

ANALYSIS AND DESIGN OF THE APPLICATION OF GREEN FINANCIAL INCLUSION AT THE MVP LEVEL

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Abstract

This research is an R and D research that aims to provide solutions to ecological problems and financial inclusion as concrete actions in the Sherpa Track and Financial Track programs that concern G20 member countries.

The method used in this research is a qualitative approach through two stages. The first stage is a feasibility analysis to explore the urgency of inclusive finance based on ecology. The steps in this stage are analyzing strategic partners, resource persons, literature studies, and public opinion surveys. The second stage is the application design stage. The research results are applications that can integrate financial inclusion activities as financial track actions and environmental sustainability-oriented activities as Sherpa track actions by forming an inclusive circular economy system.

Keywords

Financial inclusion, sherpa track, financial track, G20, ecology

Introduction

This study aims to develop the application as a financial inclusion medium to help people learn to invest and solve ecological and environmental problems. An environment program was created with the temporary target of the people of Yogyakarta, Indonesia, before developing the application, as the preliminary research called Tabungan Hijau (TH) program. The actors of this program consist of four groups, i.e., participants, volunteer managers as the operator of TH, waste management partners as the waste collector and purchasing, and financial partners, both bank and non-bank.

People who participate in the TH program are asked to collect household waste to volunteer managers of TH with the *wa'diah yad dhamanah* contract. Volunteers then sell their Household waste to waste management partners. The money from the sale of household waste is then managed by financial institutions partner both Islamic banks and non-banks through *mudharabah* contracts. The financial partners will convert them into savings and investment products suitable for TH participants. They also provided information on financial literacy.

The driving force of this program was economic tension during the pandemic. Pandemics and climate risk are similar in that they represent physical shocks, translating into an array of socioeconomic impacts (Pinner et al., 2020). The Covid-19 pandemic is a health crisis that has dragged the world's countries into an economic recession. 2020 is the year of Covid-19, and the Indonesian economy during the year aggregate growth was minus 2.1 percent (Muhyiddin, M., and Nugroho, 2021). Even though Indonesia's economic growth grew 7.07 percent during the second quarter of 2021 (Central Bureau of Statistics-Statistics Indonesia, 2021), economic uncertainty can still occur amid the ongoing pandemic.

Long before the covid-19 pandemic, many countries face global environmental problems, such as climate change (Suryani, 2020). Greenhouse gas emissions caused by household waste can accelerate climate change (De La Barrera and Hooda, 2016). Climate change causes global warming and sea-level rise, and river water runoff increases, causing flooding and erosion (Girgibo, 2021). As an archipelagic country, Indonesia is affected by rising sea levels due to climate change. These factors make Indonesia vulnerable to pandemics and the impacts of climate change. Climate change is a global crisis driven mainly by natural events and human-induced global warming (Kinney, 2018). All countries in the world are currently at war against the Covid-19 pandemic; on the other hand, people cannot ignore climate change. The Covid-19 pandemic has dominated public discourse, crowding out other important issues such as climate change (Ecker et al., 2020).

On the other hand, savings and investments are needed for the unpredictable future to meet life's emergencies (Gupta and Kashyap, 2018), including surviving an economic crisis. A tense economy caused by pandemics causes people to think that they are unlikely to have savings or investments. It is as if the desire to have savings or investments is too high. Investment behavior in Indonesia has changed significantly during the Covid-19 pandemic, one of the reasons people believe that the risk of losing money is more outstanding while the economy is also tricky (Pacific Institute, 2020). It is as if the desire to have savings or investments is too high. Investment behavior in Indonesia has changed significantly during the Covid-19 pandemic, one of the reasons people believe the risk of losing money is more outstanding while the economy is also tricky (Komalasari et al., 2021).

Awareness and affordability to save and invest are part of financial literacy and inclusion. Economically, the Indonesian people are not equipped to encounter economic paralysis; this which is partly due to the lack of public financial literacy (Yuesti et al., 2020). The pandemic has made people focus only on rising from the economic downturn; focusing on the knowledge of financial institutions and their products and activities is not a previous one. Since the Covid-19 pandemic has harmed the financial sector, the same can be said about financial inclusion (Kasradze, 2020). Financial limitations are a barrier to improving financial literacy and inclusion. The consequences of the financial downturn due to the pandemic could have a broader impact if steps are not taken to ensure access to and resources for financial inclusion accessible to all (Kasradze, 2020).

The issue of growing financial inclusion gained special significance during the Covid-19 pandemic, when a large part of the world's population was locked up at home (Kasradze, 2020). Therefore, technology is required to improve financial inclusion. The gap in Lyons and Kass-Hanna's (2021) research suggests that evidence-based assessment is critical to developing better financial literacy programs to target marginalized groups to take advantage of better financial access and innovative digital solutions, thus bridging financial literacy and digital financial literacy. Before developing the TH application, TH manual program had been created by involving many stakeholders. The assessment results from the participants and other stakeholders, such as partners in the TH Program, are used as a reference to build a digital application for TH to be more inclusive.

Research objective

Based on the explanation above, the objectives of current research are:

1. Designing a business model that can improve the services of Islamic financial institutions as an embodiment of adherence to Shariah.
2. Encourage intermediation performance through funding with new business models.

3. Digitizing the environmentally friendly financial inclusion program, called the “Tabungan Hijau”.
4. Develop the “Tabungan Hijau” application features that is encourage minimum viable product.
5. Develop the “Tabungan Hijau” application features that is easy to use and access to all levels of society.

Literature review

Minimum viable product

Entrepreneurs are often faced with limited resources in their quest to commercialize a new product technology, hence the efficient use of resources by introducing minimum viable products (MVP) to the market as soon as possible in order to test its value and the entrepreneur’s growth projections (Rancic Moogk, 2012). A minimum viable product (MVP) is a new version of a product that allows the collection of the maximum amount of validated learning about customers with minimal effort (Saadatmand, 2017). MVP is an iterative process of idea generation, prototyping, presentation, data collection, analysis, and learning. MVPs, defined as products with just enough features to gather validated learning about the products, are a significant focus in the early stages (Duc and Abrahamsson, 2016).

Savings in Islamic worldview

According to the conventional economic view, saving is the excess income over income consumption expenditure (Schumpeter and Keynes, 1936). Saving is intended to meet future consumption and provide a means for investment (Kasri and Kassim, 2009). The yield of conventional savings is determined by the rate of return on savings or by giving awards deposit interest. However, against any practice that provides excess in return of which no reward or equivalent counter-value is paid, better known as *riba* (Kasri and Kassim, 2009).

There is a dimension of social welfare in the saving behavior of Muslims. In contrast to Keynes, who argues that saving is the remainder of consumption, Jalaluddin (1992) argues that Muslims save for carrying out their obligations to themselves, their family, society, and Allah SWT, who need economic support. The Holy Qur’an and Hadith imply the importance of saving. For example, in the Holy Qur’an, Surah Al-Isra verse 29: “And do not make your hands shackled around your neck and do not (also) stretch it too high (very generously) or you will become reprehensible and regretful” (Kasri and Kassim, 2009). This verse indicates that if people are too thrifty and too extravagant, it is not good, so there must be savings. In the hadith, for example, as narrated by Bukhari: “Narrated by Umar: the holy prophet Muhammad SAW used to sell the dates of the gardens of Bani Nadir and store for his family so much as would cover their needs for a whole year.” (Al-Asqalani, 2003).

