugs in the system that may lead to an adverse change in willingness to use the digital platforms (Esmaeili et al., 2021). For example, a study on online banking notes that PU and PEOU are decreased by system malfunctions and technical interruptions, creating a lack of confidence among the users (Sonia & Gunanto, 2023).

Moreover, the research on digital platforms indicates that concerns about reliability problems, server errors, and absence of transparency generate a perception of risk, which prevents the acceptance of the systems even if the systems are very beneficial (Kaur et al., 2021). Since TAM understands the influence of the external factors in forming cognitive beliefs, perceived risk acts as the barrier that may decrease intentions to use technology by lowering the perceived reliability or safety of digital systems (Venkatesh & Davis, 2000).

Perceived risk is applicable in the monetized gamified climate-based housing platform since users need to put their trust in the platform by paying or adding their personal information, and also through long-term interactions. Upon high perception of risk, including the fear of subscription management, safety of payments or stability of features, users might be unwilling to take or pay to the digital sustainability features. Therefore, the perceived risk contributes to the acceptance of monetization by affecting the trust of the users in the reliability of the platform.

2.6.4 Intention to Use

Intention to use is the most immediate driver of actual usage of a system as it demonstrates motivational readiness to interact with a system (Davis, 1989). TAM assumes that the PU and the PEOU are the primary determinants of intention to use, which leads to adoption of a digital platform or technology (Marikyan & Papagiannidis, 2024a). Previous research on technologies such as learning platforms, biofuels, and digital marketing reveals that intention to use a system predicts the actual usage of a system or digital platform (Susanti & Astuti, 2019; Tran & Cheng, 2017). This construct of TAM can help to study the future behavior of users, monetization strategies, and user engagement towards digital platforms (Mortenson & Vidgen, 2016; Nguyen, 2025). Therefore, in our scenario, intention to use explains why users choose to pay for monetized features that would help them make sustainable choices for their houses. This study shows and supports that the intention to use the monetized platform enhances monetization success in platforms that offer sustainable solutions.

2.7 Innovation Diffusion Theory and Monetization Adoption

The Innovation Diffusion Theory (IDT) is one of the theories that serve as a starting point in the interpretation of the process of the diffusion of innovations in the social system and the reasons why people choose to adopt technologies depending on their concepts of the attributes of innovations (Rogers, 1995; Rogers & Shoemaker, 1971). According to the theory, innovations spread when people consider them beneficial, suitable according to their requirements, simple to comprehend, to be tested before adoption, and visible in their consequences (Rogers, 1995; Wani & Ali, 2015). Another fact that is emphasized by IDT is that diffusion is a process that is influenced by communication to the extent that information regarding an innovation disseminates throughout interpersonal networks and social interactions to influence user decision and adoption intentions (Kaasinen, 2005; Rogers, 2003).

Previous studies have often integrated IDT with TAM and indicated that adoption decisions are highly dependent on the five perceived characteristics, which are relative advantage, complexity, observability, compatibility, and trialability. These constructs of IDT significantly predict adoption behavior in a variety of digital platforms (Al-Rahmi et al., 2019; Tran, 2017). Since monetized digital platforms are based on the willingness of users to interact, engage, and retain, IDT offers an interesting perspective on how users consider a monetized climate-wise housing platform and gamified sustainability functionality.

2.7.1 Relative Advantage

Relative advantage is the construct of IDT that describes the extent to which users perceive an innovation to be better as compared to previous alternatives (Rogers, 1995). Previous studies have recommended that innovations with clear advantages or improvements over current practices gain adoption faster due to their superior outcomes (Al-Rahmi et al., 2019; Wani & Ali, 2015). Moreover, studies also suggest that perceived relative advantage is positively related to PU and it has a positive impact on intention to use a system (Chu & Chen, 2016; Pituch & Lee, 2006). Therefore, for monetized gamified climate-wise housing platforms, relative advantage is used to explain whether or not users perceive paid features of the platform to be more effective than previous traditional methods that they were using. When users tend to believe that the features offered by the monetized platform offer better value, IDT predicts people will be willing to pay more and adopt monetized services faster.

2.7.2 Complexity

The second construct of IDT, which is complexity, is described by Dillon & Morris (1996) as the degree to which technology or innovation is perceived to be difficult to use or understand. Previous literature suggests that users are less likely to adopt the innovation or technology when they find it difficult to use or understand (Wani & Ali, 2015). The literature also shows a negative relation between complexity and PU (TAM construct) because the complexity of a system reduces

the expectations of benefit that could be achieved through platforms (Al-Rahmi et al., 2019; Hardgrave et al., 2003). Therefore, in our scenario, complexity shapes in a way to understand whether users find monetization options difficult to engage with. If the monetized method is complex for users, they will hesitate to commit to the system. IDT suggests that reducing complexity in the interactions and providing easy paths for adoption and increases acceptance by reducing effort.

2.7.3 Compatibility

Compatibility is the construct of IDT that reflects whether the innovation or technology aligns with existing values or experiences of the users (Venkatesh et al., 2003). The literature on IDT suggests that compatibility is a major determinant of the adoption of a system because innovations that are similar to personal practices result in a reduction of uncertainty and an easy integration into behavioral habits (Kaasinen, 2005; Wani & Ali, 2015). Previous studies also reveal that compatibility improves PU and behavioral intention of users by reinforcing the innovation's relevance to the needs of users (G. C. Moore & Benbasat, 1991). In the present study compatibility shows alignment of the monetized platform with the environmental and social values of users.

