Instituto Nacional
de Ciências e Tecnologia de Timor-Leste

Report of INCT Scientific Research 2024

Title of the Research:

Digitalization System for Research Funds Selection
at Technical Secretariat of the Development Fund of Timor-Leste's Human Capital

Name of Principal Investigator:

Arão Ternorio Alves dos Santos, B.Sc., **M.Cs**

Dili, November, 2024

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Knowledge Area: Software Design and Development, Digital Products and Digital Platforms

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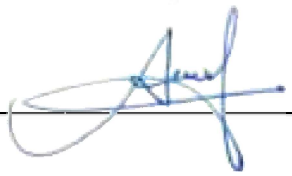
Signature of the Responsible Investigator: 

Digitalization System for Research Funds Selection at Technical Secretariat of the Development Fund of Timor-Leste's Human Capital

ABSTRACT

The Technical Secretariat of the Human Capital Development Fund (FDCH) Timor-Leste, has a mission to contribute to the development of Timor-Leste's human resources in strategic areas of development, through financing multi-year training programs and projects, including existing programs objective to increase training for Timorese professionals. To achieve the objectives of FDCH, especially to promote transparency and accountability through the system, which can facilitate the creation of quick reports for the implementation of programs and training projects, it is necessary to implement the concept of a digitalization system. Digitalization has been identified as the main trend in transforming society and business by adopting digital technology into the organization and its operations. The objective of this research is to create and implement a digitalization system for the selection of research funds in the Technical Secretariat of the Human Capital Development Fund, Timor-Leste. The methodology for the development of this digitalization system will use Agile Software Development (ASD). System development utilizes Codeigniter 4.0 programming language and MySQL Database version 8.0. The results of this research show that the use of a digitalization system can manage research fund data, storage, archive, monitoring, and reporting research fund data through digital platform automation.

Keywords: System; Digitalization; e-Service; e-Government; Research Fund.

INDEX

TABLE INDEX

INDEX OF FIGURES

1. Introduction

1.1 Introduction

The Technical Secretariat of the Timor-Leste Human Capital Development Fund (FDCH) was established to support human resource development in important priority areas, especially in public institutions, to address the need for trained staff and staff with the ability to lead the transition from an income economy low to upper middle income. FDCH has a mission to contribute to the development of Timor-Leste's human resources in strategic areas of development, through funding for multi-year training programs and projects, including programs aimed at increasing training for Timorese professionals. The objective of FDCH is to ensure funding for public investment in human resource training and development. Provide a coordinated government approach, and provide certainty in the negotiation and execution of agreements, programs, and projects that span multiple years. Promote transparency and accountability through systems to report on the implementation of programs and training projects (FDCH, 2011).

To achieve the objectives of FDCH, especially to promote transparency and accountability through the system, which can facilitate the creation of quick reports for the implementation of programs and training projects, it is necessary to implement the concept of a digitalization system. This is in line with the strategic plan of the RDTL government for 2032, focusing on digital development and ICT more specifically, in critical areas that have a significant impact on human and economic development such as providing government services, inclusive economy, health, education, and agriculture (TIC Timor, 2023).

From this strategic plan, mission, and vision, it can be seen that the implementation of the concept and digitalization in government, specifically in FDCH is very good to do. This is reinforced by the reported data on internet use in Timor-Leste until January 2023 with a total of 670.6 thousand or a significant increase of 47,000 (+7.5%) from 2022 (Datareportal, 2023). Also, the results of research conducted by (Siki, 2019) on digital literacy in Timor-Leste specifically in students in the capital Dili, showed that 44% of the level of digital literacy in the good category (level 4) or average.

Some studies related to digitalization in Timor-Leste, especially in the health sector, show that most employees have used technology for their daily work. Regarding the use of digital technology, the ability to apply Microsoft (MS) Word 78.3%, MS Excel 76.7%, and MS PowerPoint 81.7%. For communication technology skills such as email up to 89.2%, WhatsApp application 81.7% and webinar applications such as Zoom and

Google Meet 74.2%, and computer use for the workplace is 72.5%. This study also showed that 96.4% want to increase their knowledge and skills in information, communication, and technology for professional activities (Soares et al, 2024).

The implementation of digitalization has a positive impact and influence on institutions or entities in many countries, such as the application of digitalization in the automotive and media industry in Austria and Hungary which has an impact on business activities including business models, service improvements, and company relationships with customers or employees (Rachinger et al, 2019). The implementation of digitalization in the manufacturing sector in Pakistan also has a positive and significant influence on the optimization of overall processes and decisions (Peng et al, 2023). The use of digital technology in the United States of Europe has been able to improve public services, exchange information, increase openness and transparency, improve relations between government and the public and other stakeholders, and provide solutions to challenges faced by society (Halmos et al, 2019). In addition, the use of other digital technologies in European countries can also increase productivity growth and job opportunities, and digital empowerment is the main key to creating policies to strengthen the labor market (Evangelista et al, 2014). The number of indicators that influence the digitalization process, conducted by (Liang, et al, 2023) includes network infrastructure development, digital technology development, digital talent, and digital technology application. Meanwhile, the most important points for digital transformation specifically in Customer Relationship Management (CRM) (Malenkov, 2021) include the application of big data and cloud computing concepts, digital neuromarketing, the development of new digital business models, and automated business models based on artificial intelligence (Artificial Intelligence-AI). To strengthen the process of digital implementation in government, (Honnon, 2023), including strengthening digital infrastructure, investment to expand broadband internet and reduce the price of internet access, digital capacity, and skills development, establish legal structures and data protection, and collaborate with the private sector and society civilian.

Based on the mission, and strategic plan of the government, study and research on the benefits of digitalization and strengthening public services, transparency, efficiency, and effectiveness, research on digitalization in the selection system of research funds in FDCH is relevant and very important to do. In addition, studies on digitalization in the selection system of research projects in institutions include research conducted (Mufid, 2014) on the decision support system for evaluating activity proposals PNPM-MPd

through the profile matching method and Analytic Hierarchy Process (AHP)). Similar research (Rakhmadi & Rahmawati, 2023) on the implementation of the Simple Additive Weighting (SAW) method to carry out financial aid proposal selection in Sharia financial institution BMT Sejahtera Mandiri. Another research done by (Andreswari et al, 2021; Widyawati et al, 2019) on decision support system selection proposed a web-based student creativity program.

Based on direct observation and interviews in the FDCH of the researcher (2024) showed that yet in its system to process and manage selection fundus research is, on the other hand already a system for management to scholars and others. From these problems, its researcher wants to research how to create a Digitalization system to propose a fundus survey to reduce the time required to select funds, increase transparency and accountability of all decisions in FDCH, and increase the contribution of the institution to support innovation and technology skills development in Timor-Leste.

1.2 Theoretical-Practical Framework or State of the Art/Literature Review

1.2.1 Information Systems

Information systems are an important management tool that helps organizations to operate in the global economy. From a business perspective, an information system provides a solution to a problem or challenge faced by a company and provides economic value to the business (Peneva & Ivanov, 2016).

Information systems have made dynamic development according to their ability to enhance business performance. An organization that is managed effectively and, often shows optimal performance utilizing information systems. Thus the electronic system can be utilized for operational process automation and business efficiency and performance (Lutfi, 2022). Research findings and empirical evidence show that information systems are facilitators to enhance performance and major transformation in an organization (Abdullahi et al, 2024).

1.2.2 E-Government

E-Government has become a popular topic in the last decade and has become an interesting topic globally (Fan & Pan, 2023). *e-Government* is a global project that uses information and communication technology to provide services to increase public interaction and increase transparent innovation (Nguyen, 2024). *e-Government* services are created to simplify the administration process increase citizen involvement and create a new governance model after involving citizens in the decision-making process and

increasing transparency (Hashim, 2024). *E-Government* services depend on information infrastructure, communication including network facilities, and other critical technology assets to ensure availability of supply, effectiveness, and efficiency (Nicola et al, 2016). To develop *e-government,* it is necessary to change the idea of traditional administration, rethink the function of governance, and redesign the organizational structure, culture, and work processes of government based on the development *of e-government. The development of e-government* information systems shows a clear path, especially in terms of speed, quality, service, and other aspects (Li, 2016). *Online government* services are usually considered the main component of *e-government*, which has generated significant interest not only among practitioners and scholars but also among policymakers due to their very crucial role in enhancing the governance capacity of the country (Chen & Chen, 2024).

1.2.3 E-Service

Digitalization in proactive public services can reduce the administration process for customers, with automatic form-filling services can reduce costs (Scholta, 2023). The use of information technology is a fundamental mission for governments around the world to improve public services (Luna et al, 2024). Digital services in the public sector are considered the most crucial aspect of the reform of the administration system, digital services also have significant political implications for the digital transition to government in the digital world era. (Zhu et al, 2024).

Points for electronic services according to (Buyannemekh et al, 2024) are (1) system quality, which is the most significant factor in influencing the use of digital services and user satisfaction; (2) satisfaction and use, which are components of digital understanding and user satisfaction to contribute to public value *and* measured by comfort, flexibility, and ability to simplify the process; (3) *public value* as a measure of the impact and success of digitalization services from the perspective of citizens.

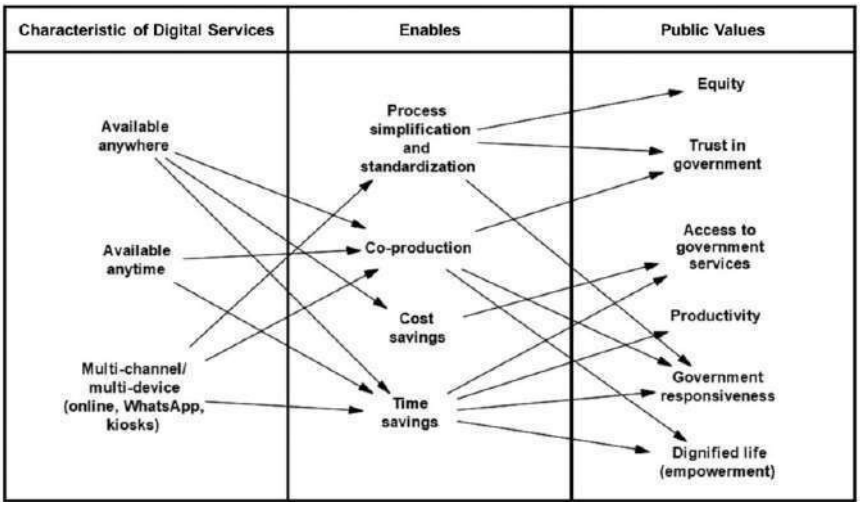


Figure 1.1. Public Values About Using Digital Services

1.2.4 Digitalization

Over the years, the government has leveraged various technologies to streamline internal operations for efficiency and create value through public services through digital provision, including citizen services (Buyannemekh et al, 2024). Digital technology has changed the course of the economy and international trade significantly, and digital trade services can also be a dissemination of transnational knowledge and can be an innovation for the development of international cooperation systems (Wen et al, 2023). Digitalization has been identified as the main trend in transforming society and business by adopting digital technology into the organization and its operations (Parviainen, 2017). Digital innovation has significantly transformed the creation and appropriation of products, services, and facilitation, and transformed entire innovative industry processes (Nambisan et al, 2017).