In Indonesia, savings in Islamic financial institutions are generally mobilized through two types of contracts, i.e., Wadi'ah and Mudharabah (Kasri and Kassim, 2009). Wadi'ah is the contract based on the Islamic principle of wadi'ah (trust). By the wadi'ah mechanism, deposits are kept as Amanah or in trust. It is also utilized by the institution entrusted with the deposit at its own risk. Depositors do not share the risk or return of any kind. Any gain or loss generated from the investment of these funds is fully charged to the institution entrusted to it. Mudharabah, on the other hand, is a contract based on a mudharabah (profit-loss sharing) contract. Under the principle of mudharabah, depositors (sahib al-mal) deposit funds to a financial institution (as mudharib or fund manager), which then invests the funds in sharia compliance business activities or projects and shares profit/loss with the depositors.

Financial inclusion

Financial inclusion is often considered access to financial resources for the broad public and small and medium-sized businesses. However, it is a broader concept and includes a wide range of access to quality financial products and services, including loans, investment, deposit services, insurance, pensions, and payment systems (Kasradze, 2020). Financial inclusion or financial inclusion became a trend after the 2008 crisis. It is mainly based on the impact of the crisis on groups at the bottom of the pyramid (low and irregular income, living in remote areas, disabled people, workers without legal identity documents, and marginalized communities), which is generally unbanked recording to be very high outside developed countries (Bank Indonesia, n.d.).

At the G20 Pittsburgh Summit 2009, G20 members agreed on increasing financial inclusion for this group (Cohn-Bendit and Harms, 2009; G20 DWG, n.d.). This agreement was confirmed at the 2010 Toronto Summit, with the issuance of the 9 Principles for Innovative Financial Inclusion as a guideline for developing financial inclusion, i.e., leadership, diversity, innovation, protection, empowerment, cooperation, knowledge, proportionality, and framework principles (Alliance for Fiscal Inclusion, 2010; GPFI, 2011).

Since then, many international institutions have focused on financial inclusion activities such as CGAP, World Bank, APEC, Asian Development Bank (ADB), and Alliance for Financial Inclusion (AFI), including standard bodies such as the BIS and Financial Action Task Force (FATF), including developing countries such as Indonesia. As a form of the Indonesian government's commitment to this program is the issuance of Peraturan Presiden Republik Indonesia Nomor 82 Tahun 2016 Tentang Strategi Nasional Keuangan Inklusif (2016). Based on the financial literacy and inclusion survey OJK (Otoritas Jasa Keuangan), in 2019, Indonesia's financial literacy index reached 38.03% and Indonesia's financial inclusion index 76.19%; this number increased from the previous year (OJK, 2019). To improve the inclusion index, OJK implements the Laku Pandai program (Otoritas Jasa Keuangan, 2020)The simple concept of Laku

Pandai is the selection and training of customers selected by the managing bank Laku Pandai to be service provider agents. In addition, agents are also equipped with ways to provide understanding to save and transact. Thus, the persistence of agents is expected to foster our brothers' confidence in the corners to utilize financial services or inclusive finance (Otoritas Jasa Keuangan, n.d.).

Pro-Environmental behavior

Achieving a sustainable future will require changes in behavior, and recent analyses have shown the importance of a behavioral perspective in addressing environmental issues (Schultz and Kaiser, 2015). Pro-environmental behavior is conscious actions performed by an individual to lessen the negative impact of human activities on the environment or enhance the quality of the environment (Sawitri et al., 2015). A growing awareness of the harmful impact of human lifestyles practiced in modern societies on the environment widens the focus of applied environmental psychology on pro-environment behavioral change (Jackson, 2005). The approach used to study pro-environmental behavior in this research focus on the impact. Focused on the impact on pro-environmental behavior refers to behaviors that contribute to preserving the natural environment (Schultz and Kaiser, 2015), such as reducing pollution, recycling waste, reforestation, conservation of water resources, and others.

The role of technology in financial inclusions

According to IBEF (2012), the roles of the use of technology in financial inclusion include 1) The combination of IT and mobile phones with other IT-enabled services has emerged as a viable solution for greater financial inclusion; 2) Essentially, this combination of technologies minimizes the need for setting up physical branches at all locations with trained persons to manage them; 3) It allows the servicing financial institutions like banks to improve efficiency and provides for the use of multiple channels to work together as an interconnected system; 4) Significant telecommunications and technology penetration in rural areas is a positive aspect of enhancing financial institutions reach and affordability.

Data and method

This research is a qualitative study type of R and D. The output of this research is to produce an android and web-based application program. The research location is on Grenjeng Karanglo Village, Purwomartani Sub District, Sleman District, Yogyakarta. The TPST (Final Waste Disposal Site) for this piloting location is the Piyungan TPST. The participants who participated in this piloting amounted to 18 families.

Framework development of application programs using the FAST method (Framework for the Application of Systems Thinking). This method was developed by Bentley and Whitten (2007). FAST stages graphed on figure 1 include eight stages, i.e., 1) scope definition, 2) problem analysis, 3) requirement analysis, 4) logical design, 5) decision analysis, 6) physical design and integration, 7) construction and testing, 8) installation and delivery. According to the research objective, this study is limited to stage four.