2.7.4 Trialability

In Innovation Diffusion Theory, trialability explains willingness of users to try new technologies before making any decision which increases user acceptance and reduces uncertainty (Rogers & Shoemaker, 1971). Previous studies suggest that testing the technologies makes it easier for users to adopt the system and to see benefits out of it (Huaung, 2004; Lee et al., 2011). Studies also indicate that digital platforms that allow users to try them out create stronger intentions of using them because people can check whether they will perform well or not before they commit (Al-Rahmi et al., 2019). In the case of our present scenario, trialability is very important as the idea of a monetized gamified platform offering suitable solutions is new to users and in such situations users often want to try free features before committing to monetized features.

2.7.5 Observability

Observability is the construct of IDT that explains how easily benefits of a technology can be observed by people. This makes users to pay attention and ultimately encourages them to adopt the technology (Lee et al., 2011; Rogers & Shoemaker, 1971). IDT states that it is when benefits are visible that sparks social or peer influence and this speeds up the spread of innovation in a community (Rogers, 1995; Wani & Ali, 2015). Earlier studies suggest that after users observe the results, they can then adopt and see the importance of a technology (Al-Rahmi et al., 2019; Lee et al., 2011). Therefore, observability in the context of the present study means the extent to which users can see the impact of monetized features through their peers or community.

By considering the above literature and theoretical foundations, the following conceptual framework is proposed for this study:

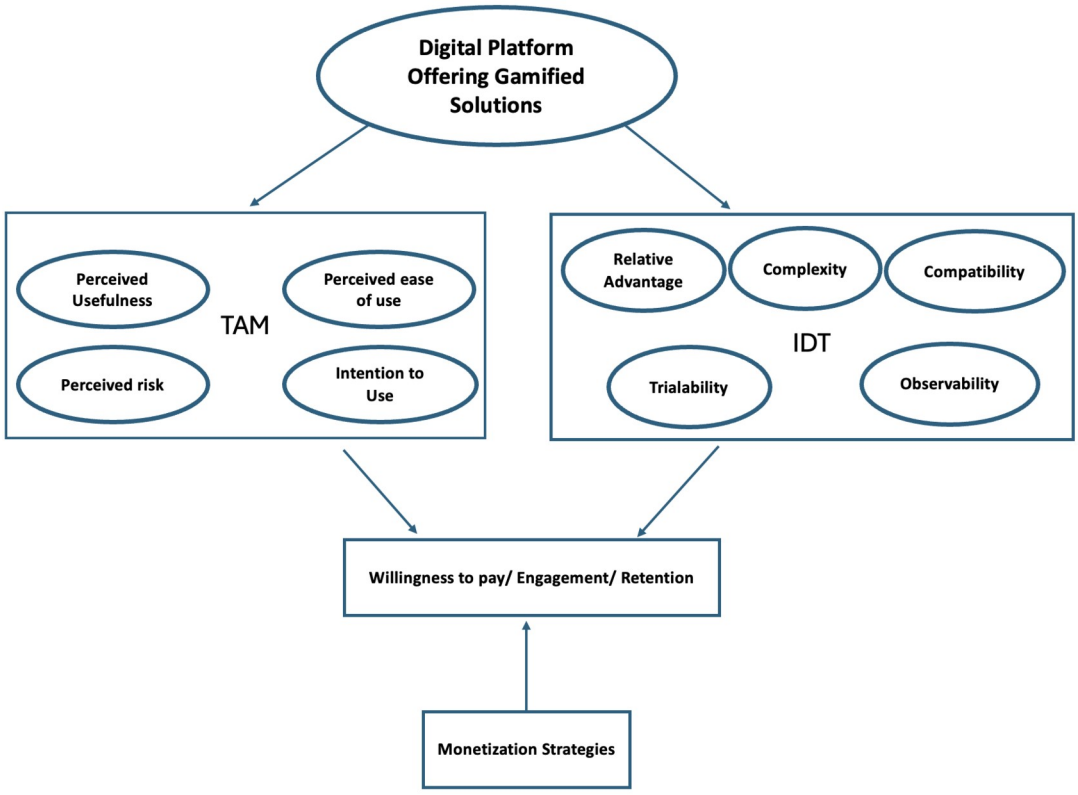

Figure 1. Conceptual Framework

3 Methodology

In this chapter, the research methods of this study are discussed by explaining the reason for the selected approach along with how data were collected, prepared, and analyzed. It also discusses the quality of the study in detail.

3.1 Research Design

This study follows a qualitative research process to explore different monetization strategies, willingness to pay and user engagement towards a monetized gamified digital platform. A qualitative approach is selected because this study aims to explain subjective perceptions and reasoning behind user willingness to pay, their engagement and monetization strategies that they would accept, rather than measuring predefined variables and testing their relationships. (Creswell & Poth, 2016; Flick, 2018). Qualitative research is generally based on inductive, deductive, and abductive approaches (Mantere & Ketokivi, 2013). For this study abductive approach is selected so that the author can look for areas where data diverge from what the existing theory would predict (Hurley et al., 2021; Rinehart, 2021).