Digital transformation in the workplace not only involves the adoption of technology but can also redesign the workplace, change equipment, and require changes to the character of activities in the work process (Selimović et al, 2021). Transform to digitalization requires the application of appropriate government policies to make the management of digital processing more modern and efficient (Vasiliev et al, 2020). Digital transformation programs focus on increasing efficiency and productivity through systems, but digital maturity also involves a change of mindset in the organization, and increasing *soft skills* such as transparency, openness, and shareability (Fletcher & Griffiths, 2020). Organizations must increase their maturity for digital because less digital organizations will not be flexible compared to organizations that have used mature digital (Fletcher,

2020). Digital transformation efforts can also be through optimization and shaping strategies to support governance (Yang, 2024).

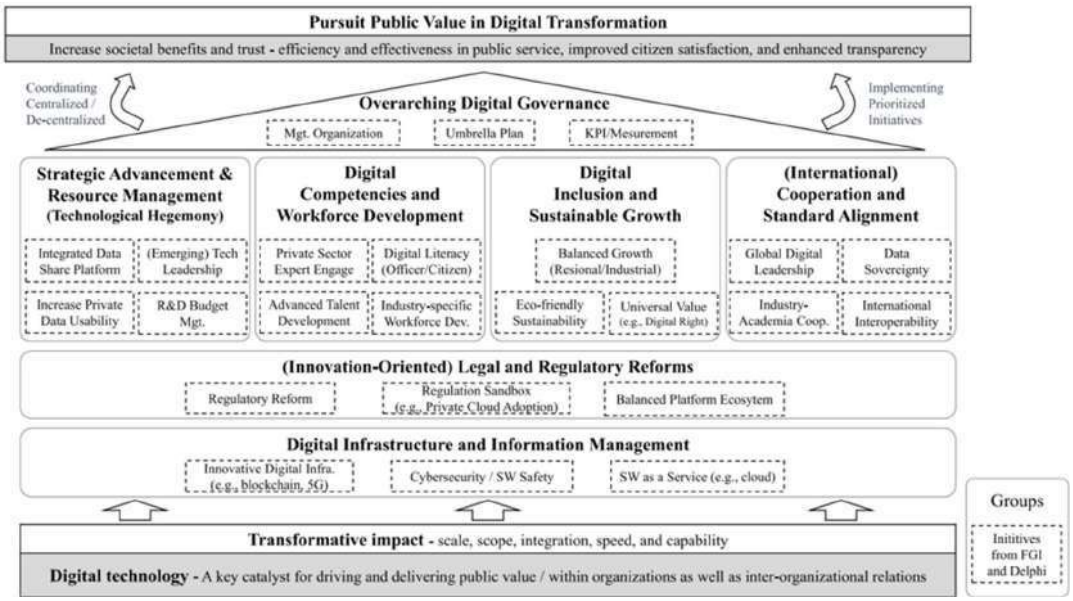


Figure 1.2. Public Values About Digital Transformation

1.3 Problematization or Problem Formulation

How to develop a digitalization system for the selection process of research funds in the Technical Secretariat of the Human Capital Development Fund, Timor-Leste?

1.4 Formulation of Hypotheses

The development of a digital system for the selection process of research funds in the Technical Secretariat of the Human Capital Development Fund, Timor-Leste, will strengthen public service, transparency, efficiency, and effectiveness in the management and distribution of research funds.

1.5 Objectives

1.5.1 General Objectives

The objective of this research is to create a digitalization system for the selection of research funds in the Technical Secretariat of the Human Capital Development Fund, Timor-Leste.

1.5.2 Specific Objectives

1. To facilitate and shorten the time for applicants to apply, view, obtain information, and monitor research funds through digital platform automation.

2. To facilitate and facilitate FDCH to manage fund data, storage, archive, monitoring, and reporting of research fund data through digital platform automation.

1.6 Significance of Research

1. Digitalization of the research fund selection system at FDCH aims to increase efficiency, transparency, and accountability in the research fund selection process.
2. To facilitate the FDCH to facilitate the management, storage, and process of archiving research fund data.
3. To facilitate applicants to apply for proposals, obtain information on funds, and monitor fund activities through digital platforms.
4. Through digitalization, the system can ensure fund selection data to the right stakeholders and can support data-based decisions.

1.7 Work Organization

The steps in this research consist of the following steps:

1. **Step One:** Preparation of introduction (contextualization), theoretical framework, formulation of the problem, formulation of hypothesis, purpose, importance of the study, and geographical location conditions of the research.
2. **Step Two**: Focus on the methodology for the development of digitalization systems using Agile Software Development (ASD) to help the research team work quickly by dividing the work in each part so that the work can run in parallel. This method will focus on stages such as collecting research fund data from FDCH, designing a new system based on the data collected, and finally developing a fund digitalization system.
3. **Third**: Presentation of results, discussion, and conclusion

1.8 Geographic Location

This research was conducted at the Technical Secretariat of the Human Capital Development Fund (FDCH), Dili Timor Leste, located in Nicolao dos Reis Lobato Street, Colmera Suco, Vera Cruz Administrative Post, Dili District.

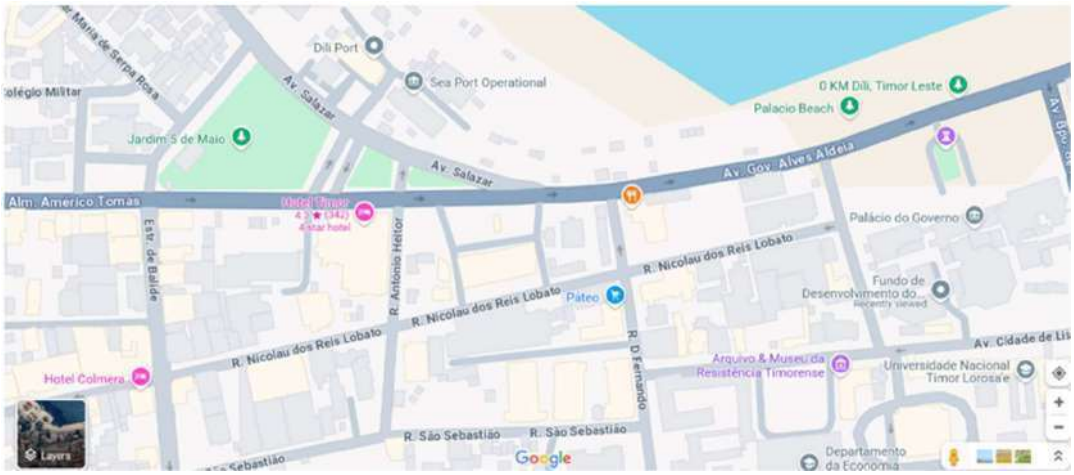


Figure 1.3. Location Map of the Human Capital Development Fund

2. Research Methodology

2.1 Time and Place of Research

The time and place of this research were conducted at the Technical Secretariat of the Human Capital Development Fund, Dili for 5 months from May to September 2024.

2.2 Data Collection Techniques

The process of collecting this data, through documentation studies such as the process of selection of research funds, evaluation, and research activity report including other documentation related to research funds, according to FDCH standards. These data will be collected by the competent authorities related to the processing of research at FDCH.

2.3 Observation

The objective of observation is to obtain various data and information to resolve or answer problems that arise, related to research. In this phase, the researcher will observe directly the competent part related to the operation of the ongoing research fund selection system and the infrastructure of the digitalization system.

2.4 Interview

To strengthen the researcher in the analysis, design, and development of this digitalization system, the researcher will conduct direct interviews and discussions with directors, staff, and other users. Topics related to interviews and discussions on the selection of research funds, evaluation, and reporting of research activities including the conduct of other documentation related to research funds, according to FDCH standards

2.5 Documentation Study

Study documentation to understand the format of proposal submission, evaluation, monitoring, report creation, archiving of annual research reports, and other indicators related to the digitalization of the system

2.6 Population and Sample

According to Sugiyono (2016), a population is a generalized area composed of objects or subjects with certain qualities and characteristics that are determined by the researcher to see and draw conclusions. Meanwhile, according to Arikunto (2013), the population is the totality of the research subject. This means that the population is all the people who have the information to focus on the research. A sample is a part of the amount and characteristics of a population (Sugiyono, 2016). In addition, according to Arikunto (2013) sample is a part or representative of the population to do research.

To select the sample, the researcher will use *nonprobability sampling* with a purposive sampling technique, which is *nonprobability sampling* to limit the sample involved in the research because not all populations have the opportunity to become a sample. *Purposive sampling* is a sample selection technique based on consideration and objectives. This technique has various advantages, especially in the context of research and development of digitalization systems, including focusing on specific groups, time and cost efficiency, comprehensive and qualitative, adaptability to situations, and it is easy to test specific hypotheses (Sugiyono, 2016). The unit that the researcher identified as the sample for this research is 13 people composed of:

Table 2.1. Sample of Research.

Node.	Unit	Total
1	Executive Director	1
2	Deputy Director	1
3	Technical Service Operational Fund Coordinator	1
4	Head of Data Management and Information Technology Unit	1
5	IT Consultant	1
6	IT Staff	3
7	Staff Fund	5
	Total	**13**

2.7 System Development Methodology

The methodology for the development of this digitalization system will use Agile Software Development (ASD) to help the research team work quickly by dividing the work into each part so that the work can run in parallel. ASD can also help the service team to regularly evaluate system requirements and outcomes.

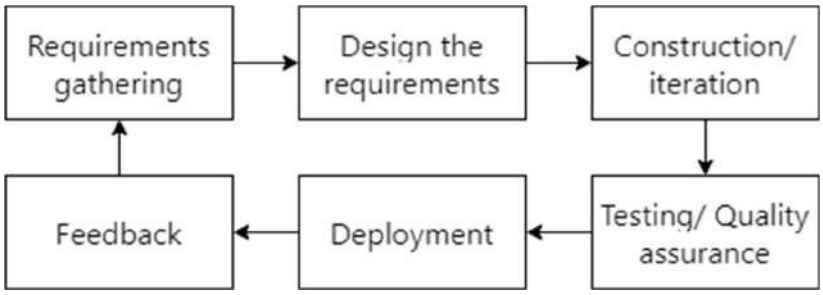


Figure 2.1. Agile Software Development Methodology

2.8 Software Needs

Software needs are very important when it creates programming or any application. Follow programming was used to create a Digitalization system to fundus research this is kind in Table 2.2 Analysis Software List for Data Processing.