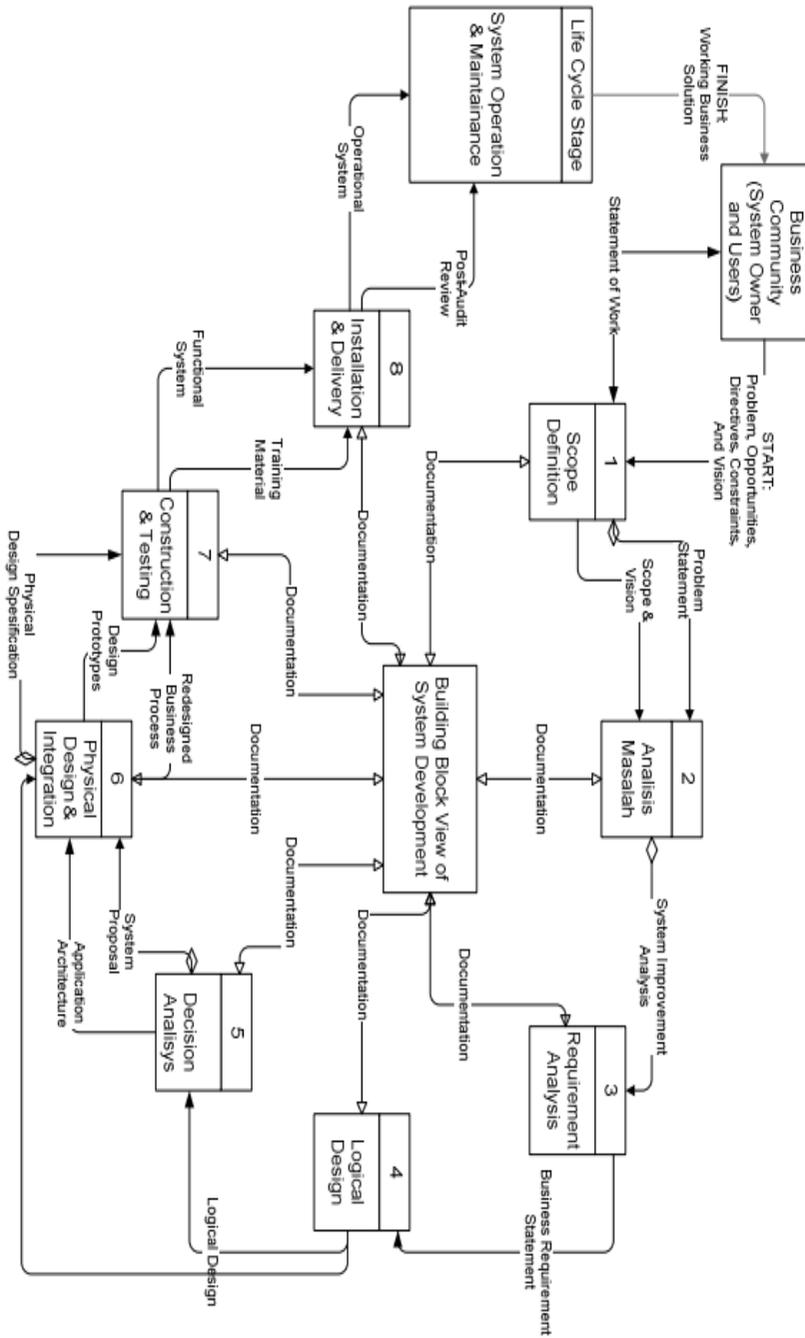


Figure 1. FAST Method
Source: (Bentley and Whitten, 2007)

Scope Definition

Scope definition is a stage that aims to know how much benefit the development system is to be performed. This stage also determines the limitations of system development by first identifying the problems, initiatives, and directives that are the drivers of system development. The purpose of this stage is not to solve problems but to classify and group problems. The analysis tools used in this stage are Systematic Review, Net Promoter Score, and Alderfer's ERG Theory. That analysis tools are used to find user needs at a minimal level. There are necessary to build an application that meets the minimum standards of viable products (MVP).

Systematic Review

The systematic review method is used against several data sources, both published and unpublished (Murdoch University, n.d.). This technique is applied to define the scope of the system. At this stage, all data collected is then analyzed to determine the scope definition that includes problems, opportunities, directives, constraints, and vision. The output produced at this stage is the problem statement, scope, and vision. Furthermore, problem statements that have been made will be analyzed (stage 2) to know the factors that need to be done to solve the problem (stage 3).

The systematic review, technically, is done through four stages. The first stage is to identify all relevant published and unpublished evidence. It was then screening data to select studies or reports for inclusion. After that, assess the quality of each eligible research or working paper, followed by synthesizing the findings from individual research or working paper unbiasedly. The last stage is interpreting the discovery. After that, present a balanced and impartial summary of the discovery with due consideration of any flaws in the evidence by dividing the relevant information into included and excluded information (Gough et al., 2017, 2018). The included information is used to create the feature in the system application. Meanwhile, the excluded information is used to construct the context of the system application. Figure 2 is described the systematic review stages.

Net Promoter Score

Net Promoter Score is often used to assess customer loyalty and satisfaction (Asmara and Ratnasari, 2016; Dwianto et al., 2018; Keiningham et al., 2007). This method was first introduced by Fred Reichheld, a partner at Bain and Company, in 2003 (Net Promoter System, n.d.-a). Technically, this method collects respondents' score data with a range of values from 0 to 10. The next step is to classify respondents into three categories, i.e., defractor (if score 0 to 6), passive (if score 7 to 8), and promoter (if score 9 to 10). Defractor is a person who does not like the products made by the company, a passive is a neutral person, and a promoter is a person who feels the products created are good and wants to disseminate them. NPS is calculated by (Net Promoter System, n.d.-b):

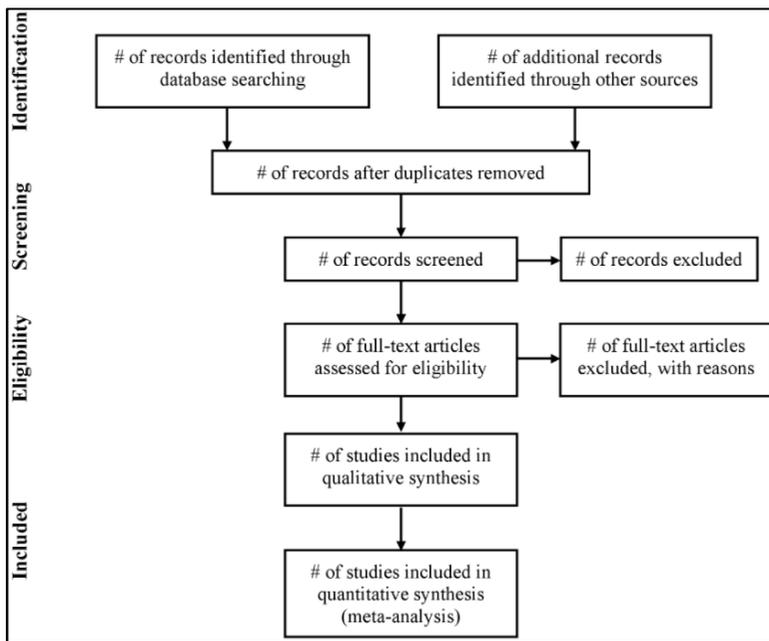


Figure 2. Systematic Review Stages
 Source: (Murdoch University, n.d.; Gough, 2017; Gough, 2018)

$$NPS = \%Promoter - \%Defractor \tag{1}$$

The power of this method is that it is easy to apply but has qualified information related to the potential of users to promote and disseminate our products (Reichheld, 2003). In this study, the NPS method was adapted to assess the potential dissemination of the business model and application done by participants as the first user.

Alderfer’s ERG Theory

Clayton Alderfer's ERG theory of motivation converges human needs into three categories: Existence, Relatedness, and Growth (Alderfer, 1969).

1. Existence Needs: This need includes basic survival and physiological needs like air, water, clothing, safety, intimacy, and affection. It equates to Maslow's first two levels.
2. Relatedness Needs: This need encompasses social and external esteem and relationships with family, friends, coworkers, and employers. This need recognizes the human need to be seen as a part of a group or family. It equates to Maslow's third and fourth levels of the motivation pyramid.
3. Growth Needs: Growth needs account for Maslow's internal esteem and self-actualization needs. It means to make a person creative and productive. In a nutshell, this need helps to person to do meaningful tasks.

This theory was used to analyze the motivations of the pioneer participants when participating in “TH” programs. It is indispensable to predict the long-term sustainability of the program.