Semi-structured interviews were selected as a primary method of data collection for this study. It helped participants to express their perceptions and feelings in their own terms and also give researcher the ability to explore issues and concerns in depth (Flick, 2018). As the selected approach is paramount for exploring values and perceptions of users (Flick, 2014), it facilitated discussions of Technology Acceptance Model and Innovation Diffusion Theory influenced by user perceptions and experiences. Therefore, the chosen approach of this study makes suitable grounds for exploring how users evaluate different monetization strategies, which strategies they prefer, and their willingness to pay and engagement towards monetized gamified digital platform.

3.2 Data collection

This study was carried out in Helsinki and Vaasa in Finland. Homeowners of detached houses were selected for this purpose. The reason for their selection is that homeowners of detached houses make their own decisions about home maintenance and energy consumption (Kanninen et al., 2024) which makes them a potential target population for our study. In total, 12 homeowners were approached and interviewed. The demographics of participants are shown in Table 1. Semi-structured interviews were conducted which were related to monetization strategies and user willingness to pay. The purposive sampling approach for data collection was followed (Flick, 2018) where main idea is to choose potential interviewees who can provide rich information (Emmel, 2013; Palinkas et al., 2015). Interviews were discontinued to deliver new insights or themes once the data collected reached 12 interviews and thereby reached saturation (Francis et al., 2010; Guest et al., 2006). The author constantly examined the data during coding process according to the applicability of the topic. It was carefully monitored whether new interviews could provide additional themes or insights. After eight interviews, no additional themes were being developed and remaining interviews supported previous themes, which supported the viability of the sample size (Saunders et al., 2018).

Interviews for this study were conducted in English via Zoom and Microsoft Teams which allowed potential interviewees to take part conveniently. Before each interview began, the participants were familiarized with a guide (Roulston, 2010) that explained them about DeCarbon Home project and received a demo of the initial gamified platform prototype. The demo ensured that each of the interviewees understood all functionalities of the platform, including the gamified elements and features that help houses to become sustainable. It was also ensured that interviewees have knowledge about different monetization strategies. Each interview took about 35 to 55 minutes, and all interviews were recorded with the informed consent of interviewees. Data collection was guided by ethical rules and adhered to guidelines of qualitative research in order to ensure that the process would be conducted transparently and respectfully (Flick & Mertens, 2018).

3.2.1 Reliability and Validity

Several measures were implemented in the study to ensure reliability and validity. All of the interviews were recorded and transcribed verbatim so that the author could have access to the original words in order to familiarize themselves with the data and coding. This approach is recommended in qualitative research so that the work can be made accurate (Guest et al., 2012). Reflective notes were also made immediately after each interview. These notes had a record of initial thoughts and context which made the process transparent. During the process of analysis, the author revisited notes many times and compared early observed insights as well as coded choices. This method corresponds with the abductive necessity of the back-and-forth movement between data and theory (Timmermans & Tavory, 2012). To support trustworthiness, the study emphasized describing the research setting and participants in detail. Providing rich, contextual information (sometimes called "thick description") is a well-established approach in naturalistic inquiry to enable the reader to make judgments of the applicability of findings (Lincoln et al., 1985).

Reliability was strengthened by audit trail based coding. NVivo allowed systematic code handling and the author constantly visited and compared previous codes in order to maintain stability in analysis. Reliability was enhanced by iterative coding, transparency of coding decisions and memo writing, established for internal consistency in qualitative research analysis (Roulston, 2010). Validity of the findings was supported by triangulation in which interpretations were checked against the constructs of Technology Acceptance Model and Innovation Diffusion Theory, which ensured that insights were not only grounded in data but also explored in relation to theoretical foundations (Patton, 1999; Timmermans & Tavory, 2012). Credibility was ensured by data saturation (Francis et al., 2010; Guest et al., 2006) and validity was further ensured by comparison of emerging insights with previous literature (Creswell & Poth, 2016; Maxwell, 2013) of user behavior, monetization models, and their acceptance, and this increased coherence of interpretations of the study.

Participant ID	Age	Gender	Profession / Role	Highest Qualification	Sector/Company Type
P1	60+	Male	Business Owner	Masters	Private Sector
P2	40-49	Male	Private Employee	Bachelors	Private Sector
P3	40-49	Female	Government Employee	PhD	Public Sector
P4	50-59	Male	Government Employee	PhD	Public Sector
P5	50-59	Female	Government Employee	PhD	Public Sector
P6	50-59	Male	Government Employee	PhD	Public Sector
P7	40-49	Male	Government Employee	PhD	Public Sector
P8	60+	Female	Government Employee	PhD	Public Sector
P9	50-59	Male	Government Employee	PhD	Public Sector
P10	40-49	Female	Government Employee	Masters	Public Sector
P11	50-59	Male	Private employee	Masters	Private Sector
P12	40-49	Male	Private employee	Master's	Private Sector

Table 1. Demographics

3.2 Data Analysis

Qualitative research is divided into inductive, deductive, and abductive approaches (Mantere & Ketokivi, 2013). Deduction is usually a theory-based and rationalist procedures, which quantitatively check a phenomenon (Hurley et al., 2021). Whereas inductive is an exploratory process that is based on assumptions to build theoretical considerations with the help of interpretive approaches (Gioia et al., 2013). Abductive approach, on the other hand, forms a middle ground between these two approaches (Timmermans & Tavory, 2012). Based on pragmatism, the abductive approach is a parallel engagement with data and theoretical understandings (Atkinson et al., 2003; Timmermans & Tavory, 2012). In the abductive approach, we look for areas where data diverge from what the existing theory would predict. These mismatches indicate where a theory is incomplete and stimulate the researcher to enhance or alter ideas to better fit the data (Hurley et al., 2021; Rinehart, 2021). The abductive approach facilitates repeating this process and running back and forth between data and theory to develop explanations from participants, and that also makes sense in the context of what is already known (Timmermans & Tavory, 2012). This method works well for this study because the way

homeowners responded towards the digital gamified monetized platform often went beyond what could be explained by existing technology acceptance and diffusion models, and the author therefore needed theorization based on contextual insights.