Table 2. 2. List of Software for Data Processing (Researcher, 2024)

No.	Software	Description
1	MySQL database version 8.0	Software to store data on research funds at FDCH
2	SQL Yog Editor	Used to create databases, table views, and others as needed in the research fund system at FDCH
3	Codeigniter Programming 4.0	As one of the main programming software to handle research projects
4	Apache web server 2.4	As a web server to run *this* system
5	Visual Studio Code version 1.86	Editor software for *typing scripts* or coding
7	Microsoft Visio 2019 and Mockup	As a model design software and system *interface*

2.9 System Architecture

The system architecture shows the separation of users to access the system for the digitalization of the research fund proposal at FDCH. Users who exist as beneficiaries who can see information and submit their documents, admin with its function to evaluate documents submitted by beneficiaries, and super-admin with its function to manage authorization for users and monitoring including superiors to get general information about the proposal for research funds at FDCH.

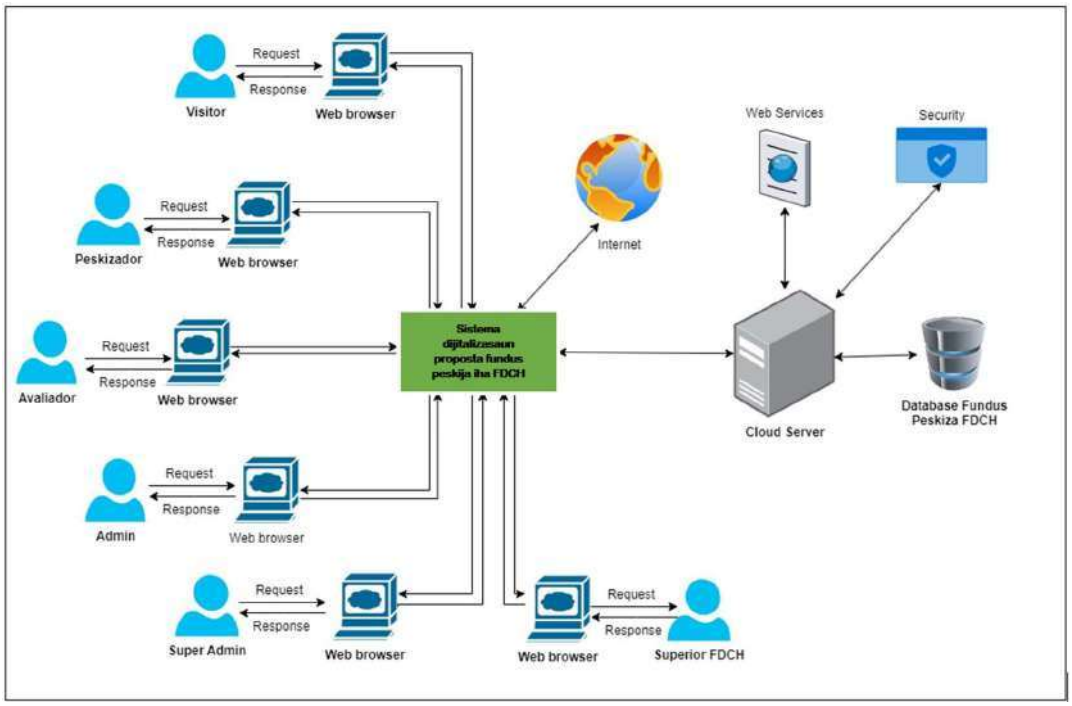


Figure 2.2. Architecture of the Digitalization System of Research Funds at FDCH

3. Results Analysis

3.1. New System Usage Flowchart

This flowchart shows the process of beneficiaries, Admin, and Super-Admin.

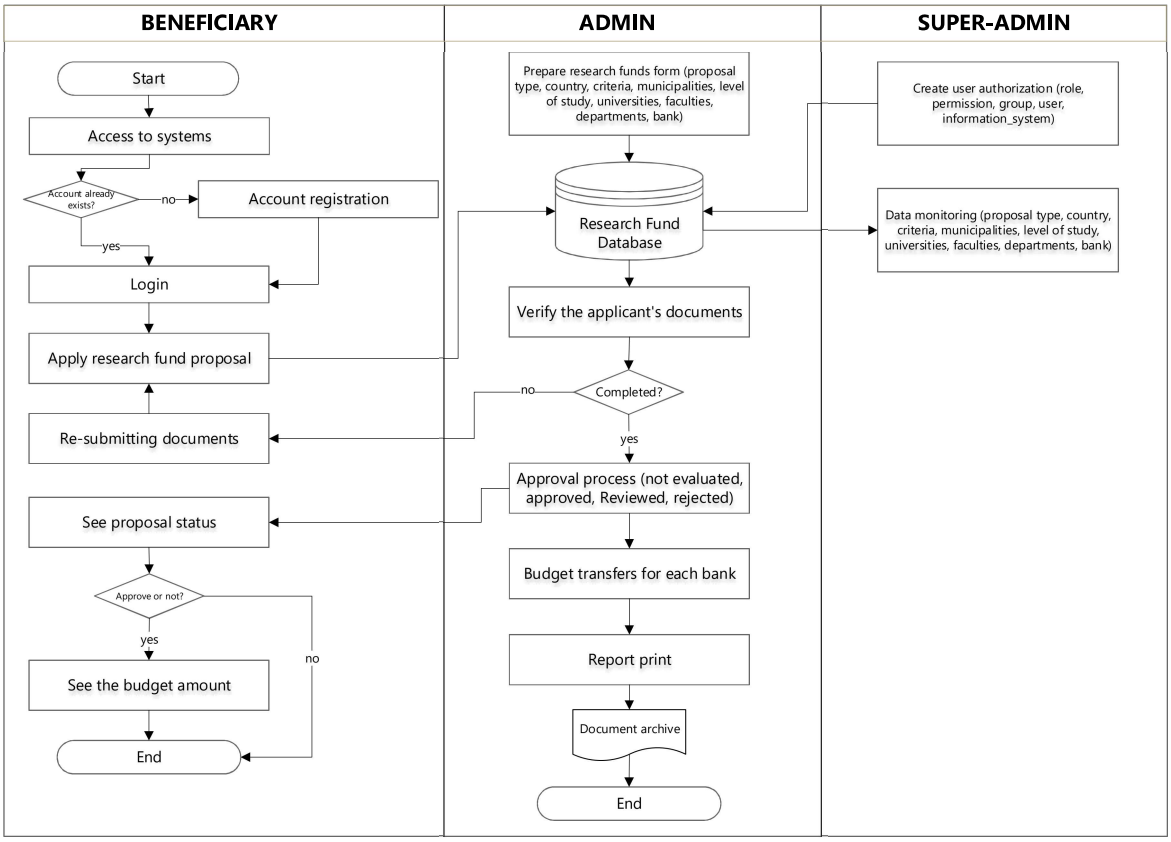


Figure 3. 1. Flowchart of New Research Fund Digitalization System

3.2 Table Structure of the Digitalization System Selection of Research Funds at FDCH

1. Table Structure of Bank

The table structure of the bank consists of data on bank ID, bank name, and bank description, and is shown in Table 3.1.

Table 3.1. Table Structure of Bank

No.	Field Name	Field Type	Length	Description
1	bank_id	Int	16	Primary Key
2	bank_name	Char	250	
3	bank_desc	Varchar	500	
4	created_at	DateTime		
5	updated_at	DateTime		
6	deleted_at	DateTime		

2. Table Structure of Beneficiary

The table structure of the Beneficiary consists of data on apply ID, beneficiary ID, beneficiary name, beneficiary description, beneficiary date of birth, municipality ID, university ID, semester, level ID, faculty ID, department ID, type ID, amount of fund, cash number, bank ID, and bank, country ID, approve, category of criteria, transfer, transfer date and is shown in Table 3.2.

Table 3.2. Table Structure of Beneficiary

No.	Field Name	Field Type	Length	Description
1	aplika_id	char	20	*Primary Key*
2	Benefisiariu_id	Int	16	
3	benefisiariu_name	Char	250	
4	benefisiariu_desc	Varchar	500	
5	created_at	DateTime		
6	updated_at	DateTime		
7	deleted_at	DateTime		
8	benefisiariu_dbirth	Date		
9	munisipiu_id	Int	16	*Foreign Key*
10	universidade_id	Int	16	*Foreign Key*
11	semester	enum('Finalista', '1', '2', '3', '4', '5', '6', '7…		
12	nivel_id	Int	16	
13	fakuldade_id	Int	16	*Foreign Key*
14	departamentu_id	Int	16	*Foreign Key*
15	valor_ipk	Float	12,2	
16	montante_osan	Float	12,2	
17	tipu_id	Int	16	*Foreign Key*
18	montante_aprova	Float	12,2	
19	numeru_kontantu	Char	250	
20	bank_id	Int	16	*Foreign Key*
21	no_bankaria	Char	250	
22	nasaun_id	Int	16	*Foreign Key*
23	aprova	enum('y', 'n', 'c', 'r')		

No.	Field Name	Field Type	Length	Description
24	kriteria_cat	enum('Jeral', 'Estranjeiro')		
25	transferensia	enum('y', 'n')		
26	data_transferensia	DateTime		

3. Table Structure of Detail Criteria

The table structure of detail criteria consists of data on criteria detail ID, apply ID, criteria ID criteria name, criteria description, criteria approval, criteria file, created date, updated date, deleted date, criteria category, and beneficiary ID as shown in table 3.3.

Table 3.3. Table Structure of Detail Criteria

No.	Field Name	Field Type	Length	Description
1	criteria_detid	Char	20	*Primary Key*
2	aplika_id	Char	20	*Foreign Key*
3	criteria_id	Int	16	*Foreign Key*
4	criteria_name	Char	250	
5	criteria_desc	Varchar	500	
6	criteria_aporva	enum('y', 'n')	-	
7	criteria_file	Char	250	
8	created_at	DateTime	-	
9	updated_at	DateTime	-	
10	deleted_at	DateTime	-	
11	kriteria_cat	enum('Jeral', 'Estranjeiro')	-	
12	benefisiariu_id	Int	16	

4. Table Structure of Departments

The table structure of detail criteria consists of data on department ID, department name, department description, create date, update date, and delete date as shown in Table 3.4.

Table 3.4. Table Structure of Departments

No.	Field Name	Field Type	Length	Description
1	departamentu_id	Int	16	*Primary Key*
2	departamentu_name	Char	250	
3	departamentu_desc	Varchar	500	
4	created_at	DateTime	-	
5	updated_at	DateTime	-	
6	deleted_at	DateTime	-	

5. Table Structure of Faculties

The table structure of faculties consists of data on faculty ID, faculty name, description, create date, update date, and delete date as shown in Table 3.5.

Table 3.5. Table Structure of Faculties

No.	Field Name	Field Type	Length	Description
1	fakuldade_id	Int	16	*Primary Key*
2	fakuldade_name	Char	250	
3	fakuldade_desc	Varchar	500	
4	created_at	DateTime	-	
5	updated_at	DateTime	-	
6	deleted_at	DateTime	-	

6. Table Structure of Groups

The Table Structure of Groups consists of data on, group ID, group name, create date, update date, and delete date as shown in table 3.6.