The Data and Variable in the Scope Definition Stage

The relevant evidence is gathered from published evidence (i.e., previous research, expertise, eligible news) and unpublished evidence (i.e., pioneer participant, strategic partner, religious text). The data from previous research, expertise, eligible, strategic partner and religious text news are analyzed by a systematic review, but the data from pioneer participants are analyzed into two techniques. Firstly, the quantitative data were analyzed by the Net Promoter Score, then qualitative data was analyzed by Alderfer’s ERG Theory framework. The Net Promoter Score (NPS) analysis is conducted to determine the potential dissemination of business models and applications created to find opportunities for the system application. Meanwhile, Alderfer’s ERG Theory framework is applied to explore the motivation of pioneer participants and other important information. The details of relevant evidence, source, validity, and analysis technique are explained in table 1 below.

Table 1. Description of Data and Variable Definition

Relevant Evidences	Sources	Validity Technique	Analysis Technique
Publish Evidences			
Previous Research		Choose data from reputable Journal that published after Paris Agreement until 2021	Systematic Review
Expertise	Online Broadcasting	Source Triangulation	Systematic Review
Eligible News	Official website	Source Triangulation	Systematic Review
Unpublish Evidences			
Pioneer Participant	Data Survey Quantitative Qualitative	Reason Questions	Quantitative data was analyzed by NPS (Net Promoters Score) then qualitative data was analyzed by ERG Theory Framework
Strategic Partner	Interview Official Website	Source Triangulation	Systematic Review
Religious Text	Al Qur’an Al Hadith	Intertext Triangulation	Systematic Review

Problem analysis

Problem analysis is an advanced stage after knowing the problem that occurred in the first stage. The function of this stage is to explore the case in more detail. So, it can be determined the factors needed to solve the problem. Problem analysis is covered by collecting previous research results, news relevant to the issue, and the views of expertise related to the field (Bentley and Whitten, 2007).

Requirement analysis

The needs analysis stage is a critical stage of the system development plan. The goal is to know the previous needs of the system over the new system to be developed. At this stage, definitions and previous end-user needs were made in business rather than technically (Bentley and Whitten, 2007).

Logical design

The business process of a system model will be developed and further studied using logical models at the system logical model design stage. System models from this stage describe data structures, business processes, data flows, and interfaces (Bentley and Whitten, 2007).

Interface creation and programming of application systems using flutter software. Flutter is an open-source technology created by Google and released in May 2017 to build mobile, desktop, and web applications with a single codebase. In short, we can use one programming language: Dart and one codebase to create two different apps (for iOS and Android)) (Flutter, n.d.; Hayati, n.d.).

Result and Discussion

Scope Definition

Previous Research Analysis (PRA)

The previous research analysis is a mechanism used to explore the condition of the TPST scientifically, that is, the piloting location. The results of this analysis will be used to determine the urgency of the "TH" program. Based on previous research, the output of the analysis is as shown in the following Table 2:

Expertise analysis (EA)

From expertise analysis, it can explore the keywords helpful in application design and other important factors related to "TH". The resume of expertise analysis is shown in table 3.

Eligible news analysis (ENA)

This study uses eligible news analysis to understand the common social situation arising from the state of TPST studied in previous research. Collect sufficient data; searches are conducted on the news related to TPST released by the official website of reputable news agencies, such as Republika, Kompas, and Harian Jogja. The presenting results of the analysis are in table 4 below:

Pioneer participants (PP)

Pioneer participants are willing to be early participants in program trials. This process is done to gain confidence regarding the program's benefits, the potential replication, and the most convenient mechanisms of the program. The participants were 18 from 18 families living in Grenjeng village Purwomartani Sub District of Kalasan District of Sleman Regency of Yogyakarta Special

Region.

Table 2. Previous Research Analysis

Title of Article	Researcher	Result	Keywords
Pengaruh Keberadaan Tempat Pembuangan Akhir (TPA) Sampah Piyungan terhadap Kualitas Air Sumur Penduduk di Sekitarnya	(Suhartini, 2008)	Waste management techniques at TPST Piyungan using the Controlled Landfill method. The waste management activities in landfills include a. Garbage admission and registration, b. Waste disposal, c. Scavenging Activities, d. Waste Cell Development, e. Garbage closure, f. Spraying and Watering as well as g. Water Quality Monitoring and Leachate Monitoring. Waste management in landfills is very influential on the water quality of the surrounding communities, especially microbiological parameters of coliform and Escherichia coli.	TPST Piyungan using the Controlled Landfill method. It is very influential on the water quality
Analisis Resiko Lingkungan pada Tempat Pembuangan Akhir (TPA) Sampah (Studi Kasus: TPA Piyungan Bantul)	(Kasam, 2011)	With TPA, it will be caused by negative impacts on the environment. It produces the emergence of gases and Lindi. Gases and Lindi have the potential to damage the environment. This environmental risk arises if the Wastewater Treatment Plant (IPAL) is unable to process Lindi. So, it exceeds the standard quality and the base layer of a landfill that is not eligible so that Lindi seeps into the soil. Based on the results of risk identification and risk analysis, four environmental components have a high risk are air pollution, groundwater pollution, reduced environment aesthetics, and surface water pollution caused by the onset of gas, Lindi flow, Lindi seepage in the soil, and odor.	Gases and Lindi produced by TPA, have the potential to damage the environment. four environmental components have a high risk are air pollution, groundwater pollution, reduced environment aesthetics, and surface water pollution
Penyelesaian Konflik Lingkungan dalam Pengelolaan Sampah di Kabupaten Bantul	(Nafis, 2020)	The conflict occurred because of poor communication. The authority of TPST Piyungan is considered not optimal in responding to the needs of management facilities and infrastructure at TPST Piyungan. It appears that the anticipatory steps taken are still sporadic. Although many policies can be staggered but often difficult to implement because of the lack of supervision and innovation. There needs to be a detailed policy instrument to reorganize waste management, such as: 1) waste sorting is carried out in all layers before being transported to TPST Piyungan, 2) encouraging and facilitating waste management in all villages in Bantul, 3) modernization of waste processing equipment into fertilizer or electricity needs.	waste sorting, waste management, modernization of waste processing
Pemilihan Teknologi PLTSa di Kota Yogyakarta (Studi Kasus: TPA Piyungan Yogyakarta)	(Musyafiq, 2020)	Based on the primary data obtained that the capacity of garbage entering the city of Yogyakarta to landfill Piyungan reached 16,275 tons/month or equivalent to 536 tons/day. The amount of incoming waste capacity is certainly already included in the large category because it has exceeded the maximum limit of 500 tons/day. The source of Yogyakarta landfill comes from household waste, markets, industries, parks, public facilities, tourism, and others. The waste mass of Yogyakarta city can generate an electric potential of 25 MW with incinerator technology. It is based on the calculation of energy conversion from the EBTKE Ministry of Energy and Mineral Resources.	TPST Piyungan overlimit Garbage is coming from household waste, markets, industries, parks, public facilities, tourism, and others Garbage can generate an electric