The process began with the preparation and sorting of the dataset. Considering the focus on early-stage engagement outlined by Braun & Clarke (2006), Coffey & Atkinson (1996), and Miles & Huberman (1994), all interview recordings were transcribed and read several times to allow immersion in the narratives. This stage provided a preliminary impression of how the participants described questions such as willingness to pay, monetization models, trust, informational transparency, values, and usability of the monetized platform. The next phase of the analysis was a preliminary phase of open coding. NVivo 15 was used in coding to allow systematic organization of the data and give a clear description of the analytic decisions. The coding approach was aligned with the conceptualization of coding developed by Saldana (2015) as a cyclic and interpretive process, where the first round in the coding process is defined by breadth and inclusivity, which aims at covering all potentially relevant aspects of the data without the need to subject it to predefined themes. This approach conforms to the suggestion that the initial coding must be participants' language-based and close to the empirical text (Braun & Clarke, 2006; Guest et al., 2012). This stage was aimed not at identifying definite themes but at building a thorough coding foundation, based on which a further narrower analysis can be built.

After this step, it entered into the focused coding phase where the original codes were compared, consolidated and assessed against each other with respect to conceptual similarity. It is known that focused coding is a stage of interpretation where descriptive terms are united in meaningful clusters representing the general theoretical ideas (Coffey & Atkinson, 1996; Saldana, 2015). In abductive analysis, this step involves an iterative approach to how developed categories connect to already existing theoretical constructs (Hurley et al., 2021; Timmermans & Tavory, 2012). NVivo was used in this phase to create codes in a systematic way, refine them and hierarchically organize, which helped to create interpretative coherence and consistency. The intentional use of analytic memos also strengthened reflexivity and offered a systematic account of why the

decisions of coding and categorization were made the way they were, which is consistent with the guidelines of qualitative methodology established by Guest et al. 2012 and Nowell et al. (2017). Reflexive documentation is particularly relevant to abductive analysis, which requires that researchers should always question how theoretical assumptions influence the interpretive results (Timmermans & Tavory, 2012).

As the categories of analysis became more discrete, the analysis switched to higher-order theme building. The thematic analysis literature notes that themes are patterns of mutual meaning with an underlying coherent story and not aggregations of codes (Braun & Clarke, 2019; Campbell et al., 2021). In an abductive approach, theme development involves a strict evaluation of how far theoretical constructs can be used to explain the connections between coded fragments, and it also points at where theoretical adjustment might be justified (Atkinson et al., 2003; Kelle, 1997). In the process, internal homogeneity and external heterogeneity of every potential theme were examined within the frames of the logical criterion of qualitative research standards (Aronson, 1995; Campbell et al., 2021). The abductive approach of theorizing was used during theme construction. Abductive context theorizing entails deciding to what degree the current frameworks, such as the TAM and IDT, correlate with data and empirical results (Coffey and Atkinson, 1996; Timmermans and Tavory, 2012). The fundamental abductive principle, seeking the most plausible explanation, through successive testing of theory to data, and vice versa, is reflected in this process (Mantere & Ketokivi, 2013; Reichertz, 2013). The analytic result is not a mere validation of already established models, but a theoretically informed explanation based on the empirical material (Makadok, 2018).

4 Results

This section consists of the results of the study in relation to the abductive approach of thematic analysis (summary in Figure 2) that brought together themes and interview data with the support of TAM and IDT. The author has followed an abductive approach, which means that results are not generated through a linear approach of going from codes to themes. Instead, the author kept going back and forth between data and observed what theory had expected, and unexpected results were taken into account again with the help of the theoretical background (Timmermans & Tavory, 2012). The method was followed in every step of the analysis of the study. In NVivo final theme development, 8 themes were developed with several sub-themes, and the codebook (shown in Appendix 2) which shows correlated information of the whole data obtained from participants. The results of the study are discussed as follows:

4.1 Perceived Usefulness and Relative Advantage

Responses revealed that TAM and IDT formed a solid backbone of monetization that was understood by participants. In the NVivo theme "User Attitude toward Paid Version", the references that were coded as "value-for-money considerations" (10 of them), and "paid version could be useful" (8 of them) indicated that participants perceived that paying for the platform is a means of gaining more in-depth and personalized information. Interviewees consistently emphasized that their view was that the service had to result in actual valuable improvements in decision making, like better estimates of cost savings. For example, respondent R11 said that the platform is useful when “I can continue to use them if it serves my needs.”, and respondent R10 states that “I would be a user if the value will be quite high”. It aligns with TAM as well as with relative advantage (construct of IDT) because it shows that if technology is useful for users then the probability to accept and adopt it increases (Al-Rahmi et al., 2019; Davis, 1985). It is relevant for IDT as participants were asked to compare these questions to compare the case with the previous traditional methods they were using. For example, respondent R9 stated that “I think that it's better than traditional methods… in which some consultant comes for a specific solutions

before any kind of audit. That is something which I try to avoid. So this method looks quite okay." which directly aligns with IDT (Lee et al., 2011; Rogers, 1995).