Table 3.6. Table Structure of Groups

No.	Field Name	Field Type	Length	Description
1	group_id	Int	10	*Primary Key*
2	group_name	Char	250	
3	group_desc	Varchar	500	

No.	Field Name	Field Type	Length	Description
4	created_at	DateTime	-	
5	updated_at	DateTime	-	
6	deleted_at	DateTime	-	
7	posmenu	Int	5	
8	group_active	enum('y', 'n')	-	
9	group_icon	Char	250	

7. Table Structure of System Information

The table structure of system information consists of data on information ID, information name, and system description as shown in Table 3.7.

Table 3.7. Table Structure of System Information

No.	Field Name	Field Type	Length	Description
1	infosystem_id	Int	16	*Primary Key*
2	infosystem_name	Char	250	
3	infosystem_img	Char	250	
4	infosystem_desc	Text	-	
5	publish_img	enum('y', 'n')	-	
6	created_at	DateTime	-	
7	updated_at	DateTime	-	
8	deleted_at	DateTime	-	

8. Table Structure of Criteria

The table structure of criteria consists of data on criteria ID, criteria name, active criteria, criteria description, create date, update date, and delete date as shown in Table 3.8.

Table 3.8. Table Structure of Criteria

No.	Field Name	Field Type	Length	Description
1	kriteria_id	Int	16	*Primary Key*
2	kriteria_name	Char	250	
3	kriteria_ativu	enum('y', 'n')	-	
4	kriteria_desc	Varchar	500	

No.	Field Name	Field Type	Length	Description
5	created_at	DateTime	-	
6	updated_at	DateTime	-	
7	deleted_at	DateTime	-	
8	kriteria_cat	enum('Jeral', 'Estranjeiro')	-	

9. Table Structure of Municipal

The Table Structure of Municipal consists of data on municipal ID, municipal name, municipal description, create date, update date, and delete date as shown in Table 3.9.

Table 3.9. Municipal Table Structure

No.	Field Name	Field Type	Length	Description
1	munisipiu_id	Int	16	*Primary Key*
2	munisipiu_name	Char	250	
3	munisipiu_desc	Varchar	500	
4	created_at	DateTime	-	
5	updated_at	DateTime	-	
6	deleted_at	DateTime	-	

10. Table Structure of the Country

The table structure of the country consists of data on country ID, country name, country description, create date, update date, and delete date as shown in Table 3.10.

Table 3.10. Table Structure of the Country

No.	Field Name	Field Type	Length	Description
1	nasaun_id	Int	16	*Primary Key*
2	nasaun_name	Char	250	
3	nasaun_desc	Varchar	500	
4	created_at	DateTime	-	
5	updated_at	DateTime	-	
6	deleted_at	DateTime	-	

11. Table Structure of the Education Level

The table structure of the education level consists of data on education level ID, education name, education description, create date, update date, and delete date as shown in Table 3.11.

Table 3.11. Table Structure of the Education Level

No.	Field Name	Field Type	Length	Description
1	nivel_id	Int	16	*Primary Key*
2	nivel_name	Char	250	
3	nivel_desc	Varchar	500	
4	created_at	DateTime	-	
5	updated_at	DateTime	-	
6	deleted_at	DateTime	-	

12. Table Structure of the Notification

The table structure of the notification table consists of data on notification ID, register ID, notification description, create, update, and delete as shown in table 3.12.

Table 3.12. Table Structure of the Notification

No.	Field Name	Field Type	Length	Description
1	notification_id	Int	16	*Primary Key*
2	register_id	Int	10	*Foreign Key*
3	notification_desc	Varchar	500	
4	created_at	DateTime	-	
5	updated_at	DateTime	-	
6	deleted_at	DateTime	-	

13. Table Structure of the Permission

The table structure of the Permission table consists of data on permission ID, permission name route, group ID, permission description, create, update, and delete as shown in table 3.13.

Table 3.13. Permission Table Structure

No.	Field Name	Field Type	Length	Description
1	permission_id	Int	10	*Primary Key*
2	permission_name	Char	250	

No.	Field Name	Field Type	Length	Description
3	route_name	Char	250	
4	group_id	Int	10	*Foreign Key*
5	permission_desc	Varchar	500	
6	created_at	DateTime	-	
7	updated_at	DateTime	-	
8	deleted_at	DateTime	-	

14. Table Structure of the Register

The table structure of the Register table consists of data on the register, name register, email register, user register, password register, and Figure register as shown in Table 3.14.

Table 3.14. Register Table Structure

No.	Field Name	Field Type	Length	Description
1	register_id	Int	10	*Primary Key*
2	register_name	Char	250	
3	register_email	Char	250	
4	register_user	Char	250	
5	register_pass	Char	250	
6	register_img	Char	250	
7	register_active	enum('y', 'n')	-	
8	register_token	Char	250	
9	token_expire	enum('y', 'n')	-	
10	created_at	DateTime	-	
11	updated_at	DateTime	-	
12	deleted_at	DateTime	-	

15. Table Structure of the User Role

The table structure of the user role table consists of data on rule ID, role name, rule description, create date, update date, and delete date as shown in Table 3.15.

Table 3.15. User Role Table Structure

No.	Field Name	Field Type	Length	Description
1	role_id	Int	10	*Primary Key*
2	role_name	Char	250	
3	role_desc	Varchar	500	
4	created_at	DateTime	-	
5	updated_at	DateTime	-	
6	deleted_at	DateTime	-	

16. Table Structure of the Research Type

The table structure of the research type table consists of data as type of research ID, name of research type, research type description, create date, update date, and delete date as shown in table 3.16.

Table 3. 16. Search Type Table Structure

No.	Field Name	Field Type	Length	Description
1	tipu_id	int	16	*Primary Key*
2	tipu_name	char	250	
3	tipu_desc	varchar	500	
4	created_at	DateTime	-	
5	updated_at	DateTime	-	
6	deleted_at	DateTime	-	

17. Table Structure of the Token

The table structure of the token table consists of data on token ID, token, user ID, create date, update date, and delete date as shown in Table 3.17.

Table 3.17. Token Table Structure

No.	Field Name	Field Type	Length	Description
1	id	int	11	*Primary Key*
2	token	char	250	
3	user_id	int	10	
4	created_at	DateTime	-	

No.	Field Name	Field Type	Length	Description
5	updated_at	DateTime	-	
6	deleted_at	DateTime	-	

18. Table Structure of the University

The table structure of the university table consists of data on university ID, university name, university description, create date, update date, and delete date as shown in Table 3.18.

Table 3.18. University Table Structure

No.	Field Name	Field Type	Length	Description
1	university_id	int	16	*Primary Key*
2	university_name	char	250	
3	universidade_desc	varchar	500	
4	created_at	DateTime	-	
5	updated_at	DateTime	-	
6	deleted_at	DateTime	-	

3.3 Entity Relationship Diagram

This Figure will show the relationship between the tables in the system which consists of the applicant table, admin, user table, applicant table, bank table, country table, university table, faculty table, department table, and type table The proposal is as shown in Figure 3.1.

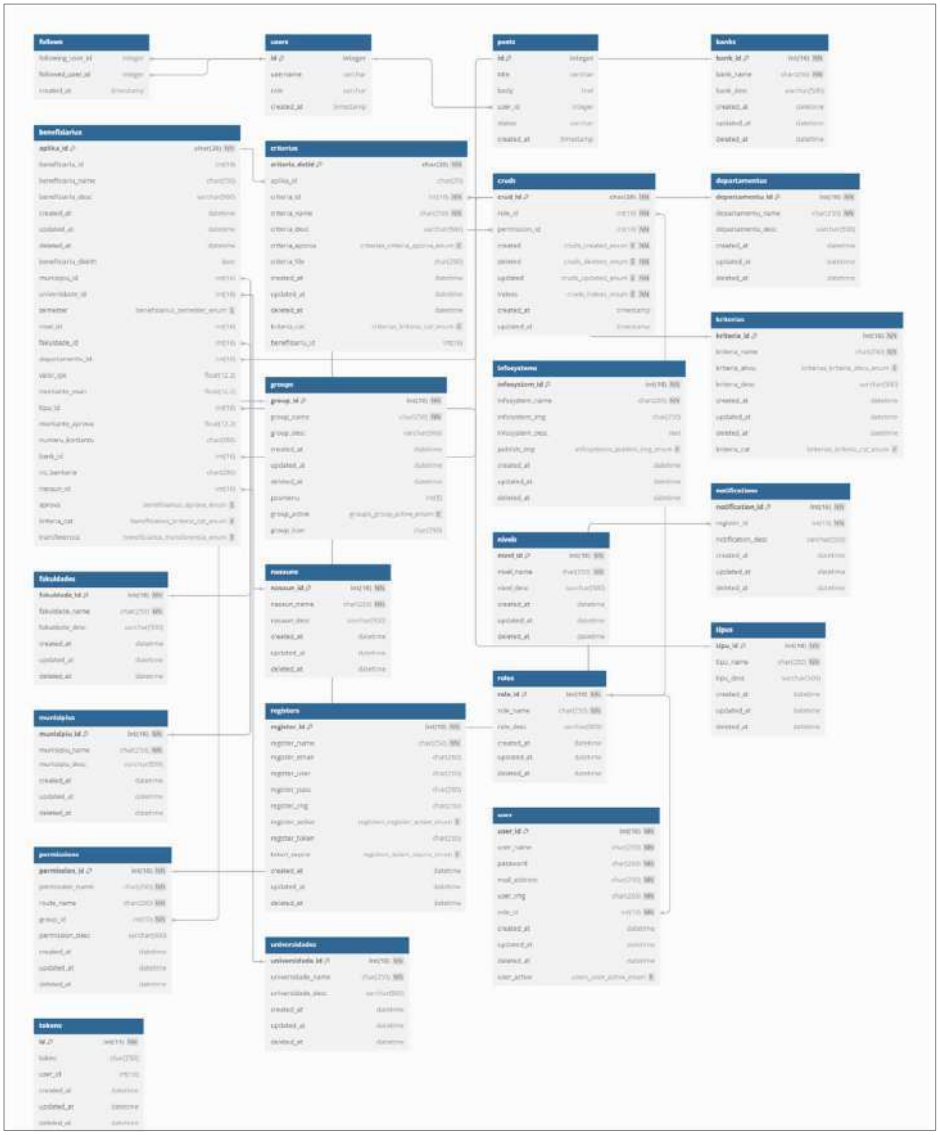


Figure 3.2. Entity Relationship Diagram

3.4 Interface Design

3.4.1 Design the Login Interface for the FDCH Research Fund System

This interface design will be used by applicants to log in for the proposed system fundus survey. In this regard, the Applicant will fill in their User ID and Password, as shown in the following Figure 3.3.