Table 3. Expertise Analysis

Title of Speech	Expertise	Result	Keywords
1. Sri Mulyani : KTT G20 Bahas Akses Vaksin Hingga Pemulihan Ekonomi 2. Wawancara Eksklusif Menteri Keuangan, Sri Mulyani Indrawati - Upaya Pengendalian Perubahan Iklim	Sri Mulyani (2020; 2021)	In the G 20 leaders summit, there is two focus of discussion. There are the finance track and the Sherpa track. The focus of the discussion in the finance track concerns jointly implementing policies to deal with Covid-19 and restore the economy so that it can recover. Support for economic and financial policies, especially in the fiscal, monetary, and regulatory sectors in the financial sectors needs to be carried out and continues to be carried out. Therefore, the discussion in the Finance track is to carry out policies to support economic recovery and do not withdraw them too early. It means that fiscal, monetary, and financial sector, regulations must continue to be implemented until the economy truly recovers strongly.	The finance track, the Sherpa track, implementing policies to deal with Covid-19, Economic recovery

Table 4 . Eligible News Analysis

Title of News	Source	Result	Keywords
Tiga Kabupaten dan Kota di DIY Diminta Kurangi Sampah yang Dibuang ke TPST Piyungan, Ini Alasannya	(Sabandar and Fadhilah, 2021)	The Local Government of Yogyakarta Special Region (DIY) asked three districts and cities to reduce waste. Waste management at TPST Piyungan still uses a sanitary landfill system. That is, almost without processing because the waste is only stacked and compacted in layers. The community is allowed to play an active role in reducing their waste.	Reduce the waste, Community Active Role, Sanitary Landfill.
TPST Piyungan Ditutup, Sampah Menumpuk di Depo	(Setiawan, 2020)	Head of The Waste Collection and Transportation Section of the Department of Environment and Forestry (DLHK) DIY, revealed the root of the garbage problem until the closure action by the citizens occurred because TPST Piyungan was overcapacity. The government cannot alone overcome the problem of garbage, especially TPST Piyungan that has been overcapacity. Community also have a role to play in reducing the waste production. At least since the family stage. If forced to dispose of, garbage must be sorted first. The only residue should be transported to the dump. To reduce waste, it becomes the obligation of the community. The key is to reduce, reduce and reduce. After that, manage by utilizing the way that can still be used.	TPST Piyungan was overcapacity, Community as the key to Reduce, Community Role, Garbage Sorted, Manage, Community Obligation
Sisa Umur TPA Piyungan Yogyakarta tak Sampai Dua Tahun	(Azizah, 2020)	The age of use of TPST Piyungan may only remain one to 1.5 years. If it is not anticipated now, Yogyakarta will have difficulty managing waste. Several times also conveyed that the capacity in TPST is overloaded. Waste management can be done using various methods. It can use a composter to manage organic waste into fertilizer. It is also can use incinerators to burn all the waste produced.	TPST Piyungan is overloaded, waste management, composter, incinerators
Ini Ternyata Benang Kusut Masalah Sampah di Jogja	(Suhartono, 2018)	The waste bank is one solution to reduce the volume of waste in Jogja. Unfortunately, of the 450 waste banks that have been established, only 60% are active. The rest are suspended. In addition, to waste banks, the presence of ulu-ulu volunteers from among residents responsible for the cleanliness of waste along the river must also be maximized.	The waste bank, the waste volunteers

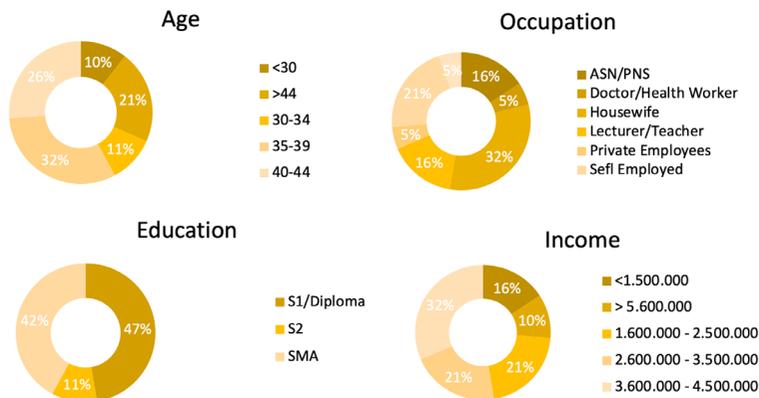


Figure 3. Demography of Pioneer Participants

The “TH” program has been implemented manually starting in September 2020. An assessment is carried out through a survey to test how worthwhile this program is. The survey instrument consisted of demographic questions, motivation to join the program, program scoring using the NPS framework, reasons for giving the score, and suggestions for program improvement. From figure 3, it can be seen the demography of pioneer participants.

Table 5. Motivation to Follow the Program, Examined by Alderfer's ERG Theory

Statement	Human Needs Categories		
	Existence	Relatedness	Growth
Want to maintain environmental sustainability as much as possible			√
Bits of help reduce home trash moreover, waste that can be recycled	√		
Very in line with our lifestyle that sorts out the garbage and ensures the Goods do not pollute the environment			√
Facilitates the separation of recyclable materials	√		
Want to reduce waste	√		
Participate in housing complex programs		√	
Reusable materials to be more usefulness and reducing waste	√		
Supports RT programs		√	
Because at home a lot of garbage	√		
Maximizing the use of used goods that are still valuable	√		
So that the unused can be reused	√		
Supporting household waste recycling activities	√		
Increase income, reduce environmental pollution			√
Sort and recycle waste for the sustainability of the earth			√
Sorting out waste, environmental preservation			√
Protecting the environment			√
Want to participate in reducing waste	√		
Reduce the skills that accumulate at home	√		
TOTAL	10	2	6

The participants' motivation for participating in the green savings is very diverse. However, based on Alderfer's ERG framework, these motivations are classified into three classifications. Table 5 above consists of details of motivational answers for participants. There were 10 participants motivated by existence needs. Two participants were motivated by relatedness factors. Then six participants were driven by growth aspects.

Table 6. NPS Category

Score	Total Participants	%	Category
9-10	10	57.89	Promoters
7-8	8	42.11	Passive
0-6	0	0	Defractors
TOTAL	18	100	

$$NPS = \% Promoters - \% Defractors (2)$$

$$NPS = 57.89\% - 0\%$$

$$NPS = 57.89\%$$

Based on table 6, the total number of participants in the green savings program is 18 people. A total of 57.89% of participants scored 9-10. The number of participants who scored 7-8 was 42.11%. No participants scored below 7. Table 7 describes the reason given for the score. Confirmation is applied through questions related to the reason for the score awarding. This process tests the validity and reliability of the TH program data score to give certainty to the scoring background.