4.2 Ease of Use and Clarity

The participants find it easy to use different monetization options in their daily lives or routine and they can understand different purchase options, which is noted under the subtheme of "monetization options are easy to understand", and "need of clear communication in pricing" with 9 and 8 references respectively. When monetization models and pricing are clear, participants perceive it easy to use which aligns directly with ease of use construct of TAM (Davis, 1985). For example, respondent R1 stated that "I don't see any problems in there. It's quite clear and easy to use, so no problem." and respondent R3 stated that "Sometimes you see these: special price, only 99 cents offers, and when you decide to take it, you find out you actually have to pay a larger lump sum, so you end up paying more… So, it has to be very clear that this is the price". These results also indicate that complex interpretation makes technologies harder to use and then people are less likely to accept it (Dillon & Morris, 1996; Susanti & Astuti, 2019).

4.3 Perceived Risk and Trust Issues

Perceived risk is also an important factor in this study. It is measured under the subthemes of data sharing which are concerns about data sharing and conditions for sharing data with 4 and 5 references, respectively. The results revealed that participants were comfortable in sharing data, but they were concerned about misuse of their home energy data. For example, respondent R8 stated "I guess with sharing information you always need to know what it's used for…I would still like to know how the data will be used. Because even if it's anonymized, energy usage is still tied to a location, so I'm not sure how anonymous it really is". Previous literature indicates that when risk perception is high it can lower down trust factor in a platform and make adoption difficult (Esmaeili et al., 2021; Kaur et al., 2021).

4.4 Intention to Use and Willingness to Pay

The TAM´s construct of intention to use was largely conditional and based on an assessment of how likely users are motivated to pay for the platform. NVivo themes of “general willingness to pay” and “conditions for paying” with 6 and 8 references indicate their intention to pay for the platform. These results show that 6 participants were willing to pay for the platform, while 8 of them put conditions on it for paying. Other participants rejected to pay for the platform. For example, participant R2 said, “Yeah, it could be useful enough to pay”, and R4 said that: If it's cheap, then why not? Participant R9 also stated that “it depends on how it works… totally on the benefits of the platform. If it's practically useful, then of course…”. These results indicate that users have a positive attitude towards willingness to pay, and engagement, especially when the platform has long-term benefits (Mortenson & Vidgen, 2016; Nguyen, 2025).

4.5 Compatibility

Participants have positive views about the alignment of the monetized gamified platform with environmental and social aspects and it defines the compatibility of the platform with their environmental and social values. The subthemes “environmental alignment” with 12 references and “social alignment” with 10 references strongly indicate that participants agree that monetized version of the platforms aligns with environmental and social values. Participant R11 stated that “it helps when it comes to house energy information… at least over the year. So, it does help. Also, green is good if it's affordable.” This focus is consistent with the literature as well that if people come to feel that they are consistent with their own values, then they tend to adopt (Moore, 2015).

4.6 Complexity

Complexity is deeply studied in this study because participants were very concerned about multi-layered subscriptions and repeated payments. The subthemes of purchase options are confusing

with 4 references, and subscription fatigue with 9 references show that participants were concerned about this factor, and it should be taken into account while choosing monetization strategies. According to participant R4 “there are also services that make canceling difficult or keep charging after cancellation, and that is very annoying”. This indicates that complexity is a hurdle in the adoption process and also support the literature (Al-Rahmi et al., 2019; Rogers, 1995; Wani & Ali, 2015).

4.7 Trialability

The factor of trialability was also deeply studied in this study. Participants are highly encouraged when free trials are available to them by stating that free trials are very important and they have shown high rejection of hard paywalls (11 times). For instance, Participant R3 said “…this platform is a bit different because it has a lot of functions and it takes some time and effort for a user to understand it..paying for it without being familiar with the most basic functions would not be the most beneficial…”. This reflects IDT studies that free trials are very important for innovation adoptions because users can see the value of technologies through free versions (Al-Rahmi et al., 2019; Rogers, 2003).

4.8 Observability and Peer Influence

Observability construct of IDT is being observed by how much users are influenced by peer benefits. The results show that 8 participants were highly encouraged if the see peer benefits and are attracted towards the paid version of the gamified platform. For example, participant R10 stated “if my friend tells me that they started to use this and they saved some money… I would definitely think that there is added value here and it saves time for me thinking and saves time for me searching for information everywhere else…I would then be more willing to buy it.” This reflects that social persuasions and visible benefits increase innovation adoption (Hamari et al., 2016; Rogers, 2003).

4.9 User Valuation of Monetization Models

The freemium model was highly supported by participants as it does not include any risk in using the service and encourages usefulness, trialability, and perceived usefulness of the platform. The NVivo coding illustrates that interviews had no problem with the freemium model (12 references supported) as participant R11 mentioned, “I do have a few premium versions of a few applications, and their billing method is okay. Pricing is also okay if the value they provide is good enough.” Moreover, respondent R6 said, “I think there are many good things in this approach.” The literature also supports that user engagement is increased by giving freemium options (Subramanian, 2025).