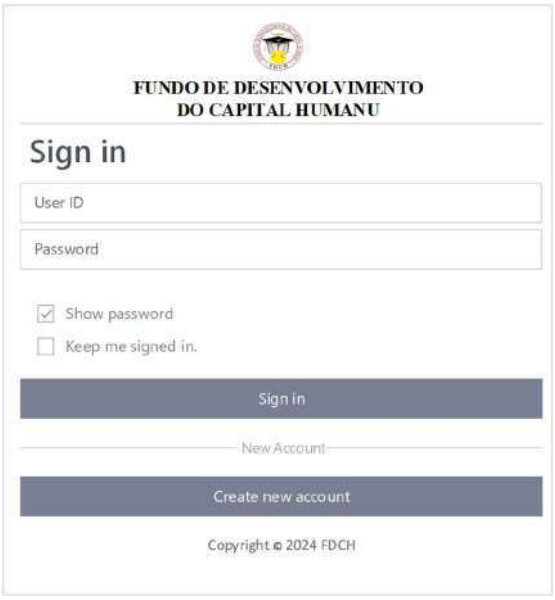


Figure 3.3. Design the Login Interface for the FDCH Research Fund System

3.4.2 Interface Design for Application Funds Research at FDCH

Interface design applies fundus research, as a form for applicants to apply documents required such as full name, date of birth, country, email, contact number, municipality, university, faculty, department, semester, GPA, proposal type, amount of money, bank and bank account, as shown in the following figure 3.4.

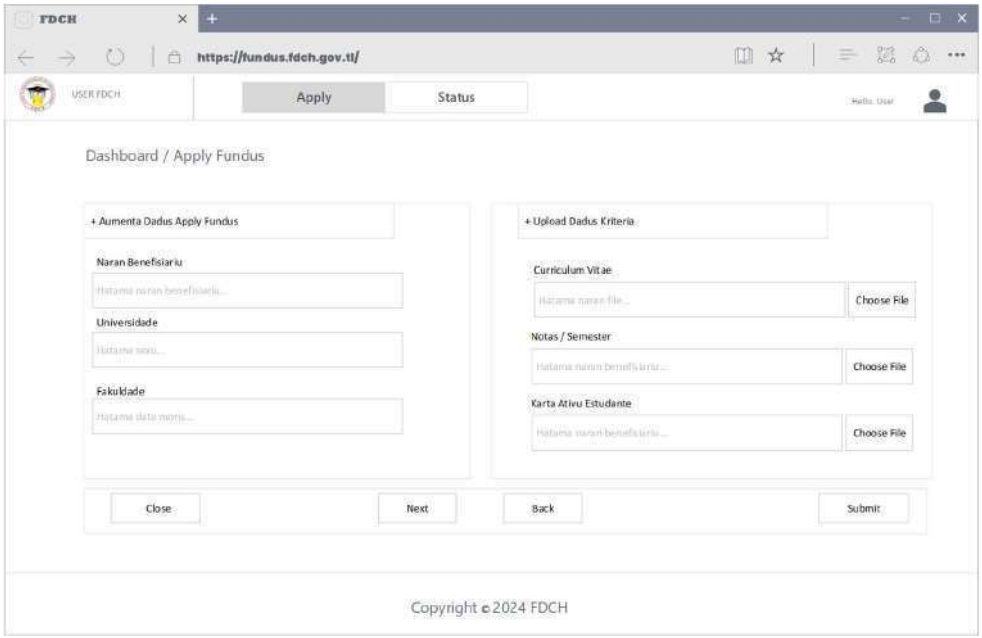


Figure 3.4. Interface Design for Application Funds Research at FDCH

3.4.3 Interface Design for Apply Research Funds at FDCH

Drawing in the interface to apply this search fund, such as a form for applicants to know the approval status of the documents they have submitted, as shown in Figure 3.5 below:

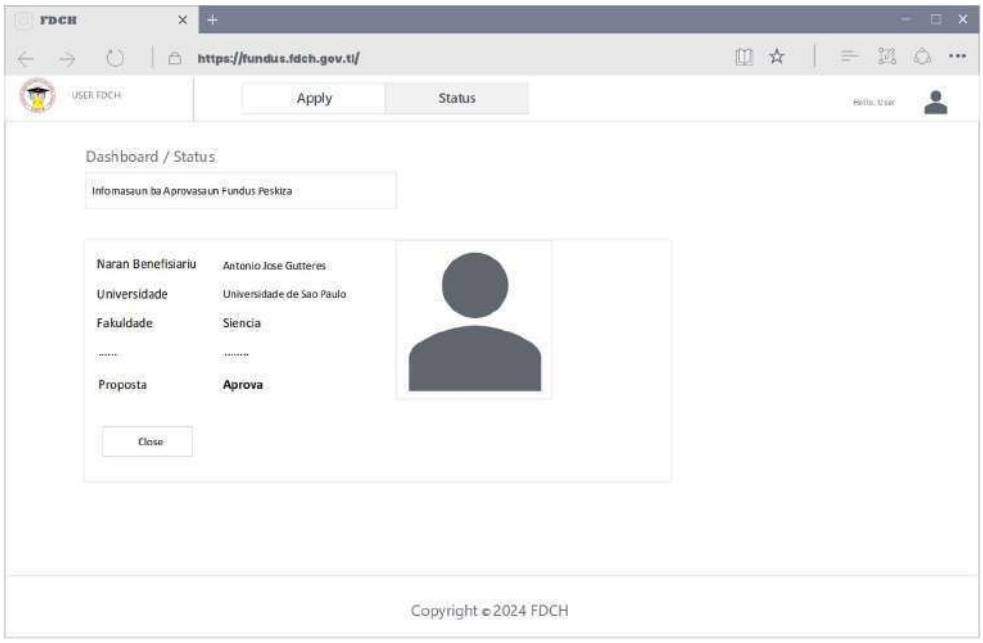


Figure 3.5. Interface Design for Apply Research Funds at FDCH

3.4.4 Interface Design for Admin Dashboard in the FDCH Research Funding System

Drawing in the interface to this d dashboard admin, as the admin homepage that will be used to process research fund data. In this dashboard, there will be main menus and sub-menus such as master data, beneficiary data, approval data, and reports, as shown in Figure 3.6.

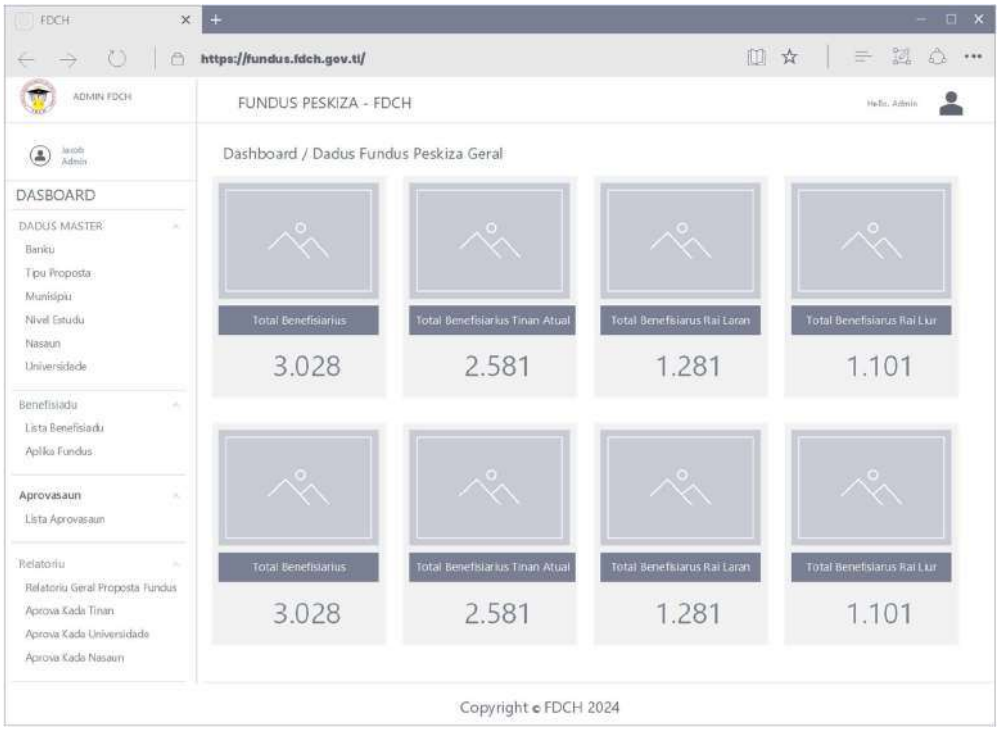


Figure 3.6. Interface Design for Admin Dashboard in the FDCH Research Funding System

3.4.5 Interface Design for Beneficiary Data

The design of the interface for the processing of beneficiary data, as this form will be used by the admin to see the data of beneficiaries, for example, the total number of

beneficiaries, documents that they apply according to the criteria or not, and other documents, such as in picture 3.7.

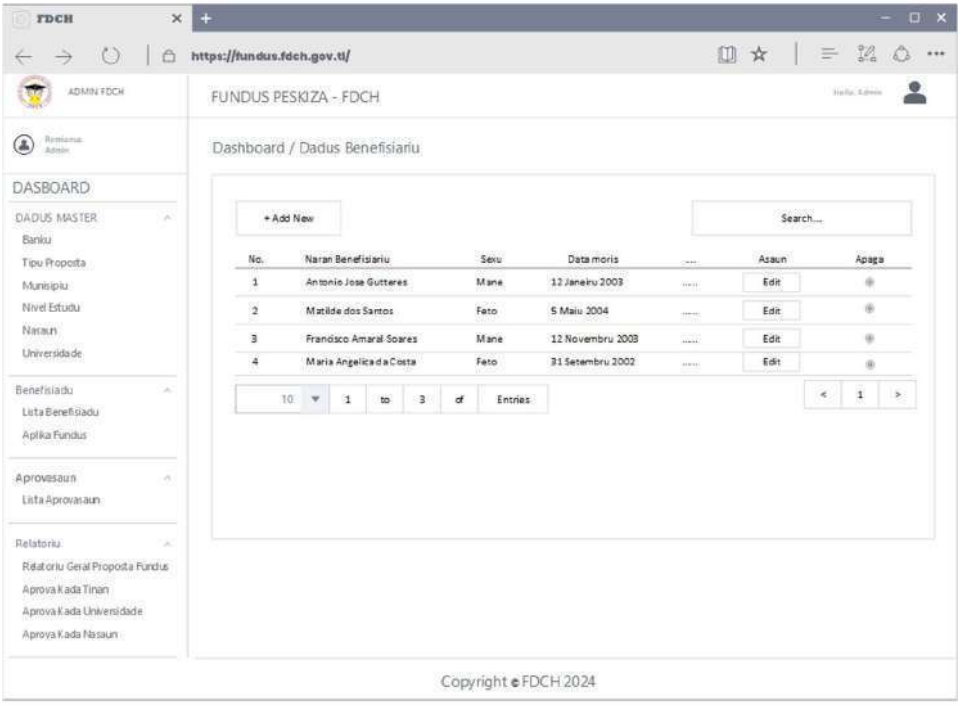


Figure 3.7. Interface Design for Beneficiary Data

3.4.6 Interface Design for Funds Approval Data

Drawing in the interface to processing a proof of this fund, as this form will be utilized by admin to make approval as "Not Evaluated, Approved, Rejected and Reviewed" to the proposed funds submitted by the beneficiaries, as in the following Figure 3.8:

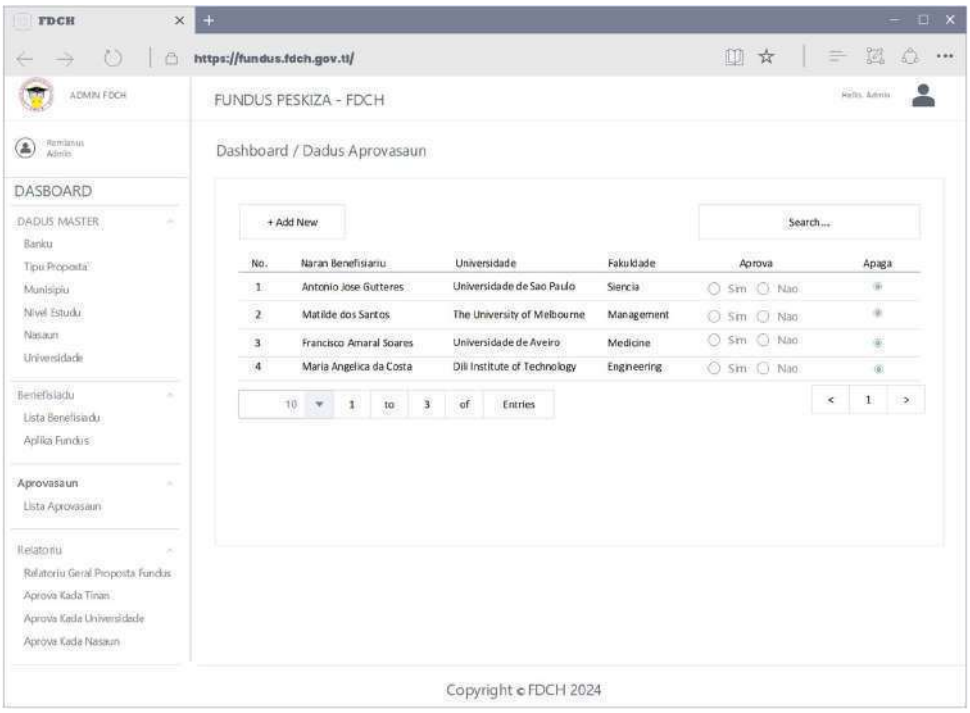


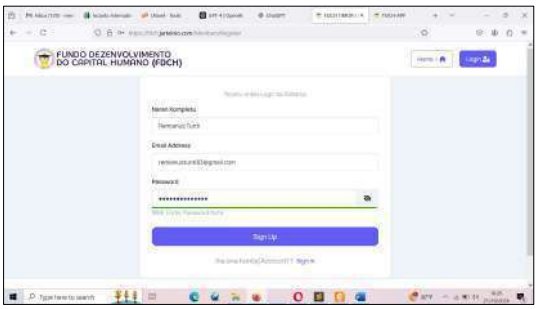
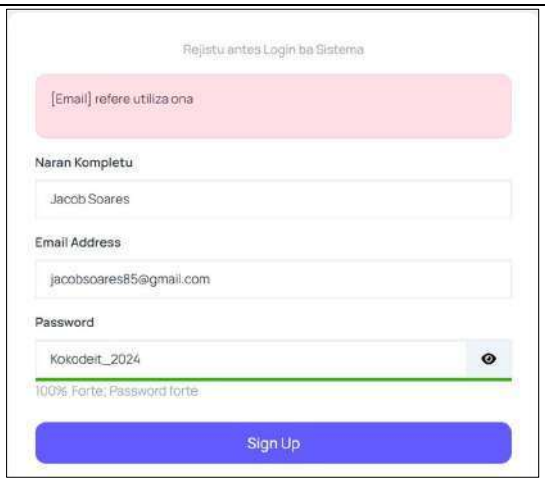
Figure 3.8. Interface Design for Funds Approval Data

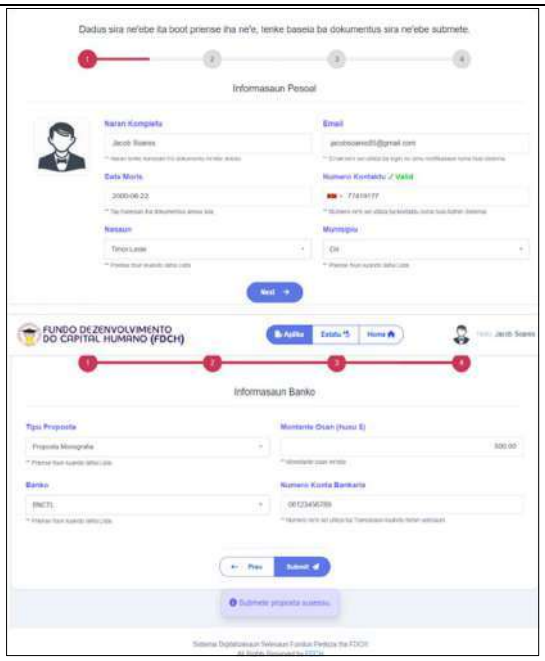
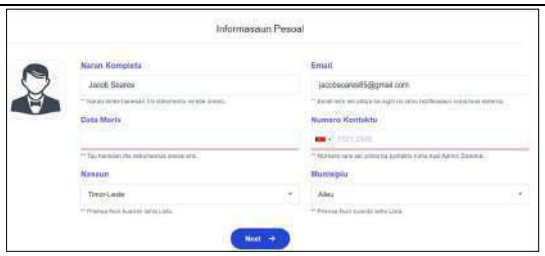
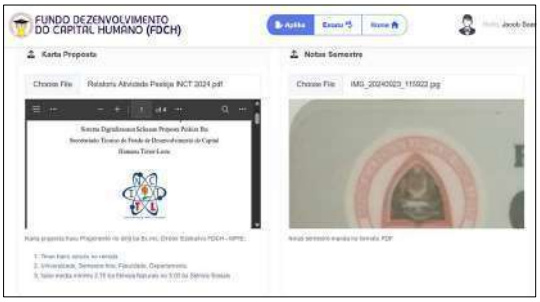
3.5 Testing the Research Proposed Fund Selection System

3.5.1 Functionality Testing for Applicant

In the table, a show test of the functionality of the system was used by the part applicant.

Table 3. 19. Functionality Testing for Applicant

No	Test Case Description	Interface	Input	Outcomes
1	Test registration for new user		Valid date as username, email, and password	The user has successfully registered and received the notification
2	Tests register race u n to the email address that already exists.		Which email exists already	Confirmation message: "Email requires ste good".
3	The password verification test is invalid.		Enter an invalid password.	Confirmation message: "Invalid password ".

No	Test Case Description	Interface	Input	Outcomes
4	Applicant form fill test.		Data complete and valid	The form is saved and the user gets a notification.
5	Testing fills the incomplete form.		Given incomplete	Confirmation message: “ field all photos should fill ”
6	Test upload the file that larger capacity.	 	Valid files cannot be larger than (Max size: 2MB)	Confirmation message: “ file cannot be huge thought of 2 mb ”

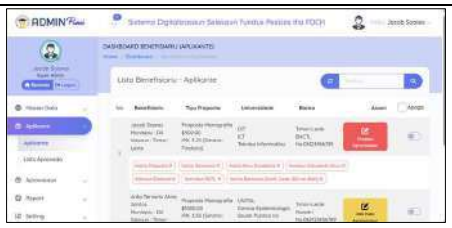
No	Test Case Description	Interface	Input	Outcomes
7	Test upload files that do not match the format		Valid file u is kind JPEG and PDF	Confirmation message: " file does not follow Layout "
8	Applicant data verification test		Data applicant which is not valid	Show data that is appropriate and expected outcome assessment.
9	Applicant data verification test		Data applicant which is not valid	Show data that is appropriate We are getting already outcome evaluation and waiting for the transfer.
10	Test notification for approval of funds to an applicant		Approval status data and transfer	Applicant receives notifications to approval fundus with transfer

No	Test Case Description	Interface	Input	Outcomes
				status already.

3.5.2 Functionality Testing for Admin

In the table, a show test about the functionality of the system was used on the admin side.

Table 3.20. Functionality Testing for Admin

No	Test Case Description	Interface	Input	Outcome
1	Test login to the admin		Valid date as username, email, and password	Admin logged in successfully and received a notification
2	Test login with incorrect credentials		Invalid password	Error message: “ Admin name or password is not true "
3	Test view list of submissions		Demonstrate data submission	Shows a list of all incoming applications
4	Application Details Verification Test		approval to criteria proposal	Show full details of the application.
5	Testing approves the application.		Submission ID valid	status changes to “Approved”

6	Application rejection test		data submission	The submission's status changes to “Rejected”
7	Submission Cleanup Test		data valid submission u	Data submission has been successfully deleted and is not listed.
8	Admin account managemen t test		Edit admin profile	Changes are saved with success.
9	Report access submission test		Report to submission	Display criteria-based submission report
1 0	Test the notification settings.		Edit settings	Notification settings saved successfully.

3.6 Discussion of Results

3.6.1 Applicant Research Proposal Selection System Interface

In this interface as the first page of the research proposal selection system, applicants will register before logging in to apply their proposal as shown in Figure 3.9.

Figure 3.9. Applicant Research Proposal Selection System Interface

3.6.2 Registration Interface for Applicants

In this form, applicants will first register in the system, data that must be filled in by applicants such as the applicant's full name, active e-mail, and password, as shown in Figure 3.10.

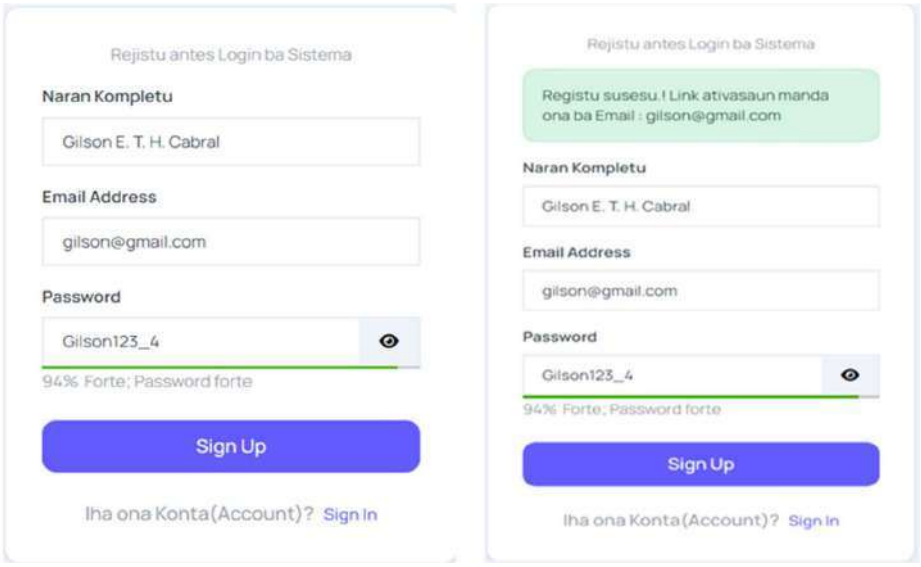


Figure 3.10. Interface Registered Before Login

3.6.3 System Login Interface

In this interface, applicants will log in to the system using their registered email and password to continue applying their research proposal.