Strategic partners (SP)

Strategic partners are analyzed to obtain adequate information about the potential to integrate "TH" programs with financial institution products. This integration is intended to create financial inclusion, especially for people who are constrained by finance to be still able to save and invest. The results of the analysis can be seen in Table 8 below:

Table 7. The Reason Giving of the Score

Statement	Triangulation Check		
	NPS Score	Confirmed	Keywords
This program is very urgent.	10	√	Urgent
It is a great program to keep the environment clean. It also can teach everyone how to process recycled waste in their respective homes.	9	√	Environment clean, literacy
This program can be distributing used goods to make them more useful.	10	√	Recycle the used goods
This program is well organized.	10	√	Well organized
This program is participating in waste reduction.	8	√	Waste reduction
I can use used materials.	9	√	Recycle the used goods
It's good enough.	9	√	Good enough
It's running smoothly.	10	√	Running smoothly
I like it because the garbage can be money.	8	√	Garbage can be money
I like it because it is helpful and give for more benefits.	9	√	Helpful, beneficiary
Effective and efficient.	10	√	Effective and efficient
Scheduled garbage collection. Transparency is OK.	9	√	Scheduled, transparence
Can help Housewives increase income.	8	√	Increase the income
It's very worthwhile for household inorganic waste management.	8	√	Worthwhile
This program is expected to continue so that the earth becomes better.	8	√	Continuing
Hopefully, this program is beneficial.	8	√	Beneficial program
It's been good.	8	√	Good
This program helps us to be able to sort out the waste that can be recycled.	7	√	Sort out the waste

Table 8. Strategic Partners Analysis

Strategic Partner	Corporate Social Responsibility	Keywords
Bank Syariah Indonesia	<ol style="list-style-type: none"> 1. Realizing a harmonious relationship between the company and society 2. Support the implementation of transparent and responsible business practices 3. Building a positive image and garnering community support 4. Exploring and empowering the potential of MSMEs through the distribution of partnership funds 5. Participate in environmental conservation programs, improve the quality of education, health, welfare, religious life, and other public facilities improvement. Source: (Bank Syariah Indonesia, n.d.)	Participate in environmental conservation programs
Pegadaian Syariah	TH is in line with our CSR program, The Gade Clean and Gold. We set up waste banks in different regions. Through this Waste Bank, Pegadaian Syariah wants to turn household waste into gold savings. Source: Interview with Mr. Munardi (Yogyakarta Branch Head)	wants to turn household waste into gold savings

Religious text (RT)

This study uses two verses in the Qur'an as the basis for taking action against the environment. These are the verses Q.S. Al Baqarah verse 30 and Q.S. Al A'raf verse 56. In al-Munir's commentary is explained that Adam (as the caliph) and his descendants obeyed The Commands of God. Including the command to guard the earth and prohibiting doing anything that damages nature as in Q.S. Al A'raf verse 56. The analysis of the religious text is shown in table 9.

Table 9. Religious Text Analysis

Verse	Focal Point	Keywords
Al Baqarah verse 30 " (Remember) when your Lord said to the angels, 'I want to make a caliph on earth.' They ask, 'Do you want to make a destructive person and shed blood there? We glorify Your name. He said: 'I know what you don't know."	God want to make a caliph on earth Destructive person and shed blood	Caliph, destructive person
Al A'raf verse 56 And do not mischief in the earth after it has been made good. Pray to Him with fear and hope. Verily the mercy of Allah is near to him who does good.	Forbidden to do not mischief in the earth God is near to him who does good.	do not mischief, do the goodness
HR. Tirmidzi "Whoever gives life to the dead earth will be his."	This hadith stated that the person who took care of it has the right to make the land his property. It is a tribute to those who care about the sustainability of the natural environment.	gives life to the dead earth

Systematic review for all evidence

After gathering relevant evidence, then review all evidence by systematic review. In table 10 below, analysis.

Table 10. Systematic Review

Source	Keywords/Relevant Information	Included/Excluded (Code)
Previous Research Analysis (PRA)	<p>TPST Piyungan using the Controlled Landfill method. It is very influential on the water quality.</p> <p>Gases and Lindi produced by TPA, have the potential to damage the environment.</p> <p>Four environmental components have a high risk are air pollution, groundwater pollution, reduced environment aesthetics, and surface water pollution.</p> <p>Waste sorting, waste management, modernization of waste processing.</p> <p>TPST Piyungan overlimit</p> <p>Garbage is coming from household waste, markets, industries, parks, public facilities, tourism, and others</p> <p>Garbage can generate an electric.</p>	<p>Included:</p> <p>waste sorting (PRA1)</p> <p>waste management (PRA2)</p> <p>modernization of waste processing (PRA3)</p> <p>TPST is very influential on the water quality (PRA4)</p> <p>Gases and Lindi damage the environment (PRA5)</p> <p>Garbage can generate an electric (PRA6)</p> <p>Excluded:</p> <p>Controlled Landfill (PRA7)</p> <p>TPST Piyungan overlimit (PRA8)</p> <p>Garbage is coming from household waste, markets, industries, parks, public facilities, tourism, and others (PRA9)</p>
Expertise Analysis (EA)	<p>The financial track, the Sherpa track, implementing policies to deal with Covid-19, Economic recovery</p>	<p>Included:</p> <p>The financial track (EA1)</p> <p>The Sherpa track (EA2)</p> <p>Excluded:</p> <p>Implementing policies to deal with Covid-19 (EA3)</p> <p>Economic recovery (EA4)</p>
Eligible News Analysis (ENA)	<p>Reduce the waste, Community Active Role, Sanitary Landfill, TPST Piyungan was overcapacity, Community as the key to Reduce, Community Role, Garbage Sorted, Manage, Community Obligation, TPST Piyungan is overloaded, waste management, composter, incinerators</p>	<p>Included:</p> <p>Reduce the waste (ENA1),</p> <p>Community Active Role (ENA2),</p> <p>Community Role (ENA2),</p> <p>Community Obligation (ENA2),</p> <p>Community as the key to Reduce (ENA1.2),</p> <p>Garbage Sorted (ENA3),</p> <p>Manage (ENA4),</p> <p>waste management (ENA4).</p> <p>The waste bank (ENA5),</p> <p>The waste volunteers (ENA6)</p> <p>composter (ENA7),</p> <p>incinerators (ENA8)</p> <p>Excluded:</p> <p>Sanitary Landfill (ENA9),</p> <p>TPST Piyungan was overcapacity (ENA10),</p> <p>TPST Piyungan is overloaded (ENA10)</p>

Source	Keywords/Relevant Information	Included/Excluded (Code)
Pioneer Participants (PP)	Urgent, Environment clean, literacy, Recycle the used goods, well organized, Waste reduction, Good enough, running smoothly, Garbage can be money, Helpful, beneficiary, Effective and efficient, Scheduled, transparency, Increase the income, Worthwhile, Continuing, Beneficial program, Good, Sort out the waste.	<p>Included: Environment clean (PP1) literacy (PP2) Recycle the used goods (PP3) well organized (PP4) Waste reduction (PP5) Garbage can be money (PP6) Scheduled (PP7) transparency (PP8) Increase the income (PP9) Worthwhile (PP10) Sort out the waste (PP11)</p> <p>Excluded: Urgent (PP12) Good enough (PP13) running smoothly (PP14) Helpful (PP15) beneficiary (PP16) Effective and efficient (PP17) Continuing (PP18) Beneficial program (PP19) Good (PP20)</p>
Strategic Partners (SP)	Participate in environmental conservation programs wants to turn household waste into gold savings	<p>Included: environmental conservation programs (SP1) turn household waste into gold savings (SP2)</p> <p>Excluded: -</p>
Religious Text (RT)	Caliph, destructive person, do not mischief, do the goodness, gives life to the dead earth	<p>Included: Caliph (RT1) Do the goodness (RT2) gives life to the dead earth (RT2)</p> <p>Excluded: Destructive person (RT3) Do not mischief (RT4)</p>

Problem analysis

The waste in the Piyungan TPST comes from household waste, markets, industries, parks, public facilities, tourism, and others (PRA9). Controlled Landfill (PRA7) and Sanitary Landfill (ENA9) are waste management methods. However, the Piyungan TPST is currently experiencing an over-limit (PRA8; ENA10). According to the participants, this "TH" program is urgent (PP12), good enough (PP13), and can run smoothly (PP14). Looking at the facts, strategic partners also have programs supporting ecology. BSI carries out examples through environmental conservation programs (SP1) and Pegadaian Syariah to turn household waste into gold savings (SP2) programs.

At the same time, an economic downturn caused people's purchasing power to decline. It, of course, also affected people's ability to save. So, it is necessary to take steps that support Economic recovery (EA4).

Requirement analysis

After getting the information needed to develop the features, a requirement analysis is carried out. In this stage, the results of a systematic review are used as a reference in developing application features to suit the needs of stakeholders. Develop these features presented in table 11 below:

Table 11. Requirement Analysis

Feature	Function	Evidence Code
News/Berita	To provide education to the community related to waste.	(PRA3), (PRA4), (PRA5), (PRA6), (ENA1.2), (ENA5), (ENA7), (ENA8), (PP1), (PP2), (PP3), (SP1)
Volunteers Registration/ Registrasi Relawan	To assist waste management at the RT level as a form of community role and obligation to waste management.	(EA2), (ENA2), (ENA4), (ENA6), (RT1), (RT2)
Login	As the user control	
Add Customer/Tambah Nasabah	As a database of people participating in green savings programs. As a form of community role and concern in sorting and managing their waste.	(EA2), (ENA2), (ENA3), (ENA4), (RT1), (RT2)
Record the junk/Catat Sampah	To record the waste that has been sorted and deposited into TH. As a form of waste management at the family level.	(PRA1), (PRA2), (ENA3), (ENA4), (PP3), (PP4), (PP5)
Conversion/Konversi	To record transactions conversion of green savings to gold savings or other forms of investment.	(EA1), (PP6), (PP9), (PP10) (SP2)
Sent the Report/Kirim Laporan	To give transparency of reports to customers.	(PP7), (PP8)

Logical design

At this stage, design related to the business model, system logic, and the interface is carried out. The business model describes the flow of green savings activities. System logic is a programming command for the “TH” application. Meanwhile, the interface is the display layer of this application.

Business Model

In its implementation, “TH” is carried out by employing each family to do waste sorting independently (1). The separated types of waste are an-organic waste (2) and jelantah (3; used cooking oil). The sorted waste is then deposited to the volunteers (4). After that, the volunteer calls the waste processing partner to pick the waste up (5). Then waste processing partners change it by money (6). By volunteers, the money is divided into two parts; 10% of the nominal value of the waste is added to the RT cash balance (7), while 90% is added to the participant's balance (8). After all, participants deposited their waste; the volunteer contacted the waste processing partner to collect it. After the participant's balance has accumulated more than IDR 100,000, the "TH" value is converted into financial institution products such as Gold Savings, Stock, and others (9A, 10A). Participants can exchange their green savings balance

for fruit and vegetable plant seeds for urban farming purposes (9B, 10B). The flow of the "TH" business process is depicted in figure 4 below:

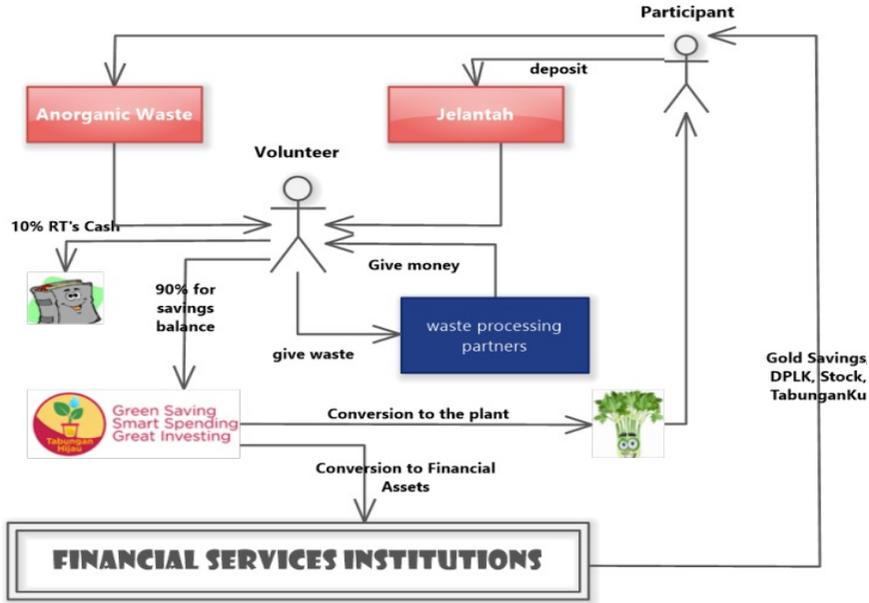


Figure 4. The Business Model of Application "Tabungan Hijau"

Database design and interface

The business model is then translated into a programming language using flutter. An example of coding for the "Green Savings" application can be seen in figure 5, while figure 6 describes the web administrator interface. The user interface can be seen in figure 7.

Conclusion

Based on the result, the development of the Tabungan Hijau (TH) program has an adequate feasibility level. The NPS value of 57.89% shows it. This value means that 57.89% of participants who become the Tabungan Hijau pilot project will share this information with their colleagues. From the qualitative data, it was found that the participants felt that this program was urgent (PP12), good enough (PP13), running smoothly (PP14), helpful (PP15), beneficiary (PP16), and also effective and efficient (PP17). Strategic partners will support this program because it follows its vision and mission (SP1; SP2).

Advancing digital financial inclusion is more effective when efforts from diverse stakeholders are coordinated to encourage cooperation between public and private sectors, such as government agencies, financial regulatory authorities, educational institutions, and financial services providers (OECD, 2020). The development of financial inclusion applications in this study

has involved all stakeholders from the public and private sectors. “TH” can improve funding performance for intermediation institutions by converting “TH” balance into financial services institutions, banks, and non-bank products. With this conversion, people with financial limitations can still have savings or investments without spending money. This business model will support Islamic financial services institutions in realizing Sharia law that concerns muamalah and environmental concerns.

This pro-environmental program uses application technology, making it more inclusive. When viewed from the urgency, this program is beneficial to be carried out and disseminated because it can contribute to reducing the impact of climate change by managing household waste. On the other hand, this program is adaptive in a pandemic situation.

Policy recommendation

This model of financial inclusion with “TH” is easy to replicate. It is because all stakeholders benefit from this program. Volunteers get income, people get “TH” balances to be converted into products from financial service institutions, waste processors get raw materials, the environment becomes clean, and inclusion made by volunteers helps financial service institutions. The result of this research is an application that can integrate financial inclusion activities as financial track actions and activities oriented to environmental sustainability as Sherpa track action. For further research, it can be replicated in other places and broaden stakeholders from the public sector as the policymakers.

As a recommendation for the financial track, they are adding a financial inclusion program with a savings feature that directly impacts ecology. To support this program, the Ministry of Finance and Bank Indonesia need to synergize with the Ministry of Environment and Forestry related to ecological management also Otoritas Jasa Keuangan (OJK). One of the financial inclusion programs that can support the implementation of this synergy is through Laku Pandai agents. Agents from financial institutions, banks, and non-banks, are very close to the community because they live and interact daily in society. These agents can simultaneously become ecological volunteers by adding a waste-saving deposit feature. Furthermore, the agents can carry out the conversion process from waste savings balances to financial institution products. Alternatively, the intelligent behavior agents work with the waste-saving volunteers to facilitate the conversion process carried out by the waste-saving volunteers.

Meanwhile, the Sherpa Track policy synergy can be carried out by the Ministry of Finance and BI with the Ministry of Industry and Trade and the Ministry of Environment and Forestry. Concretely, this policy synergy will strengthen climate change mitigation measures, one of the Sherpa track’s essential points.

```

1 part of 'pages.dart';
2
3 class MainPage extends StatefulWidget {
4   @override
5   _MainPageState createState() => _MainPageState();
6 }
7
8 class _MainPageState extends State<MainPage> {
9   int selectedPage = 0;
10  PageController pageController = PageController(initialPage: 0);
11
12  @override
13  Widget build(BuildContext context) {
14    return Scaffold(
15      backgroundColor: backgroundColorPrimary,
16      resizeToAvoidBottomInset: false,
17      body: Stack(
18        children: [
19          Container(
20            color: backgroundColorPrimary,
21          ),
22          SafeArea(
23            child: Container(
24              color: backgroundColorPrimary,
25            ),
26          ),
27          SafeArea(
28            child: Stack(
29              children: [
30                Container(

```

Figure 5. The Sample of Coding Page of Application “Tabungan Hijau”

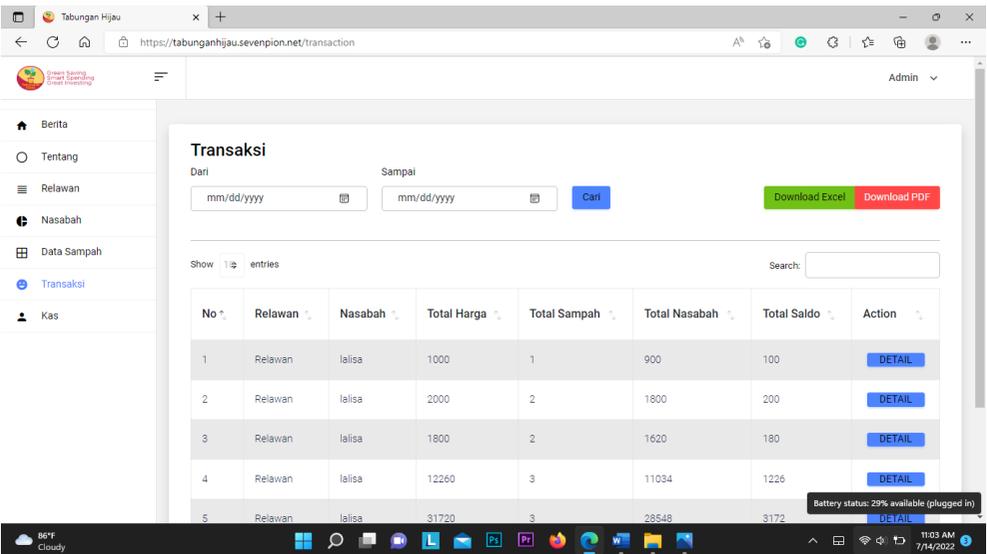


Figure 6. The Sample of Web Administrator Interface

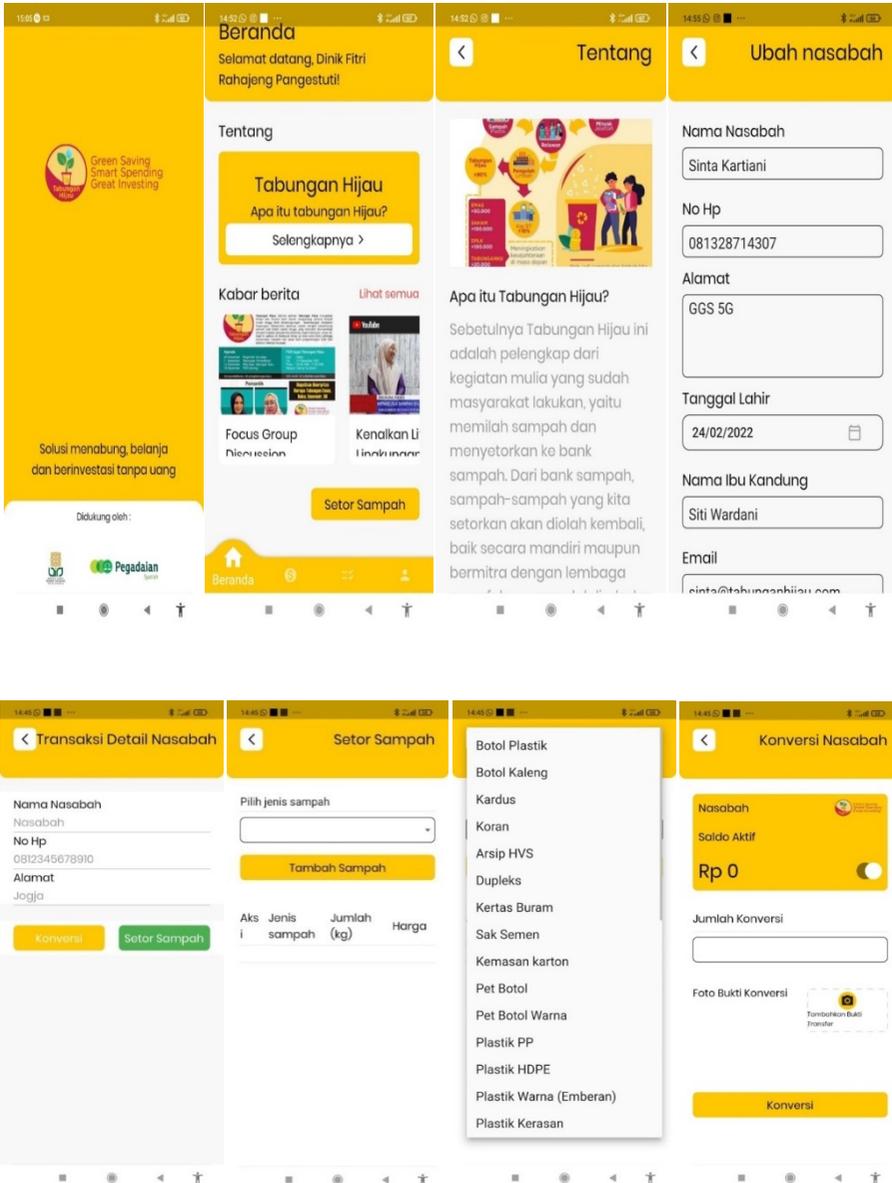


Figure 7. The Sample of User Interface of Application “Tabungan Hijau”

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