On the other hand, the respondents were somewhat uncomfortable with long-term subscription models. Our results indicate that subscription fatigue was one of the major concerns quoted 9 times in interviews. For example, according to respondent R4, “But there are also services that make canceling difficult or keep charging after cancellation, and that is very annoying”. Also, participant R6 stated that “I might subscribe on my own, but if I feel like they are spamming me… then I’m not giving anything.” Subscription acceptance plays an important role in retaining a 6consumer. Participants encouraged transparency in subscription models and favor the continuous value addition (Roy & Ortiz, 2023). Moreover, 7 of the participants were comfortable with monthly subscriptions, while others were happy with yearly subscriptions, and their major concern was paying for short-term vs long-term based on their finances.

The model Pay-per-use (PPU) was found complex by participants, and they found it exhausting to repeat micro payments. Therefore, it is incompatible with their expectations. They were clearly not interested in PPU as stated 8 times in the interviews. In addition to that, they were concerned about repeated payments, which were quoted 4 times in the interviews. As discussed in the literature that repeated payments develop cognitive overload and decision fatigue (Iyengar et al., 2022). Moreover, participants show positive behavior towards the advertisement model in general, quoted 8 times in responses. Although it was noted that they mentioned 6 times in their responses that ads should be relevant. Yet some oppose and encourage it to be ad-free quoted 5

times in interviews. As per our literature, acceptance of the advertisement model totally depends upon the relevance of the content (Goldfarb & Tucker, 2011). The referral and reward model is also acceptable by the majority of the participants. The behavior towards rewards and referrals was positive in more than 9 and 7 responses, respectively. Less than 5 responses have opposed rewards and referral offers.

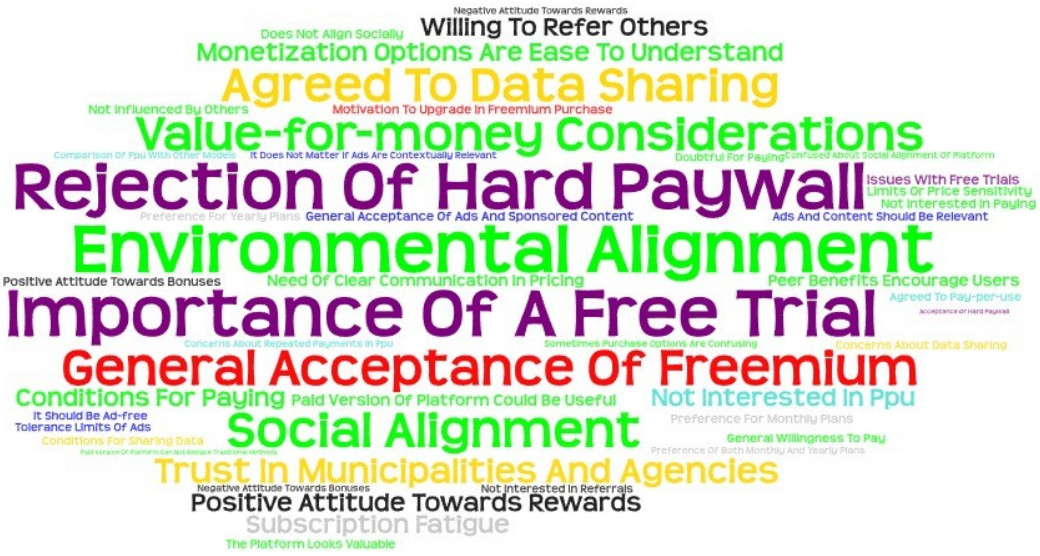

Figure 2. Codes Cloud

5 Discussions and Implications

The purpose of this study is to explore effective monetization strategies for a gamified digital platform offering climate-wise housing solutions and to investigate how different monetization strategies affect user willingness to pay and their engagement towards a monetized gamified digital platform offering climate-wise housing solutions. The results of this research demonstrate the participants' perception on monetization of a gamified climate-wise housing platform with the help of constructs derived from TAM and IDT, and the abductive approach enabled the author to combine anticipated and unanticipated patterns of thought. The fact that perceived usefulness and relative advantage were the key factors that participants considered when evaluating paid features proves that they were more focused on receiving a more personalized and detailed information. The essence of TAM and IDT claim that the adoption of technology should result in tangible benefits to decisions, like, more comprehensible cost-saving estimates or improved prioritization guidance, can be found in their conviction that premium access would result in the tangible benefits, i.e., in thematic improvements of the decision-making processes (Davis, 1985; Rogers, 1995; Al-Rahmi et al., 2019; Lee et al., 2011). The interview quotes of the platform being more advantageous than traditional methods confirm that the participants anticipated practical value of solutions in exchange of money.

The participants also emphasized that the ease of use mainly relied on the clear monetization arrangements. When pricing models were understandable and simple to understand, users were not afraid of using various options, and this scenario fits the argument of TAM that reduced effort increases adoption. However, when confusing or misleading payment structure was described, e.g., vague one-off prices, misleading promotional deals, etc., it was proved that the perceived ease of use is quickly diminished by complexity (Dillon and Morris, 1996; Susanti and Astuti, 2019). The findings indicate that to be accepted, cognitive simplicity is required, not merely when interacting with the interface but also in understanding the economic terms of use.

Perceived risk occurred especially when there was a discussion about data sharing. Even though a significant number of participants acknowledged the need to share energy-related data, there

were doubts regarding the anonymization and the possibility of misuse. The mentioned concerns are consistent with the research indicating that risk perception contributes to the lack of trust and, thus, decreases the intention to adopt (Esmaeili et al., 2021; Kaur et al., 2021). Users desired more information and a guarantee that the information would not be used commercially and implied that ethical information management is an imperative to agree to pay.

The intention to use construct was a conditional motivation and revealed that users were willing to pay when the platform had some obvious long-term advantages, but a number of users stated that they would only be willing to pay to the extent the platform is successful. This aligns with the rest of the literature that intention to adopt is reinforced by the user having a perception of long-term relevance and reliability (Mortenson and Vidgen, 2016; Nguyen, 2025a). The ambivalent reactions, some of which were willing to pay and some said that they had conditional acceptance, indicate that intention is informed by a balanced assessment of usefulness, risk, effort, and value compatibility.

The other significant construct was compatibility. When accessible and affordable support was offered to them in making decisions related to their energy consumption, participants considered the platform to be in line with both environmental and social values. Their quote proves that it is more probable to use technologies that align with individual values (Moore, 2015). Here compatibility assumed both an environmental and a social sense with it being seen that the process of monetization is only acceptable when it appears to be fair and supportive of sustainability and not the opposite.

Complexity was also influential in acceptance of monetization strategies. The participants explained that multi-layered subscriptions and repeated micro-payments were mentally exhausting, inconvenient, and counterproductive. These responses are consistent with the existing reports that multi-faceted payment models deter adoption (Rogers, 1995; Al-Rahmi et al., 2019; Wani and Ali, 2015). Trialability, on the contrary, promoted acceptance. Free trials were highly preferred by the users, whereas hard paywalls were not, whereas in line with the claims of

IDT, trialability minimizes uncertainty and generates confidence in the innovation (Rogers, 2003; Al-Rahmi et al., 2019). Respondents also stressed that payment would not be justifiable until an opportunity to get familiar with the core functions of the platform is given.

The observability was evident in the different values that the participants attributed to peer benefits. Their motivation to use or pay the platform went up seeing other people save money or enhance efficiency, which confirms the notion that visible social proof reinforces adoption behavior (Hamari et al., 2016; Rogers, 2003). Lastly, these theoretical constructs influenced the attitudes towards monetization models themselves. The concept of freemium received strong support since it mitigated risk and gave users the chance to evaluate usefulness. Subscriptions were feared because it leads to commitment fatigue, but monthly plans were more comfortable. Paid-per-use was widely dismissed because of mental load and frequent payments, advertising was only acceptable if appropriate. Rewards and referral systems were mostly welcome when seen as significant.

5.1 Practical Implications

These findings have a number of practical implications for developers and providers of monetized sustainability platforms. Firstly, it suggests that monetization should be based on provable utility i.e. paid content should provide valuable and enhanced information in comparison to free versions of the same or conventional ways. Secondly, it also proposes that platform owners should state clear pricing and avoid strategies such as special price tactics and complex tiering. The study also suggests that being able to understand the cost and being able to view the bill are both critical to the reduction of cognitive load and perceived ease of use. Fourth, the data governance practices should consider the issues of anonymity and exploitation raised by users to reduce perceived risk. Moreover, it is essential to provide free trials, after which users can form an opinion on the value of the offer and make financial commitments. Lastly, monetization should be aligned with the values of the environment and social aspects to prevent negative attitudes to

inconsistency or exploitation. Also, visible benefits and recommendation strategies may be used to strengthen confidence and perceived credibility.

5.2 Limitations and Future Research

The study is limited despite the contributions to it. The qualitative design restricts the possibility of generalizability since the results are based on the opinions of a particular group of respondents instead of an extensive population. Perceptions that are self-reported before testing of actual monetized sustainability-oriented digital platform might not be entirely beneficial to the behavior in actual monetized situations. The subjects were assessed on hypothetical monetization values rather than on a live system with financial implications which could affect the richness or accuracy of their answers. The representativeness of the findings can also be influenced by the sample size and the composition of the sample, in particular, in the views on willingness to pay. Also, the study has not deeply explored demographic impacts of decision making. These limitations suggest opportunities for future research. For example, there is an opportunity to study whether demographics such as age, gender, income limits, etc., could change perceptions of users. It can also be explored what users of monetized version of a gamified platform offering sustainable solutions presume about available monetization options. Moreover, research can be done to explore user attitudes based on quantitative methodology and a large sample size. Future research can also investigate users long term retention towards monetization options available for them.

6 Conclusion

This study explores effective monetization strategies for gamified digital platforms that offer sustainable solutions for climate-wise housing. User willingness to pay and the effect of monetization strategies on user engagement are also studied in this dissertation. A comprehensive framework was designed to support the monetization strategies for users by using Technology Acceptance Model and Innovation Diffusion Theory. An abductive approach was used for the investigation of this study. The findings of this study reveal that participants agree to pay for and engage with the platform under certain scenarios. The most important factor among these was the value of the platform and the presence of free trials. Moreover, they also agreed to subscribe to freemium services. Furthermore, they also agreed to watch advertisements, contextually relevant ads, and sponsored content, and data sharing under certain conditions. The results also revealed that participants were concerned about subscription fatigue and rejected pay-per-use models.

In addition to these findings, this study also contributes to the literature of TAM and IDT. The results show that perceived usefulness and ease of use are strongly influenced not only by digital platforms but also by fair and transparent structure of monetization models. Moreover, the findings reveal that perceived risk is a major ethical concern of users as it affects user choices and WIP. In the contribution of IDT, this study highlights that compatibility includes alignment of a monetized gamified digital platform with users´ environmental and social values. Results also discovered the importance of trialability and observability in user adoption. Complexity is also projected in the study as the users presume that subscription fatigue causes inconveniency. The study further discloses that relative advantage plays a prominent role in exploring what users perceive about paying for monetized version of the digital platforms as compared to the earlier traditional methods they use. These insights assist the development of monetization with the perspective of TAM and IDT. In summary, the study concludes that monetization in sustainability offering platforms is only accepted as functional value with ethical transparency and trust among

users. It also suggests that designing monetization options and strategies that honor these conditions is critical for long-term usage and sustainable decision-making.

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Appendices

Appendix 1 Questionnaire

Demographics

Age: 20-30, 31-39, 40-49, 50-59, 60+

Gender: Male, Female, prefer not to answer

Occupation: Government employee, Private employee, Business owner, Unemployed, Other (please specify)

Education: Vocational, Bachelor's, Ph.D. Other (please specify)

Interview Questions

1. Have you ever paid for home assessments or detailed audits, and do you think that this website/platform is useful enough to pay for as compared to the traditional methods?

2. Many platforms offer basic and premium purchase options, such as Duolingo and Spotify. How clear or confusing do you find different purchase options?

3. If a fee is introduced, will you use/continue to use and recommend others about this platform?

4. Do you think monetizing this website aligns with the environmental and social values it provides?

5. People often subscribe to LinkedIn Premium or buy cloud storage after noticing peers' benefits. How likely will it encourage you to spend if you notice others gaining valuable information through the paid version of this website/platform?

6. Do you personally use any membership services, such as basic or premium plans, and what do you think about their pricing and billing methods?

7. Several platforms like MyFitnessPal offer basic features, but their premium features are paid.

What do you think about having free basic features (such as calculating the status of your home) but paying for upgrades (such as how much you can save, renovation tips, etc.) for this platform?

8. What is your opinion on anonymized data of energy usage being shared with municipalities or energy agencies for research and planning?

9. Some platforms, such as Netflix and BookBeat, offer monthly recurring subscriptions, and others, such as Evernote, offer yearly memberships as well. Would you prefer repetitive monthly payments or a one-time payment option? Why?

10. Platforms like HBO Max and Disney+ don't offer any free trial. How would it affect your decision if the website does not provide any free trials?

11. What do you think about paying a nominal fee every time you access the services from the website/platform, such as Apple Books or Google Play Books purchases?

12. Would you agree to watch advertisements or sponsored content? Do you think it makes a difference whether the ad or sponsor is contextually relevant, or whether it could be for any type of product (e.g., Heinz ketchup or Grammarly advertisement on the platform)?

13. What do you think about referral bonuses, badges and rewards such as in Duolingo and Wolt?

Appendix 2: Codebook

Name	Description	Sources	References
Theme 1. User attitude towards paid version of the platform	This theme shows how willing users are to pay for the platform, including their doubts, pricing concerns, expectations of transparency, peer influence, and social and environmental alignment.	12	139
Conditions for paying		8	16
Confused about social alignment of platform		1	1
Does not align socially		1	1
Doubtful for paying		4	5
Environmental alignment		12	12
General willingness to pay		6	12
Monetization options are easy to understand		9	11
Need of clear communication in pricing		8	11
Not influenced by others		3	3
Not interested in paying		4	11
Paid version of platform could be useful		8	12
Peer benefits encourage users		8	8
Social alignment		10	11
Sometimes purchase options are confusing		4	4
Value-for-money considerations		10	21
Theme 2. Advertisements and sponsored content	This theme explains about general acceptance of advertisements and sponsored content, their contextual relevance, and ads limits.	12	33

Name	Description	Sources	References
Ads and content should be relevant		6	6
General acceptance of ads and sponsored content		8	9
It does not matter if ads are contextually relevant		4	4
It should be ad-free		5	6
Tolerance limits of ads		5	8
Theme 3. Data sharing	This theme captures users' views on sharing anonymized energy data, their concerns, and trust in municipalities and agencies.	12	33
Agreed to data sharing		10	11
Concerns about data sharing		4	6
Conditions for sharing data		5	6
Trust in municipalities and agencies		10	10
Theme 4. Free trial	This theme tells about importance of free trials.	12	37
Acceptance of hard paywall		1	1
Importance of a free trial		11	21
Issues with free trials		1	1
Rejection of hard paywall		11	14
Theme 5. Freemium model	This theme captures how users feel about having free basic features with optional paid upgrades.	12	23
General acceptance of Freemium		12	16
Motivation to upgrade in Freemium purchase		7	7
Theme 6. Pay-Per-Use	This theme reflects users' mixed reactions to paying only when using a feature.	12	20
Agreed to Pay-Per-Use		4	4

Name	Description	Sources	References
Comparison of PPU with other models		3	4
Concerns about repeated payments in PPU		4	4
Not interested in PPU		8	8
Theme 7. Referrals, bonuses, rewards	This theme covers users' views on reward systems, bonuses, and their willingness to refer others.	12	40
Negative attitude towards bonuses		4	4
Negative attitude towards rewards		4	6
Not interested in referrals		1	1
Positive attitude towards bonuses		7	7
Positive attitude towards rewards		9	10
Willing to refer others		9	12
Theme 8. Subscription models	This theme describes users' preferences for monthly vs. yearly plans, and concerns about subscription fatigue.	12	34
Preference for monthly plans		7	10
Preference for yearly plans		5	6
Preference of both monthly and yearly plans		4	5
Subscription fatigue		9	13