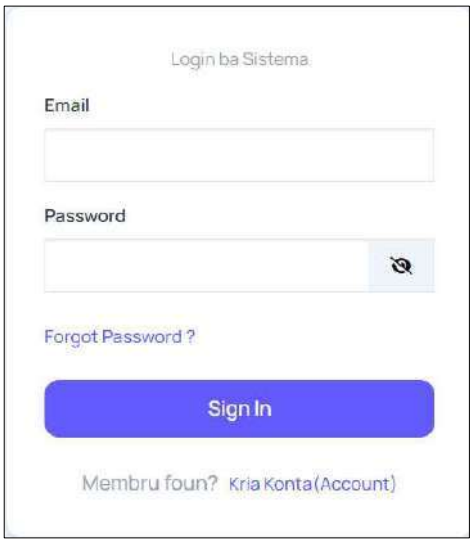


Figure 3.11. System Login Interface

3.6.4 Research Proposal Selection Interface

In this interface, when applicants want to apply their research proposal, they must click on the button "Apply" to apply their research proposal and important documents, through a form and on the button "Status" to see their status on whether their application has been approved or not. The following is the Figure of the applicant form as shown below.

Figure 3. 12. Research Proposal Selection Interface

3.6.5 Applicant Form Interface

In this interface is a form for applicants to apply for documents required such as full name, date of birth, country, email, contact number, municipality, university, faculty, department, semester, GPA value, proposal type, amount of money, bank and bank account as shown in Figure 3.13.

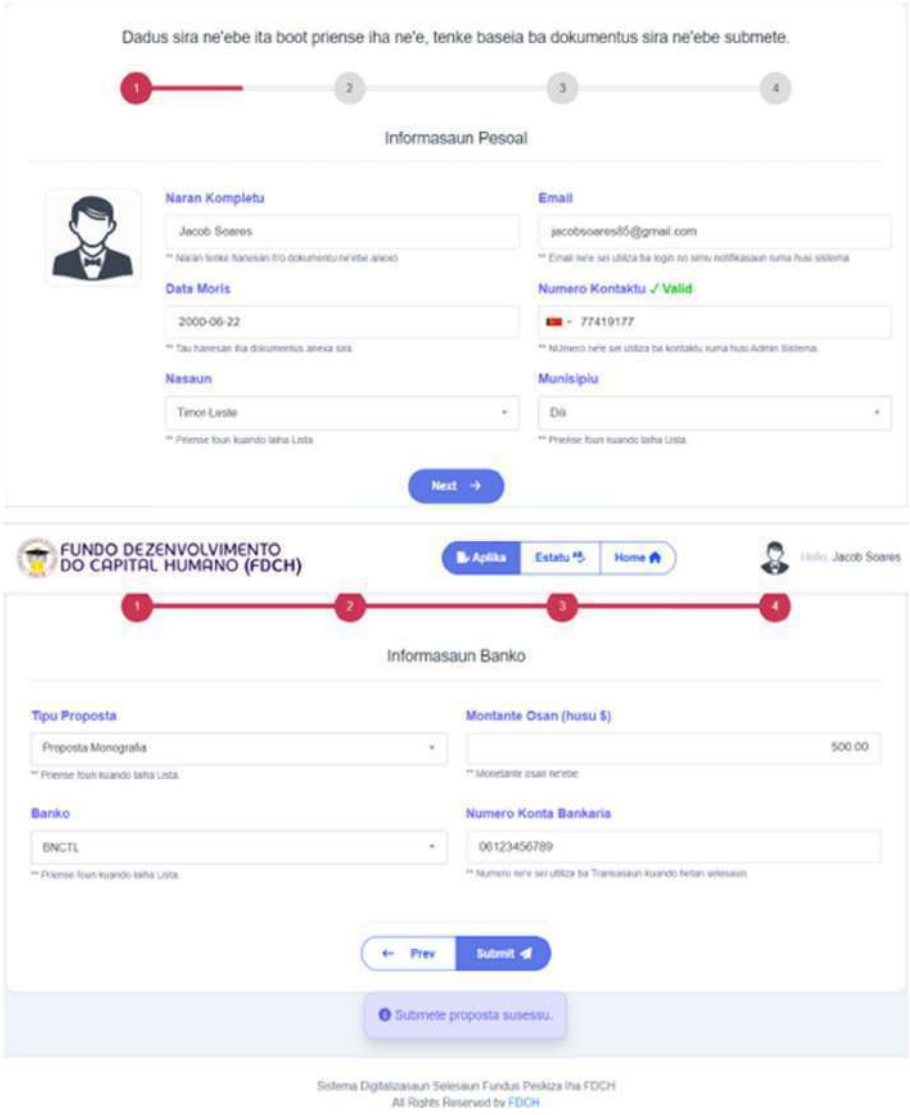


Figure 3.13. Applicant Form Interface

3.6.6 Applicant Interface to view the Status of the Research Proposal

In this interface, applicants can see whether their research proposal has been approved by the evaluators or not as shown in Figure 3.14.

Figure 3.14. Proposed Applicants List and Status Interface

3.6.7 Applicant Interface to view the Status of the Research Proposal

In this interface, applicants can see whether their research proposal has been approved by the evaluators or not and, how much budget has been approved, and has been transferred as shown in Figure 3.15.

Figure 3.15. Interface of List and Approval Status of Research Proposal Budget

3.6.8 Interface Login as Admin to Enter the System

In this interface login to the system as admin because admin can evaluate the proposal that applicants submit.

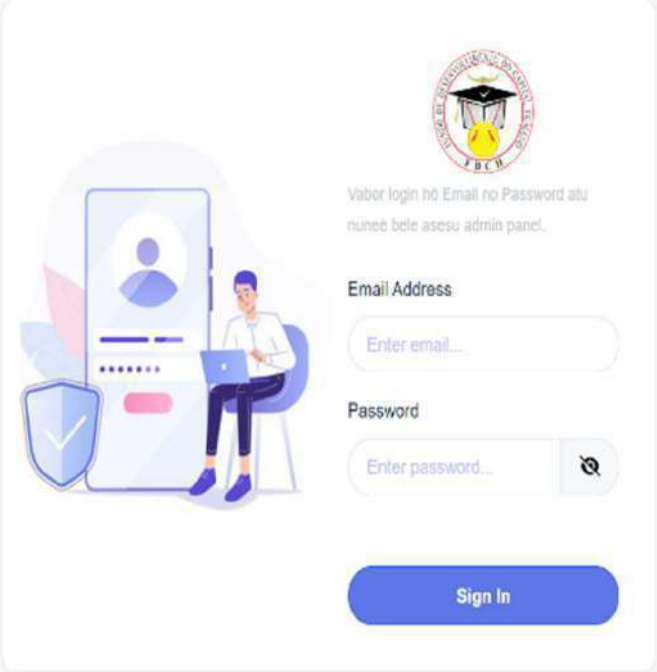


Figure 3.16. Interface Login as Admin to Enter the System

3.6.9 Admin Dashboard Page Interface

In this admin home page interface, there are main menus and sub-menus, Master data, Applicant, Approval, and Report. This form itself has many sub-menus similar to Master Data with its sub-menu: Bank, Proposal Type, Municipality, Education Level, University, Faculty, Department, and Criteria. The Applicant Sub Menu is the Applicant and Approval List. The Approval sub-menu is the Approval List. The Report sub-menu is General Report, Annual Report, Country Report, and University Report as shown in Figure 3.17.

Figure 3.17. Interface Home Page Admin

3.6.10 Beneficiary Data Interface

In this interface the admin can see the data of the beneficiaries, for example, the total number of beneficiaries, the documents they apply according to the criteria or not, and the type of proposal, and all these data will be evaluated directly by the admin (the competent part of FDCH) and approve the applicants' proposal as shown in Figure 3.18.

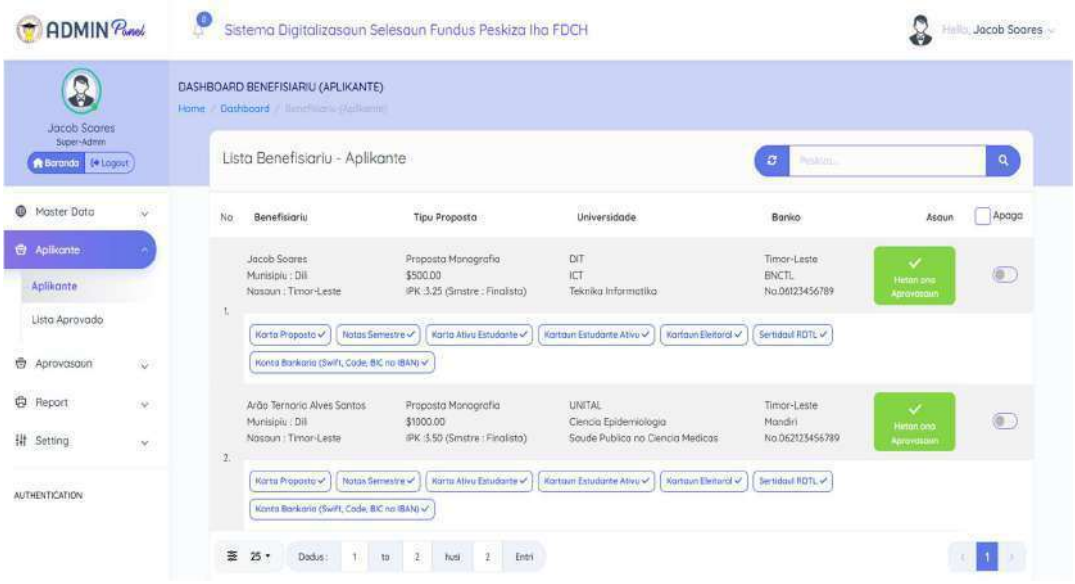


Figure 3.18. Data Beneficiary Interface

3.6.11 Interface Approval of Applicant proposal.

In this interface, will evaluate the documents that applicants submit, in this form admin will choose options based on applicants' documents. These options are "Not Evaluated,

Approved, Rejected, and Reviewed", there are also some descriptions that require comments based on the option that the admin has chosen as in Figure 3.19.

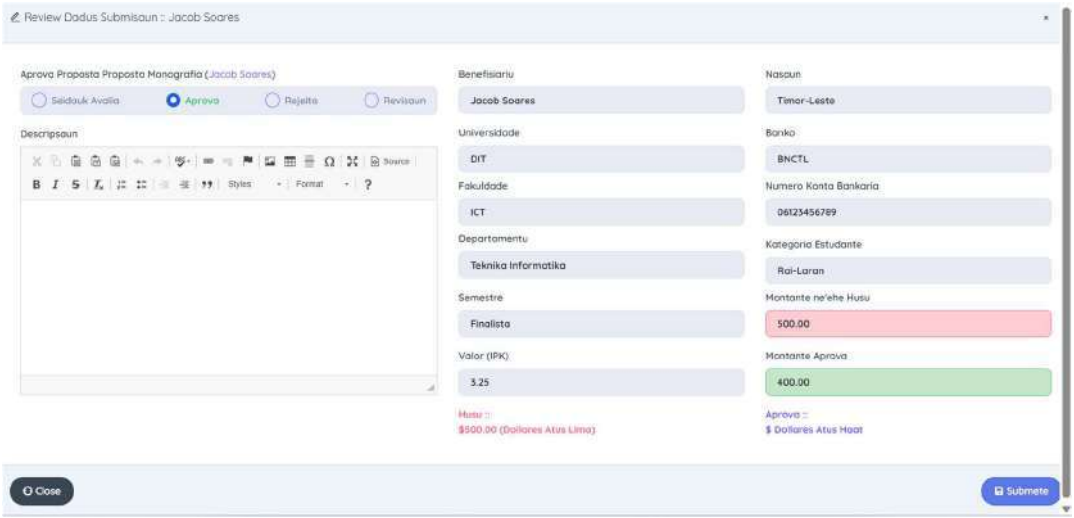


Figure 3.19. Beneficiary Data Interface

3.6.12 Beneficiary Approved List Interface

In this interface, the admin can see the list of approved beneficiaries who have been approved such as the name of the beneficiary, type of proposal, university, and bank account that they have applied.

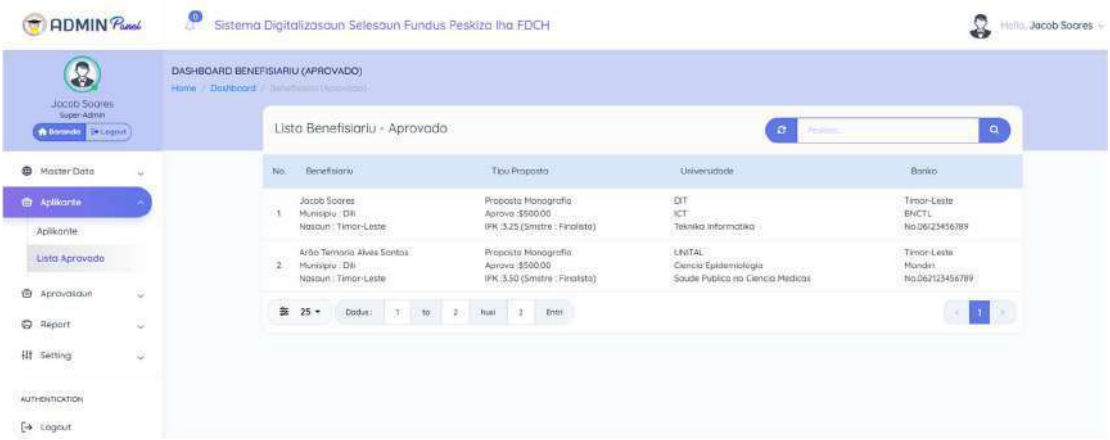


Figure 3.20. List of Beneficiary Approval

3.6.13 Beneficiary Transfer Approved List Interface

This interface is the admin part to see the total data of beneficiaries and see if the status of beneficiaries has been approved or not, as in Figure 3.21.

Figure 3.21. Beneficiary Transfer Approved List Interface

3.6.14 Beneficiary Transfer Approved Interface

In this interface, the admin will select the password and comment in the description about whether the transfer has been made or not, as shown in Figure 3. 22.

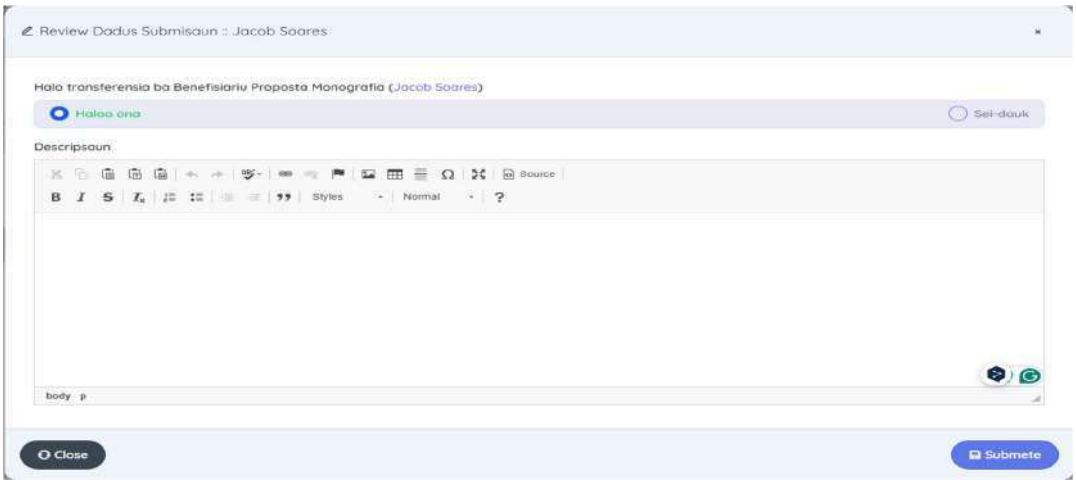


Figure 3.22. Beneficiary Transfer Approved Interface

3.6.15 Interface Approved Research Funds for Applicants

In this interface, information about the approval of research proposals is published and transferred to applicants through the bank account that they submitted as shown in Figure 3.23.

Figure 3.23. Interface Approved And Transferred To Beneficiary

3.6.16 Beneficiary General Reporting Interface

This general report interface will display a general report on all applicants in this interface, you can also see the total budget that the applicant mentioned in the proposal and how much the total budget was approved. In this section, you can see details about the report per year, the report per country, and the report per university, as shown in Figure 3.24

Figure 3.24. General Reporting Interface

4. Conclusion and Recommendations

4.1. Conclusion

Based on the results and discussion, it can be concluded that the development and implementation of the digitalization system for research funds has a great influence on all aspects of research fund data processing. Here are some conclusions that can be mentioned as:

1. The researcher has developed a digitalization system for the selection of research funds in the Technical Secretariat of the Human Capital Development Fund (FDCH), Timor-Leste.
2. All applicants who need funds can apply through the system that has been created and can upload all documents as requirements for the funding proposal online. Then the applicant can see and get information about the approval of funds and know the total budget.
3. The admin part can manage all data about research funds, check and evaluate documents from applicants, can approve, disapprove reject, and monitor the overall system.
4. Overall, the use of this research fund digitalization system facilitates and facilitates beneficiaries to apply for funding proposals, monitor

4.2. Recommendations

1. With the creation of this system, it is hoped that it can be implemented and used in the funds of the Technical Secretariat of the Human Capital Development Fund (FDCH), Timor-Leste.
2. The digitalization system for the selection of research funds in the Technical Secretariat of the Human Capital Development Fund (FDCH), Timor-Leste is web-based and can be run on equipment such as mobile, laptop, and PC. It is hoped that in the future this system can be developed for Android and OS platforms.

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Attachments

Relatório Foto de Atividades de Pesquisa

Sistema Digitalizasaun Selesaun Proposta Peskiza Iha Secretariado Técnico do Fundo de Desenvolvimento do Capital Humanu Timor-Leste

Periodo / data	**Atividades**	**Evidencias**
20 de Marco de 2024	Foto hamutuk ho ijamindador principal nain rua (Dr. Abel Pires no Dr. Cancio Monteiro) depois de halo aprejentasaun proposta peskija ba primeiru periode	
11 de Abril de 2024	Foto hamutuk ho presidente INCT Dr. José Cornelio Guterres, Ph.D, iha momentu asina kontratu peskija iha salaun INCT Balide Dili	
14 de Julho de 2024	Foto iha momentu lori karta peskija husi INCT ba entrega iha FDCH Timor Leste	
27 de Maio de 2024	Ekipa peskijador husi INCT halo diskusaun ho director geral FDCH Sr. Julio Apariceo ho nia membru sira iha edefisio FDCH konaba Sistema Digitalizasaun Selesaun Proposta Peskiza	
22 de Julho de 2024	Ekipa peskijador Kontinua halo diskusaun ho parte ICT FDCH nian konaba prosesu selesaun proposta peskija	

Periodo / data	**Atividades**	**Evidencias**
14 de Agusto de 2024	Ekipa peskijador husi INCT halo diskusaun ho director geral FDCH Sr. Julio Apariceo ho nia membru sira iha edefisio FDCH konaba Sistema Digitalizasaun Selesaun Proposta Peskiza	
16 de Setembru de 2024	Ekipa peskijador kontinua halo teste ba Sistema selesaun proposta peskija	

DEMOCRATIC REPUBLIC OF EAST TIMOR

NATIONAL INSTITUTE OF SCIENCE AND TECHNOLOGY

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RESEARCH QUESTIONNAIRE

For the Development of the Digitization System for the Selection of Research Funds in the Technical Secretariat of the Human Capital Development Fund (FDCH), Timor-Leste

FROM THE TEAM:

Arão Ternorio Alves Santos, B.Sc., M. Cs

Remianus Tunti, S.Com., M.T.

Jacob Soares, B.Sc., M.T.

Ofelia Cizela da Costa Tavares, B.Sc., M.T.

MAY, 2024

STATEMENT LETTER

Reach out to :

Technical Secretariat of the Human Capital Development Fund (FDCH), Timor-Leste

Subject : ***Request Availability to fill out the Questionnaire***

In Place

To the respondent whom we respect,

To facilitate researchers to obtain information on the development of the Research Fund Selection Digitization System at the Technical Secretariat of the Human Capital Development Fund (FDCH), we humbly request the availability of time for you to fill in and answer the questions we have prepared. This questionnaire aims to know information from you, to develop a digitalization system for the selection of research funds. All data and information provided by you are considered confidential and used only for this research.

We would also like to express our gratitude to the ladies who are willing to fill out this questionnaire.

No, 27 May 2024

Research Team Leader,

Arão Ternorio Alves Santos, B.Sc., M. Cs

1. What is your name and position?

Full Name	:_____
Position	: _____
And. Phone	:_____

2. What is the process of selecting funds for research projects that have been carried out during this time?

3. Did you have any difficulties recapping research project funding selection data? (Yes/No)

4. What problems did you encounter when selecting research project funds during this time? (Example: Data could not be opened, data lost)

5. How do we manage research project fund selection data?
   (Example: Using Excel, Writing by Manual)

6. What is the procedure for selecting research project funds to assist candidates who will receive the funds?

7. What are the steps to select research project funds to help candidates who receive funds?

8. Is there a team of its own to select the project to help with the research project budget?

9. If there is a team, which team determines or compiles the proposal?

10. How and what are the criteria for evaluating this proposal?

11. After the selection process, how do you disclose information about the final selection results to the candidates?

12. How does the data archive model select fund proposals that deserve and do not deserve to receive aid, so that one day it can be reopened?

13. Is the concept of reporting going on now?

14. Further comments on the budget aid proposal selection system: