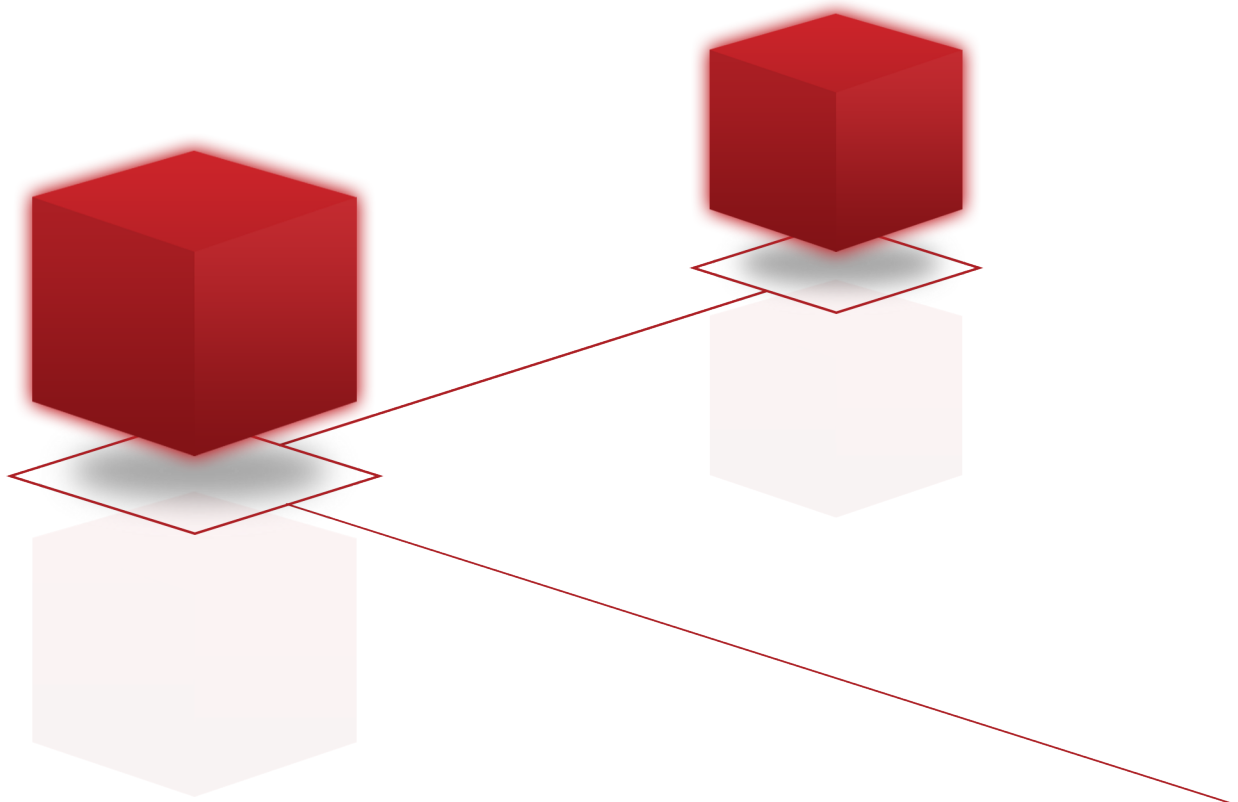




FEASIBILITY STUDY REPORT

**BLOCKCHAIN
TRIAL AND
OTHER
TECHNOLOGIES
TO SUPPORT THE
BANGGA PAPUA
PROGRAM**

February 2021



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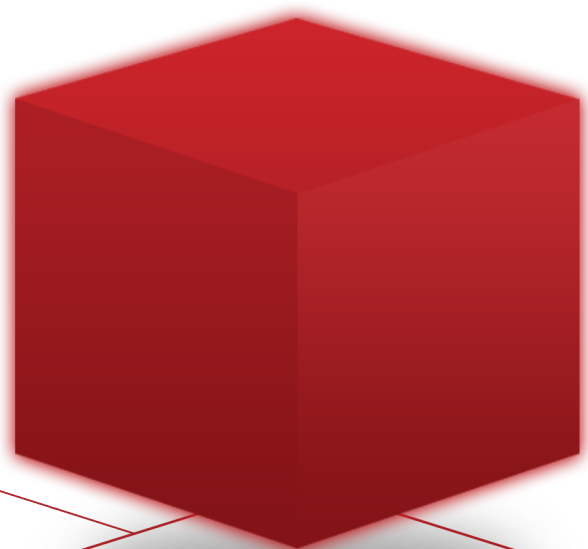
Written by:

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February 2021

KOMPAK

Kolaborasi Masyarakat dan Pelayanan untuk Kesejahteraan
Kemitraan Pemerintah Australia - Indonesia



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Glossary

API	Application Programming Interface – Software that can receive requests and provide answers to other software.
Automated Teller Machine (ATM)	Machines for customers to withdraw money.
BANGGA Papua	<i>(Bangun Generasi dan Keluarga Papua Sejahtera)</i> Building the Welfare of Papuan Generations and Families)
Biometrics	The measurement of physical and behavioural characteristics to identify individuals.
Blockchain	Technologies for data storage, management and utilisation that are decentralized, transparent, immutable and secure.
Consensus algorithm	Procedures within the blockchain that are agreed upon by the parties in the network.
Cryptography	Techniques for encoding data so that it cannot be legible to the naked eye, for maintaining the confidentiality of information.
CS	Customer Service – Bank Papua staff who receive customers at the office.
Database	A collection of data that is stored and managed systematically in a computer.
Database Administrator	The person responsible for managing the database.
<i>Dinas Kependudukan dan Catatan Sipil (Disdukcapil)</i>	Population and Civil Registration Office; the governmental office that manages population data.
Distributed ledger technology	A data storage technology that is coherent, decentralised, and accessible to parties in the network.
<i>Kartu Keluarga (KK)</i>	Family Card; identity documents of individuals in a family.

Kartu Tanda Penduduk (KTP)	Citizen ID; individual identity documents issued by the Indonesian Government.
KOMPAK	<i>(Kolaborasi Masyarakat dan Pelayanan untuk Kesejahteraan)</i> Governance for Growth
KYC	Know Your Customer – The principle for knowing and verifying the information and identity of customers or users.
Management Information System (MIS)	The digital and online information systems used for the BANGGA Papua Program.
NIK	National ID Number
POS	Point of Sales
Query	A technique of retrieving data from the database.
SIAK	<i>Sistem Informasi Administrasi Kependudukan</i> – a system used by the Population and Civil Registration Office to manage population data.
SMS	Short Message Service – text information exchange service between mobile telephone users.
Validation	A way to ensure that data regarding identity is true according to facts.
Value transfer	The value obtained through moving data or information by using the blockchain.
Verification	A way to ensure that data regarding identity matches with an individual.

EXECUTIVE SUMMARY

Within the past decade, organisations and companies have competed to carry out the research, development, testing, and implementation of various digital transformation initiatives.

The goal is to improve all business processes, so they can be more scalable and sustainable, and so they become highly effective and can compete globally. Government institutions, on the other hand, with various powers, policies, and existing work programs, can also make improvements to business processes to make them more efficient and easier, so that public satisfaction with public services increases.

The Papua Provincial Government has a program to improve the quality of human resources in the province, called BANGGA Papua. The form of this program is the provision of cash assistance to indigenous Papuan children under four years of age through their biological mother or guardian, so they can buy food to meet the developing child's nutritional needs. The money assistance is provided by transferring to a bank account to be disbursed and spent by the biological mother or guardian.

Even though it sounds straightforward, there are many challenges and obstacles in implementing this program in the field; for example, locations that are difficult to reach, limited facilities and infrastructure, as well as limited financial literacy, and low public health. Therefore, it would take a breakthrough in various factors for the BANGGA Papua program to be implemented more easily and efficiently, by using technology.

This feasibility study was conducted to find out whether blockchain and other technology trials could be carried out to help implement the BANGGA Papua program. To answer this, we collected data by conducting desk reviews, interviews, and field observations, to describe the existing business processes. Furthermore, it was necessary to identify what kind of technology use could reduce the gap between the expected situation and the current situation in the field.

The conclusion of this study is that improvement in the implementation of BANGGA Papua is needed, by using the appropriate technologies, as summarised in the following three recommendations. The first recommendation is for the continued development of the BANGGA Papua Management Information System (MIS) by adding features and data integration, so that the registration process and determination of beneficiaries are more efficient. The second is for the use of biometrics to improve the quality of verification and validation of beneficiaries in the field. The third is for the monitoring of beneficiary transactions at the location of expenditure, so that the funds channelled can be monitored for further evaluation.

The use of blockchain has not been recommended as an initial solution. There are many business processes that need to be addressed, and other information technologies are needed that are simpler, as well as more efficient. Several preconditions would need to be met before blockchain would be a recommended solution, such as reliable and faster internet connectivity and electricity. If the preconditions were met, the three recommendations above could be strengthened by using blockchain, so that the data that flows in every business process of the BANGGA Papua program could be checked for its quality as well as integrity.

BACKGROUND

1.1 BANGGA Papua Overview

BANGGA Papua is a program of the Papua Provincial Government with the aim of improving the quality of human resources of indigenous Papuans.



BANGGA stands for *Bangun Generasi dan Keluarga Papua Sejahtera* (Building the Welfare of Papuan Generations and Families). This program is expected to contribute to increasing the nutritional intake of Papuan children, stimulating the micro-economy in the program locations, and ultimately reducing poverty.

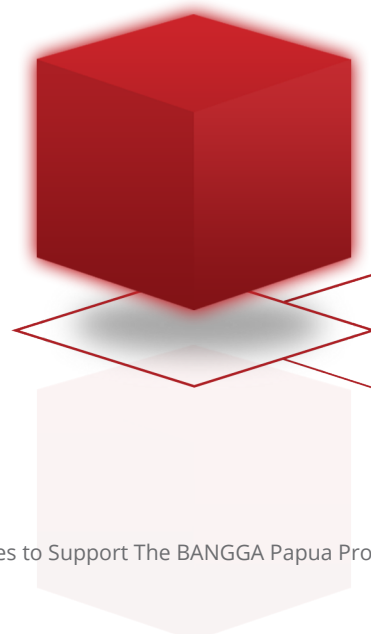
This program was designed in 2017, and began to be implemented in 2018 in three districts as program trial locations, including Asmat District, Lanny Jaya District, and Paniai District. The criteria to be eligible beneficiaries of this program are that people are indigenous Papuans, who are children under four years of age, and domiciled in the district where the program is carried out.

1.2 Blockchain Technology Overview

In the last five years, a lot of talk about new technologies has emerged in general public discussion, and one of these technologies is blockchain. This technology is popularly known through the use of a cryptocurrency called Bitcoin. However, Bitcoin is only one example of the application of blockchain technology. There are many potential applications in various industries that can take advantage of this technology.

Blockchain is a technology that transforms how digital assets are used, both for storing and transacting data. Transactions do not necessarily have to mean those associated with money. Whenever data is deemed to have value and can be transferred, it can be called a transaction.

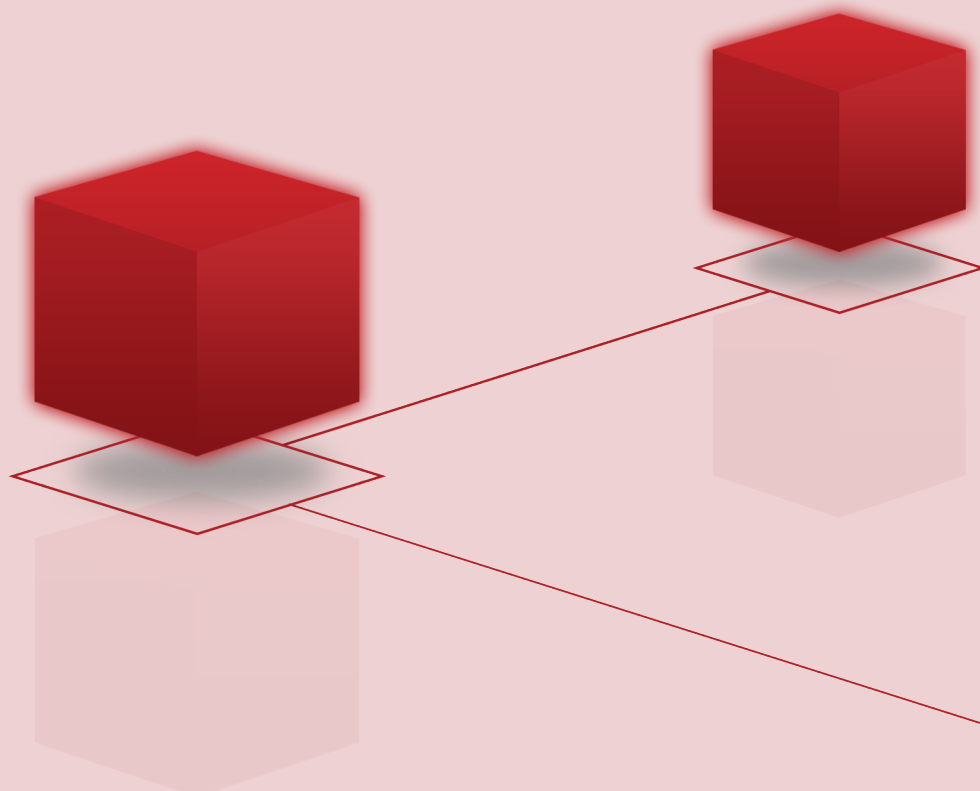
In simple terms, a blockchain can be illustrated as a spreadsheet file that is shared and used by parties in a group, where the methods for completing and managing the data have been mutually agreed upon. Some of the technological elements that form the foundation of a blockchain are distributed ledger technology, cryptography, and a consensus algorithm. The main principles of blockchain are decentralisation, transparency, immutability, and difficulty to hack. Each party that is part of a blockchain network will have the same database, so transactions that occur can be known by all parties. The data that has been stored or transactions that have occurred cannot be changed or discarded, because they can only be added. Each transaction with the previous transaction will be locked, so that to hack any data all previous transaction data must be hacked, on all computers of all parties on the network.



02

OBJECTIVES

The purpose of this feasibility study is to identify whether or not the application of blockchain or other technologies can support the implementation of the BANGGA Papua program, especially in Asmat District, to make it easier, faster, and more affordable.



03

METHODOLOGY

This report was compiled based on the results of literature studies, field observations, and in-depth interviews.



A literature study was conducted by the author to obtain initial information regarding the BANGGA Papua program. This had the aim of identifying the stakeholders involved and knowing the business processes and activities in the BANGGA Papua program. It enabled preliminary identification of the challenges and obstacles that could potentially occur. The literature study sources included searches on the internet and investigation by the KOMPAK team and related partners. This study was conducted on 22–23 May 2019, and the results were presented to the KOMPAK Team on 24 May 2019.

Field observations and in-depth interviews were carried out by the author and the KOMPAK Innovation Team as a continuation of the literature study. The aim was to validate the results of the literature study and obtain an immediate picture of the implementation of the BANGGA Papua program. These two activities were carried out in a series of visits to Asmat District, Papua Province.

Field observations were carried out by observing the process of distributing BANGGA Papua funds to beneficiaries at two payment points, in Agats District and Atsj District. Observations were also carried out at the BANGGA Papua Supermarket in Agats District, where beneficiaries bought their necessities using the funds received.

Meanwhile, in-depth interviews were conducted with resource persons, who were key stakeholders to extract information about the roles, obstacles, and challenges in implementing the BANGGA Papua program. The following is a list of people who have been interviewed.

1. Coordinator for Data and MIS at the Joint Secretariat (Sekber) of Asmat District and Database Administrator at the Disdukcapil of Asmat District.
2. Several members of the Asmat District Secretariat.
3. Members of the Asmat District Secretariat Steering Committee.
4. Head of Bank Papua Asmat Branch.
5. Head of the Asmat District Communication and Information Service (Kominfo).
6. Religious leaders in Asmat District.
7. Head of the Asmat Regional Financial and Asset Management Agency.
8. Managers and officers of the BANGGA Papua Supermarket.



04

MAPPING THE BANGGA PAPUA PROGRAM JOURNEY

This mapping was carried out to determine the relationship between stages and activities of the program, along with the roles of stakeholders involved in the current situation, and to identify which methods or approaches have already been used.



Furthermore, the current situation was analysed to find out the constraints and challenges, and to enable the expected situation to be proposed.

In general, the journey of the BANGGA Papua program can be mapped into three parts, starting with the process of beneficiary registration, then the sending and withdrawing of funds, and finally the use of these funds by the beneficiaries.

4.1 Beneficiary Registration

The main objective of this stage is to determine the eligibility of a person as a beneficiary. For the beneficiary registration stage, there are four main activities as described in the following section:

1. Initial data collection

Current situation

To process beneficiaries, the Joint Secretariat (Sekber) of BANGGA Papua in Asmat District will conduct preliminary data collection from several sources. The main source is the Asmat Population Administration Information System (SIAK). To access the data, the Asmat Secretariat team sends a request to the Asmat Disdukcapil, which manages the SIAK.

Disdukcapil officers, in this case the database administrator, need to access the SIAK database to perform data retrieval in the database or make a data query to obtain a list of residents under four years of age, along with information about their mothers and biological fathers. After that, the data is exported in the form of a Microsoft Excel file (CSV format), and is then sent to the Asmat Secretariat. In the case of Asmat, there is a member of the secretariat who is in charge of data and MIS for BANGGA Papua, who is also the database administrator at the Asmat Disdukcapil officers, and this shortens the duration of this process.

Apart from SIAK, the Asmat Secretariat team also requests data from the church and Public Health Centres or *puskesmas*, because these two parties also collect data when children are born. Based on our interview with one of the Joint Secretariat team members who also Religious Leader in Asmat, the church records data using an Excel format. Thus, the church administration staff can retrieve the child's birth data and provide the file in Excel to the Asmat Secretariat.

In several cases, there were occasions when a child was born and registered by the church, but did not have a birth certificate, and so did not have a NIK (National ID Number). In such cases, the Joint Secretariat team will ask the child's parents to arrange a birth certificate in the Disdukcapil. Thus, the child will be registered in SIAK, and the Asmat Joint Secretariat team is able to register the child in the BANGGA Papua MIS.

Communication between members of the Asmat Secretariat and the Disdukcapil, as well as the church and *puskesmas*, is carried out using a mobile telephone, either as a call, SMS, or via the WhatsApp application.

Current obstacles

The main obstacle in this process is the manual data collection. Data requests are performed by communicating manually. The process after requesting data is also manual, where the data must be searched first in the SIAK database, then a query created and the data exported to Microsoft Excel (CSV format). Such a process requires people with database technical skills and access to the SIAK network.

Another obstacle is the susceptibility of this process to data manipulation, because Excel files are downloaded manually and sent manually, either via email, WhatsApp, or a flash drive from one party to another. Figure 1 shows beneficiary data stored locally on a computer. Human error can also occur in selecting Excel files that are stored locally on individual computers. The manual process of data transfer and data storage has the risk of data leaks by those who can access it.

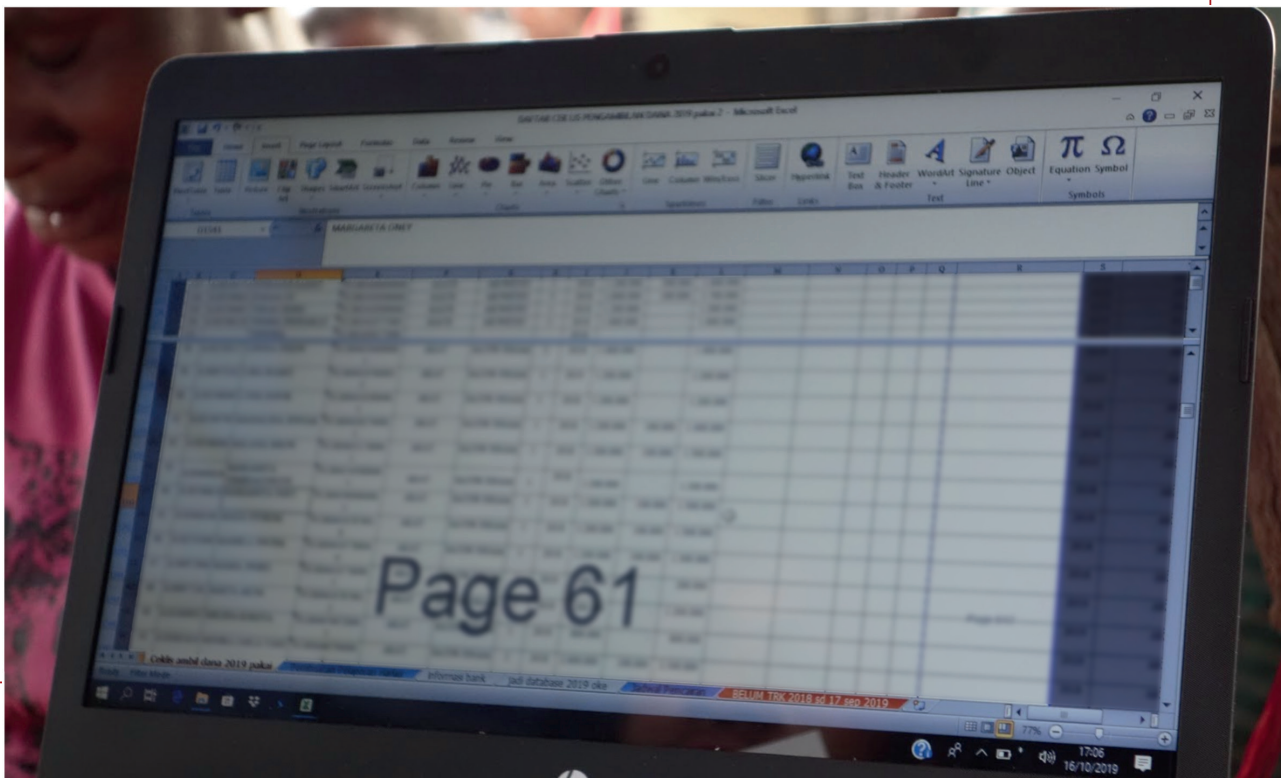


Figure 1: Beneficiary Data Excel File

Expected situation

To anticipate the potential for data manipulation, human error, and data leaks, it is necessary to improve the data management, so that every request and provision of data can be recorded, any data changes can be monitored, and access and read rights granted to a party can be regulated.

2. Registration of participants

Current situation

The stakeholders involved in this activity are the Asmat Joint Secretariat team, which is the MIS operator and handles the data. They open the Excel file they previously obtained from the Disdukcapil of Asmat, and then register participants in the MIS according to the required information. This work is carried out manually, one by one, entering the names of eligible children along with other required demographic information. The Joint Secretariat team also needs to open and examine Excel files from churches and *puskesmas* to check with the data already in the MIS. After registering participants one by one, the Asmat Joint Secretariat team must then summarise the list of participants in a registration batch, according to the payment cycle.

Current obstacles

The main obstacle in this process is the length of time required, which is directly proportional to the number of people who are being registered in the MIS. In 2018, there were a total of 8,612 registered guardians and 11,083 children in Asmat District. This was the first-time enrolment in MIS, because the BANGGA Papua program only started in 2018. In 2019, the first and second stages of each were, respectively, 2,853 guardians and 3,846 children, and 600 guardians and 786 children. Figure 2 shows the number of guardians (applicants), and the number of children for each batch of registrants.

Gelombang Pendaftaran

No.	Nama Gelombang	Jumlah Pemohon	Jumlah Anak	Verifikasi Kabupaten	Otorisasi Provinsi	Status	Aksi
1	Phase 2018-01	2815	3232	Selesai Kabupaten	Selesai Provinsi	Terselesa	
2	Phase 2018-02	680	790	Selesai Kabupaten	Selesai Provinsi	Terselesa	
3	Phase 2018-03	180	210	Selesai Kabupaten	Selesai Provinsi	Terselesa	
4	Phase 2018-04	2853	3846	Selesai Kabupaten	Selesai Provinsi	Terselesa	
5	Phase 2019-01	600	786	Selesai Kabupaten	Selesai Provinsi	Terselesa	
6	Phase 2019-02	600	786	Selesai Kabupaten	Selesai Provinsi	Terselesa	
7	Phase 2019-03	2853	3846	Selesai Kabupaten	Selesai Provinsi	Terselesa	
8	Phase 2019-04	600	786	Selesai Kabupaten	Selesai Provinsi	Terselesa	
9	Phase 2019-05	600	786	Selesai Kabupaten	Selesai Provinsi	Terselesa	

Menampilkan 1 ke 9 dari 9 data

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Figure 2: Number of Guardians and Registered Children

This work can be prone to data manipulation, because Excel files are received manually using email, WhatsApp, or a flash drive, and stored locally. The risk of human error also exists when copying and pasting Excel files, or manually writing to forms in the MIS. Another obstacle is the possibility of file damage (errors), due to the incompatibility of the software used to open Excel files, and the possibility that the table format is corrupted or not suitable, which makes it difficult for users to read the data. A process like this creates the risk of file loss, as well as data leaks, by those who have access to the computer.

Expected situation


To help the Asmat Joint Secretariat team speed up the data entry, MIS features are needed that would enable Excel files or other database files to be imported. In addition, a data similarity detection feature is also needed in case there is duplicate or similar data between two or more people. This would enable the Joint Secretariat team to immediately check further into the relevant records.

3. Checking the Data

Current situation


Those who have been registered in the MIS and are included in the batch of registrations do not automatically become program beneficiaries. There are still several stages of the process that must occur, starting from first checking the data. In accordance with the Operational Technical Guidelines, the Asmat Joint Secretariat team must print a list of potential beneficiaries from the batch of registrations. The list needs to be discussed by the District Steering Committee and the Asmat Joint Secretariat regarding the eligibility of the children's guardians on the list. The Head of the District Steering Committee then approves and initiates the draft Regent Decree and the List of Prospective Beneficiaries, based on the document shown in Figure 3 on the following page:

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BANGGA Papua
Bangsa Cemerlang dan Keluarga
Papua Sejahtera

**DAFTAR PENERIMA PEMBAYARAN
BP-2018-1**



Siklus: January 2018 - December 2018
 Dibuat Oleh: MARIKE KBAREK, 28 November 2018

Jumlah Wali	Jumlah Anak Menerima Penah	Jumlah Anak Menerima Sebagian	Jumlah Tunai
10007	10000	000	Rp. 68.270.000.000

Nomor Register	Nama Wali	NIK	Kabupaten	Distrik	Kampung	Jumlah Anak	Jumlah Tunai
1							
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BP-2018-1 (28 November 2018)

Figure 3: List of BANGGA Papua Beneficiaries of Asmat District in 2018

Data checking is carried out to confirm once again whether the data on the list of beneficiaries is in accordance with the data in the MIS, and that there is no duplicated data.

Current obstacles

Data checking takes a long time, because the team members have to check one by one whether the guardian on the list really has the correct number of children and the amount of funds to be paid. Therefore, the process is prone to input errors and checking errors, because it must be done so manually.

Expected situation

As mentioned previously, checking data could be assisted by the addition of a data similarity detection feature. The Asmat Joint Secretariat team could focus more easily on information that has indications of duplication or similarity. If found, these records could be further examined and compared with data sources, either in the MIS or with other sources such as SIAK.

4. Proposal and Determination of Beneficiaries

Current situation

The District Secretariat Steering Committee submits a draft Regent Decree along with a list of potential beneficiaries, for which the Regent issues the decree. Furthermore, the Provincial Secretariat re-checks the data with the data contained in the MIS and issues a proposed list of beneficiary names for each district.

Similarly to the process at the district level, the Provincial Steering Committee examines the results of the Provincial Secretariat's work regarding the names of beneficiaries. If it is deemed correct, the Chairperson of the Provincial Steering Committee approves and initiates a draft Governor's Decree, attached to the list of beneficiaries. This list has become a decision, and the people listed are no longer just nominated candidates. There is a possibility that a guardian or child who was nominated by the District Secretariat is removed at the Provincial Secretariat level for some reason.

Based on interviews with the Data and MIS Coordinator at the Asmat Joint Secretariat, there is data cleaning carried out at the provincial level, but the mechanism was not known in detail.

Current obstacles

The data checking activity is repetitive in nature, and the data comparison is carried out between the list of proposed beneficiaries and the data in the MIS. However, the list of proposed beneficiaries also comes from the MIS. In addition, data checking is also carried out manually. The time and effort required is directly proportional to the number of beneficiary lists, and there is the potential for human error. It should be noted that beneficiaries who have received funds will remain in the list of beneficiaries for the next stages of payment, as long as the child is still considered eligible (i.e. is under four years of age).

In addition, the total time needed from the stage of being registered in the MIS to being determined to be a beneficiary is still lengthy. In Figure 4, it can be seen that a beneficiary guardian was registered for the first time in the MIS by the Asmat Secretariat on 16 April 2019, and only on 17 July 2019 was the status approved by the Provincial Secretariat.

Status	Date	Authorised
Batch Approved by Province	17/07/2019	
Batch Approved by District	17/07/2019	
Registration Batch Opened	17/07/2019	
Registration Batch Archived	17/07/2019	
Registration Batch Opened	17/07/2019	
Approved	02/07/2019	
Pending	16/04/2019	
Pending	16/04/2019	

Figure 4: Registration Status History in the MIS

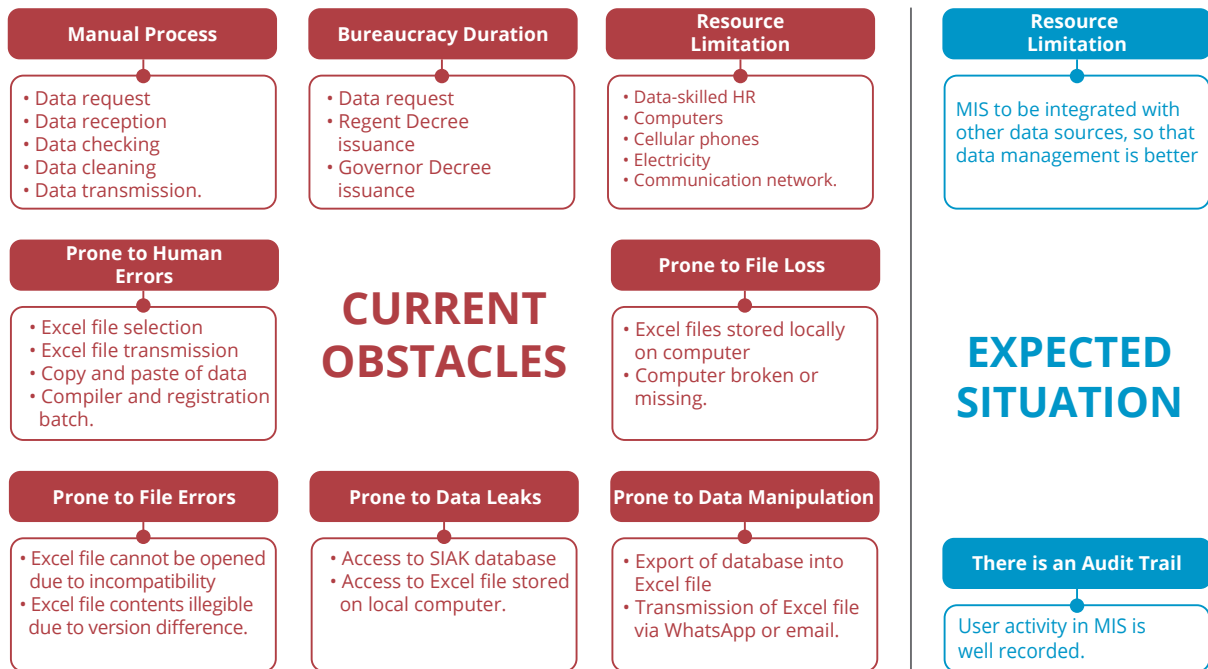
It took three months for a person to finally be approved as a potential beneficiary in a registration batch. Then there is still a further process for the issuance of the Governor’s Decree, which requires more time.

Expected situation

The data checking is repetitive, so it is necessary to have a feature in the MIS to assist the Joint Secretariat team at both the district and provincial levels. This will minimise human error and enable this process to be more measurable, especially considering that currently only three districts have become pilot locations. If the program is implemented in more districts, the task of data inspection, especially at the provincial level, will become overwhelming and heavy.

Regarding the determination of beneficiaries, currently a District Head's Decree is needed for the proposed list of beneficiaries, and a Governor's Decree to confirm the beneficiaries. If this process can be minimised, the time needed to change the status from being registered to confirmed as a beneficiary can be shorter.

Beneficiary Registration: Expectations and Obstacles



4.2 Onboarding and Funds Withdrawal

The main objective of this stage is that registered and confirmed beneficiaries can withdraw their funds. There are five main activities at this stage, as described in the following information.

1. Completing requirements

Current situation

Even though a child or guardian has been listed in the attachment to the Governor's Decree, there are still other administrative processes that need to occur, both from the side of the Asmat Secretariat and the guardian concerned. The Asmat Secretariat must print a form for all beneficiaries via the MIS. In addition, the Asmat Secretariat must check whether the guardian has an identity document that needs to be printed, both for those who do not currently have a

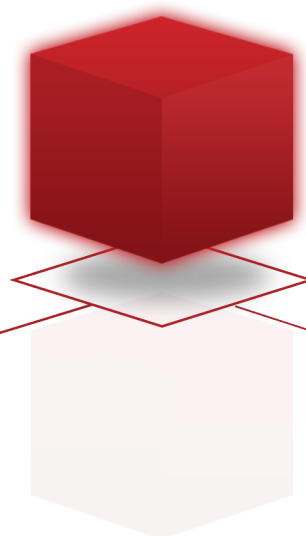
document, and those who already have it but whose data needs updating. The Asmat Secretariat must coordinate with the Asmat Disdukcapil to make requests for printing of these identity documents; for example, a birth certificate or a family card. The Disdukcapil as the party receiving the request will process, print, and send the physical document to the Asmat Secretariat.

After obtaining the population documents from Disdukcapil, Asmat Secretariat then combines these with each beneficiary's application form. The application form and residence documents, if any, are grouped by village name. This is done to make it easier for the Asmat Secretariat team to serve and verify the beneficiaries.

On the day of payment, the Asmat Secretariat team has the application forms and identity documents ready at the verification desk. Beneficiary guardians who come from various villages must bring any existing identity documents, such as citizen ID (KTP), birth certificates of beneficiary children, and family cards (KK).

Current obstacles

In this process, the Asmat Joint Secretariat team is prone to human error in preparing the files, as they have to select and print the application forms one by one for each beneficiary. Beneficiaries who have new identity documents, such as a family card and birth certificate from the Asmat Disdukcapil, must also have these combined manually with their file. All documents must be stored and in good condition until they are distributed to the relevant beneficiaries on the day of payment.



It is possible to manipulate the data in several ways. Beneficiary information between the Governor's Decree and the MIS might not be accurate. Beneficiary guardians who come to the verification location on the day of payment might declare they have a child who is entitled to receive funds, even when the child has passed away. Another example might be a falsified power of attorney on behalf of the guardian of certain beneficiaries.

The use of physical documents for application forms and identity documents creates a risk of damage to these important records. For example, guardians and beneficiary children who come from a village might need to use a longboat to reach the payment location in the district centre.

Expected situation

To facilitate the work of the Asmat Secretariat regarding the completeness of beneficiary requirements, the registration form does not need to be printed and the signature or fingerprint of the beneficiary can be done electronically or digitally, so that the Asmat Secretariat does not need to save and retrieve the physical documents of the application form. The time and effort required of a digital system could be minimal, and the use of paper reduced. One example of a company in Indonesia that offers digital signature services is PrivyID, as seen in Figure 5.



Figure 5: Privy ID is a Provider of Digital Signature Services

2. Opening a bank account

Current situation

When first registered and determined to be a beneficiary, Bank Papua opens a BANGGA Papua account for each of the beneficiaries. The account opening in 2018 was carried out collectively at Central Papua Bank. After this approach was evaluated, for 2019 the account opening was carried out directly at the district-level branch offices.

Currently, Bank Papua Asmat Branch Office does not have access to login to the MIS. To open an account, the Bank Papua Asmat Branch Office requests data from the Asmat Secretariat. Then, the Asmat Secretariat accesses the MIS, downloads as a PDF file the list of beneficiaries for the registration batch according to the payment stage, and sends it to the Bank Papua Asmat Branch Office. The data obtained is reconciled with the list of beneficiaries in the Governor's Decree. The account opening itself requires complete information from the beneficiary's guardian. This detailed information is obtained from existing data in the MIS. In other words, the account opening is carried out in the absence of the beneficiaries themselves.

Current obstacles

The process of requesting and reconciling data is still done manually either from the Asmat Secretary and the Bank Papua Asmat Branch Office. This makes it prone to human error as well as data manipulation. Moreover, time required also becomes significant.

Expected situation

It would be easier for both the Asmat Secretariat and the Bank Papua Asmat Branch Office to make the account opening process faster if there was data integration between the MIS and Bank Papua. Then the information required to open an account could be shared directly between systems, Bank Papua Asmat Branch would no longer need to request data from the Asmat Secretariat, or check and enter the required information for each beneficiary one by one.

3. Fund transfers

Current situation

The source of funds for BANGGA Papua comes from the Special Autonomy (Otsus) fund from the central government, which is given to the Provincial Government of Papua. Central Papua Bank receives a Fund Disbursement

Order from the Regional Financial and Asset Management Agency (BPKAD) of Papua Province to transfer funds from the Regional General Treasury Account (RKUD) to each beneficiary account, through an intermediary account belonging to Bank Papua.

Bank Papua Asmat Branch Office prepares cash according to the needs of the day of payment at each payment point location. For Agats District, payments are made at the Bank Papua Asmat Branch Office. For the Atsj District, payments are made at Bank Papua Atsj Sub-Branch Offices. Bank Papua then prepares cash for the amount of funds that the beneficiaries have in their respective accounts.

Current obstacles

Transfer of funds into the recipients' accounts must go through a fairly long and bureaucratic process, and cannot be instantaneous.

Expected situation

If the time needed for the entire process of sending funds can be accelerated, it will simplify the next part of the process, which is preparing for payment of the funds. Currently, payments are only made two times a year. If in the future payments can be made every three months or even every month, it will be a challenge for the Central Papua Bank and its branches, and the Provincial and District Secretariats.

4. Beneficiary verification

Current situation

The participant registration process up to opening their bank account occurs without the presence of the beneficiary, and this results in the need for a direct or face-to-face verification process with the beneficiaries concerned. Currently, verification is only done on the day of payment. The Asmat Secretariat team carries out the verification process by opening the verification table and the problem complaint table. Beneficiaries who come to Agats payment locations are scheduled according to district. They stand in line until it is their district and village's turn to be called.

The Asmat Joint Secretariat team at the verification table serves the beneficiaries one by one. Beneficiaries are asked to state their full names and submit documents they have brought with them, such as ID cards, family cards, and account books from BANGGA Papua.

The Asmat Secretariat team checks the information between the document and the data in the Excel file that has been prepared previously, and also with the data in the MIS.

If this is the first time the beneficiary has arrived for payment, they are required to give a signature or fingerprint on the application form that was previously printed by the Asmat Secretariat team. The Asmat Secretariat team also informs them how much balance is in the account, and the funds that have been transferred for the latest payment stage, as well as asking them about how much money will be taken at this time.

Administrative procedures related to account opening are also carried out at the verification location. The Joint Secretariat of Asmat has prepared a template for the Bank Papua account opening form in an Excel file. If a beneficiary arrives on the day of payment, and does not yet have a passbook, the Secretariat team members at the verification desk will fill in the account opening form according to the data available in the MIS. The form will be printed on the spot, combined with the application form and other supporting documents, and given to the respective beneficiaries. Then, beneficiaries will bring and show these documents at the Asmat Branch Office of Bank Papua to withdraw funds and receive a savings book for those who do not have them yet.

Current obstacles

The main obstacle that occurs is the length of time for the verification process on the day of payment. Beneficiaries from various villages come to the payment location in the district centre with physical documents related to identity, such as their citizen ID, family card, and birth certificates. They need to wait in line for long enough to have their turn for verification. When verification is carried out, the documents brought by the beneficiaries are examined by the Asmat Joint Secretariat team in stages at several tables for verification, but all stages have the same goal, which is to ensure that the people who come have the correct documents and are indeed the approved beneficiaries.

It is difficult for the Asmat Secretariat team to detect if there are beneficiary guardians who claim to have children that have in fact passed away. If the beneficiary does not provide this information, then other sources of information are needed; for example, by checking with the village head or other beneficiary guardians from the same village. However, this is still prone to manipulation, and the accuracy of the information might be low.

If during verification, there is a discrepancy in the documents, or it is deemed necessary to update records, then the beneficiary will be asked to take care of it at the problem-handling desk. For payment locations in the Agats District in October 2019, the table was filled by several members of the Asmat Secretariat, who were also the Asmat Disdukcapil database administration staff. The time it took to deal with a problem varied according to its complexity. As the size of the Asmat Secretariat team is limited, this process can take a long time and result in multiple queues.

Expected situation

To provide beneficiaries with good experiences as users of the BANGGA Papua program, it is necessary to improve activities, especially in the verification process. Creating a common basis and method for the entire verification process could help achieve this, by eliminating the need for cascading and repetitive verifications. The quality of the verification process needs to be improved so that it is oriented towards the potential beneficiaries, not only on documents.

5. Funds withdrawal

Current situation

Based on information from the Head of Bank Papua, Asmat Branch, for Bank Papua Savings, there are no ATM card facilities, SMS banking, or internet banking available to beneficiaries. Withdrawal of funds by beneficiaries as account holders can only be done through a bank teller by showing their account book and ID card.

Beneficiaries who pass the verification stage by the Asmat Joint Secretariat team come to the Bank Papua Asmat Branch Office with an application form, ID card, and account book. For those who do not yet have an account book, they bring the account opening form obtained from the Asmat Secretariat team at the verification table. The Bank Papua Customer Service (CS) Officer will re-examine the documents shown by the beneficiaries, as a final verification stage carried out by Bank Papua. Beneficiaries who withdraw funds for the first time receive their savings account book. On the account book, beneficiaries are asked to print their fingerprints. In addition, officers also take photos of the beneficiaries for future visual inspection needs.

Like most savings account owners, beneficiaries fill out a withdrawal slip stating the amount of money they want to withdraw. The CS Officer guides the beneficiaries in filling out the slip, informing them of the amount of money available, and reconfirming how much money they want to withdraw. Next, beneficiaries are accompanied to the teller to collect their money.

Current obstacles

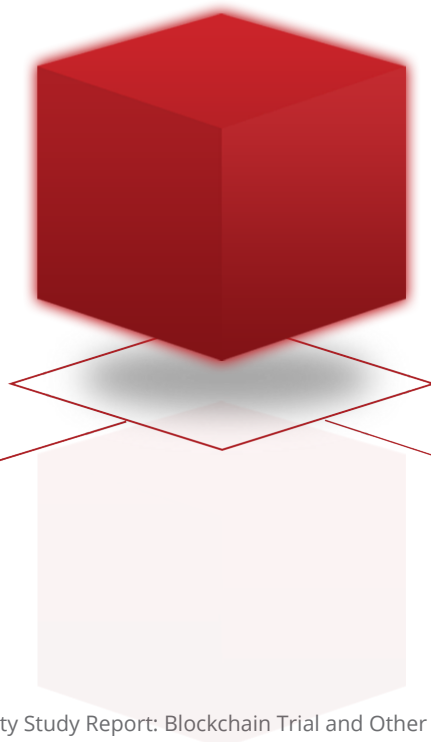
When the documents are examined by the CS Officer at the Bank Papua Asmat branch, among the beneficiaries there were still found those who had passed the verification stage, but were later discovered not to be the beneficiaries. Such people attempt to withdraw money by claiming to be a beneficiary, bringing supporting documents that are not their own, or by falsifying an heir's power of attorney.

The cash provided for beneficiaries is also vulnerable to damage, loss, and theft. This becomes more risky for beneficiaries who live in distant villages and require sea transportation.

Expected situation

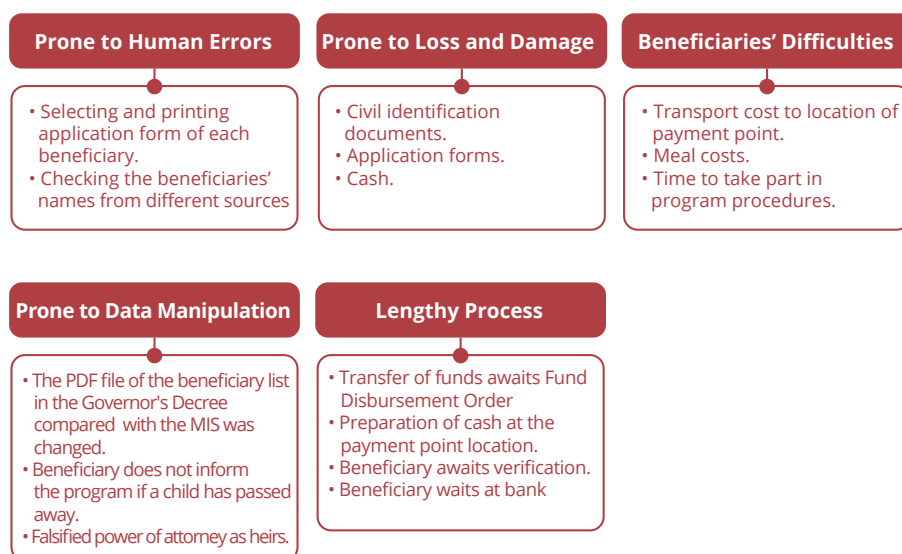
Beneficiary verification based only on documents needs to be strengthened. The initiative carried out by Bank Papua's Asmat Branch Office to take photos of the beneficiaries showed that other data better representing the beneficiaries was needed. However, checking the photos with the beneficiaries' faces is still done by sight by the officers, so it is prone to human error.

As the mechanism for providing assistance in the BANGGA Papua program is carried out in cash, the risk of the cash being damaged, lost, and stolen remains. Perhaps policy makers could consider other distribution channels or indirect cash; for example, by providing facilities for the use of ATM cards or even electronic money (e-money).

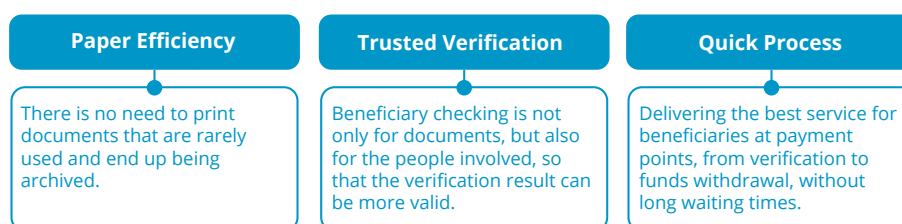


Onboarding and funds withdrawal: current and expected situation

CURRENT OBSTACLES



EXPECTED SITUATION



4.3 USE OF FUNDS

The final stage of this program is the use of funds by the beneficiaries. The hope is that the beneficiary guardians use these funds according to what is needed by the beneficiary children, in line with the intended contributions and planned achievements of the BANGGA Papua program, which are to increase children's nutritional intake, drive the micro-economy, and alleviate poverty.

1. Expenditure

Current situation

After beneficiaries withdraw money from the Asmat Branch Office of Bank Papua, they will be directed to BANGGA Papua Supermarket. The Asmat Secretariat team coordinates the pick-and-drop activity of beneficiaries from the payment location to the supermarket, using motorbikes with open basins. About five to six people can be escorted on one trip. Upon arrival at the supermarket, they will shop under the guidance of the Asmat Secretariat team and supermarket officers. A large banner also informs them of which goods are recommended to be bought and which are not.

The Asmat Secretariat team always urges beneficiaries to buy the appropriate goods. Beneficiaries are then directed to the cashier to show the purchased goods and pay with the money that has been obtained. When the author visited the BANGGA Papua Supermarket, the cash register could not be used, so the transaction was recorded manually and the buyers did not receive receipts. Every day, the supermarket manager deposits the income into the supermarket account at Bank Papua's Asmat Branch Office.

Current obstacles

Not all beneficiaries shop at the BANGGA Papua Supermarket. Many beneficiaries are not accompanied or are unwilling to shop at the supermarket. Those who shop elsewhere cannot be guided and advised on what items should and should not be purchased with the funds. In addition, beneficiaries who come to the supermarket do not necessarily want to follow the advice from the supermarket manager. There are still beneficiary guardians who buy items that are not suitable. Supermarket managers cannot do much to change this, because it is the beneficiary's right to buy what they want, as this program is an unconditional cash transfer. Also, where supermarket managers are still recording transactions manually, the system is prone to human error and data manipulation.

Expected situation

Visiting and shopping activities at the BANGGA Papua Supermarket need to be made more attractive, with certain incentives for beneficiaries to purchase the appropriate goods that will help the beneficiary children. The digital recording of transactions is also required to facilitate buying and selling operations. The supermarket officer needs to ask the buyer whether they are a beneficiary, for example, by asking them to show the BANGGA Papua account book.

2. Monitoring

Current situation

Monitoring activities are currently still operational. The Asmat Joint Secretariat team conducts observations of beneficiaries who come from payment locations to BANGGA Papua Supermarket. Team members coordinate using radio communication devices and mobile telephones to communicate between the two points, payment location and the supermarket. The supermarket manager calculates the amount of income earned each day during the program payment day, and then compares it with the payment days in the previous stage.

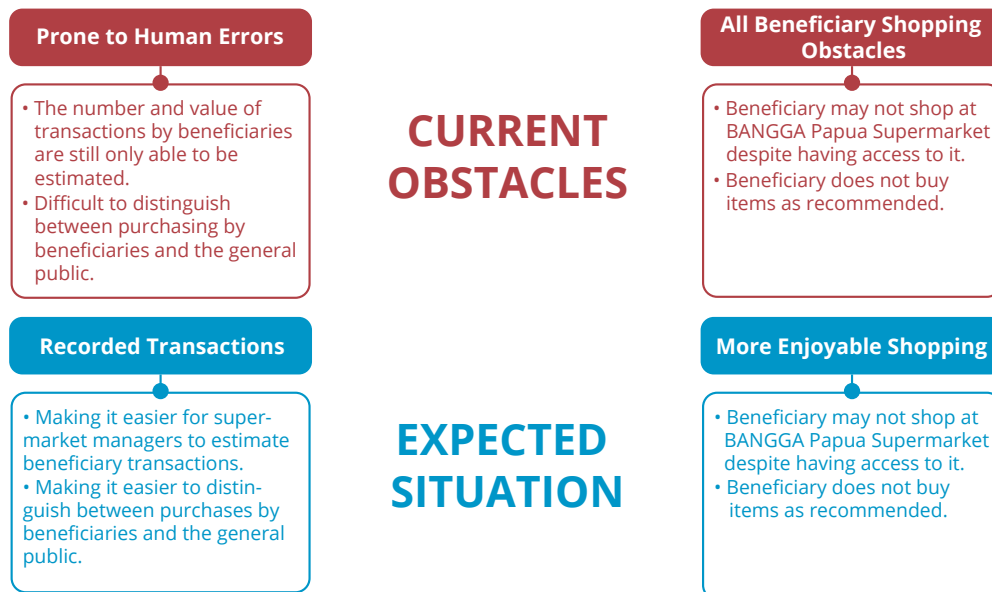
Current obstacles

The supermarket manager advised that, in October 2019, the income obtained from beneficiaries was still very small when compared with the payment days in the previous stage. This happened because fewer beneficiaries came, although at this time there was no check as to whether those who visited the supermarket to shop were beneficiaries or general members of the public. In addition, the manager also felt that the amount of money spent by beneficiaries was still low.

Expected situation

Monitoring is an important thing to do, because it will be used to evaluate whether the aid received by the beneficiaries of the BANGGA Papua program was spent according to the advice that was conveyed. Beneficiaries who come and shop at BANGGA Papua Supermarket must be properly recorded by the supermarket manager and the Asmat Joint Secretariat team, so that accurate data can be obtained regarding the use of funds.

Use of funds: obstacles and expectations



SOLUTION RECOMMENDATIONS

Based on the analysis of the previous BANGGA Papua program journey, we identified three technology-based solutions (see Figure 6).

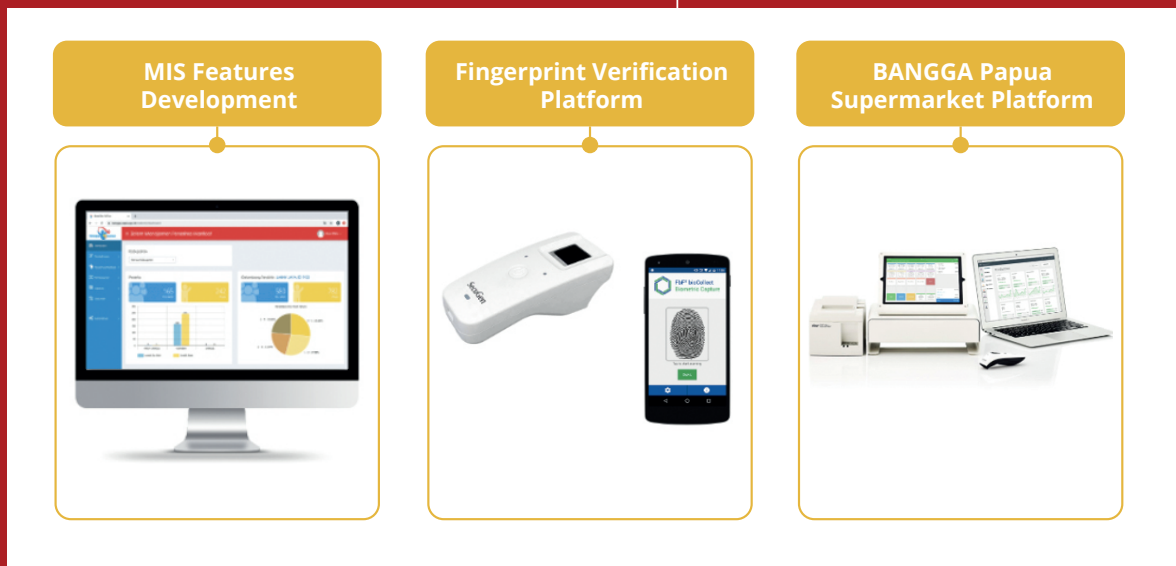


Figure 6: Three Solution Recommendations

These three solutions are expected to be able to assist the Secretariat of BANGGA Papua in overcoming the existing obstacles and achieving the expected situation.

5.1 Development of BANGGA Papua MIS

Currently, the program implementation has used an information system or a web-based portal, which is better known as BANGGA Papua MIS. The MIS is used by the BANGGA Papua Secretariat at both the provincial and district levels to carry out various processes related to beneficiaries, including participant registration, preparation of the potential beneficiaries list, and retrieval and reporting of beneficiary data. There are six new features proposed, as shown in Figure 7.

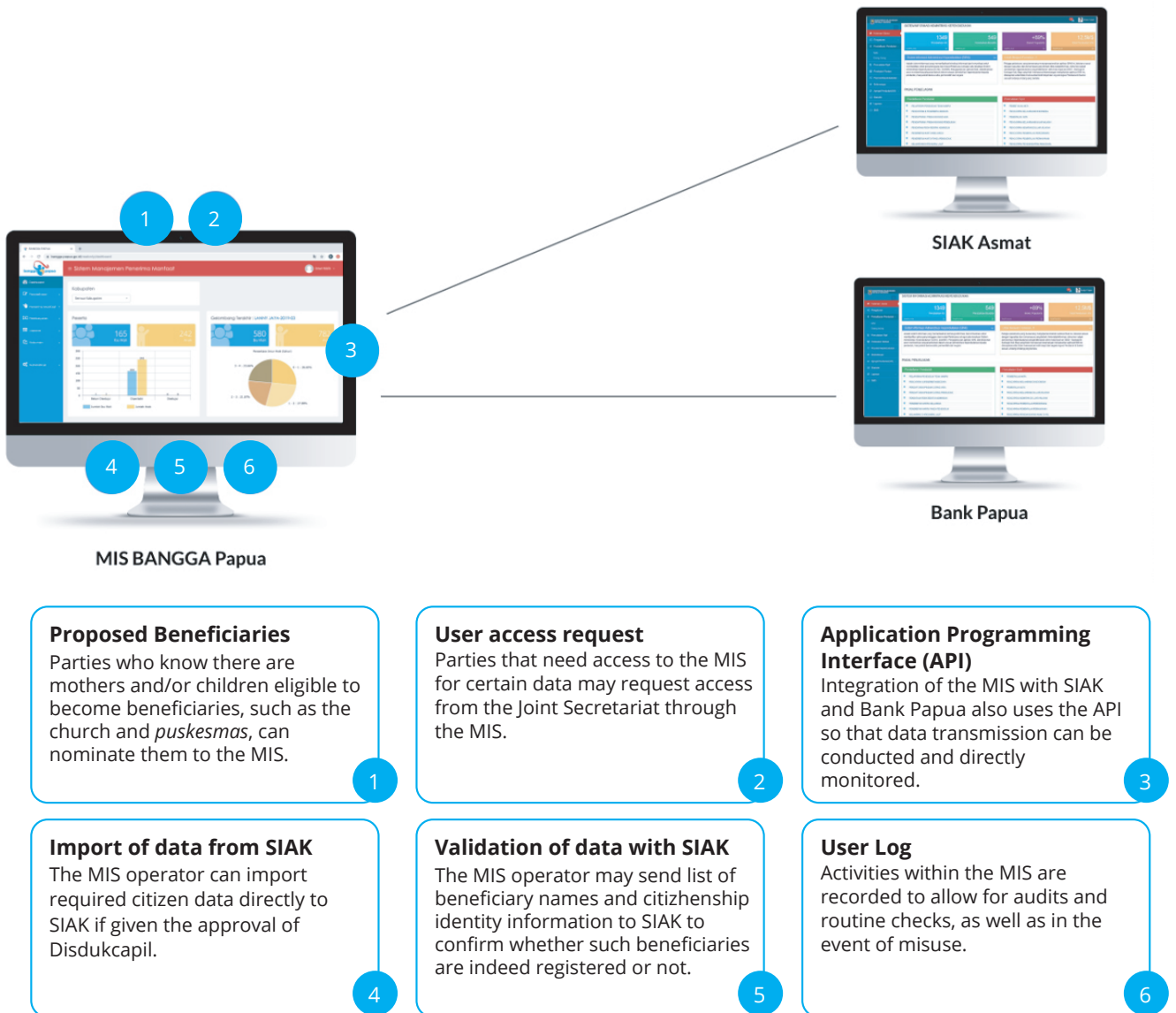


Figure 7: Illustration of the Proposed Integration of MIS with SIAK and Bank Papua along with Additional Development Features

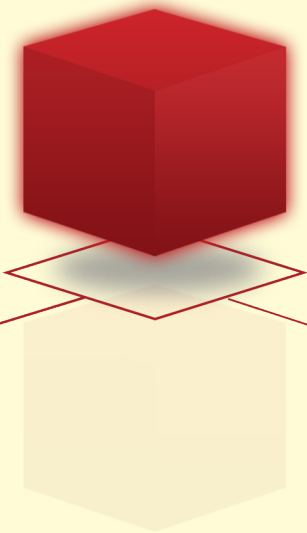
The following is an explanation of these features

Proposed Beneficiaries

Ensuring the success of the BANGGA Papua program means that it cannot only be carried out by the Joint Secretariat, but also requires wider community participation. The beneficiary nomination feature is intended to accommodate sources of information from parties outside the Joint Secretariat; for example, the church and *puskesmas*. These organisations have data on child births that could be more up-to-date. Also, those who are already beneficiaries or other community members may have information about relatives or neighbours who might have the right to be beneficiaries. For this reason, it is necessary for these parties to have access to channels to submit nominations of citizens who might be entitled to be beneficiaries. The nomination could be submitted via a physical form, online form, SMS, or by telephone to the Joint Secretariat, which will then record it in the MIS.

User Access Request

Currently, the use of MIS access is limited to the Joint Secretariat. To support a wider range of potential beneficiary nominations, limited user access could be granted to external parties. For example, churches and *puskesmas*, which have registered birth data, could request user access to the MIS administrator to enter new beneficiary nominations. They could fill out online forms or upload Excel files according to the specified format into the MIS. Apart from the need to nominate beneficiaries, access to external parties could also be provided as a way to disseminate information, such as the number of beneficiaries, the amount of funds channelled, the distribution of beneficiaries and the amount of funds, and other information. Currently the MIS already has information visualisation on the dashboard page, as shown in Figure 8.



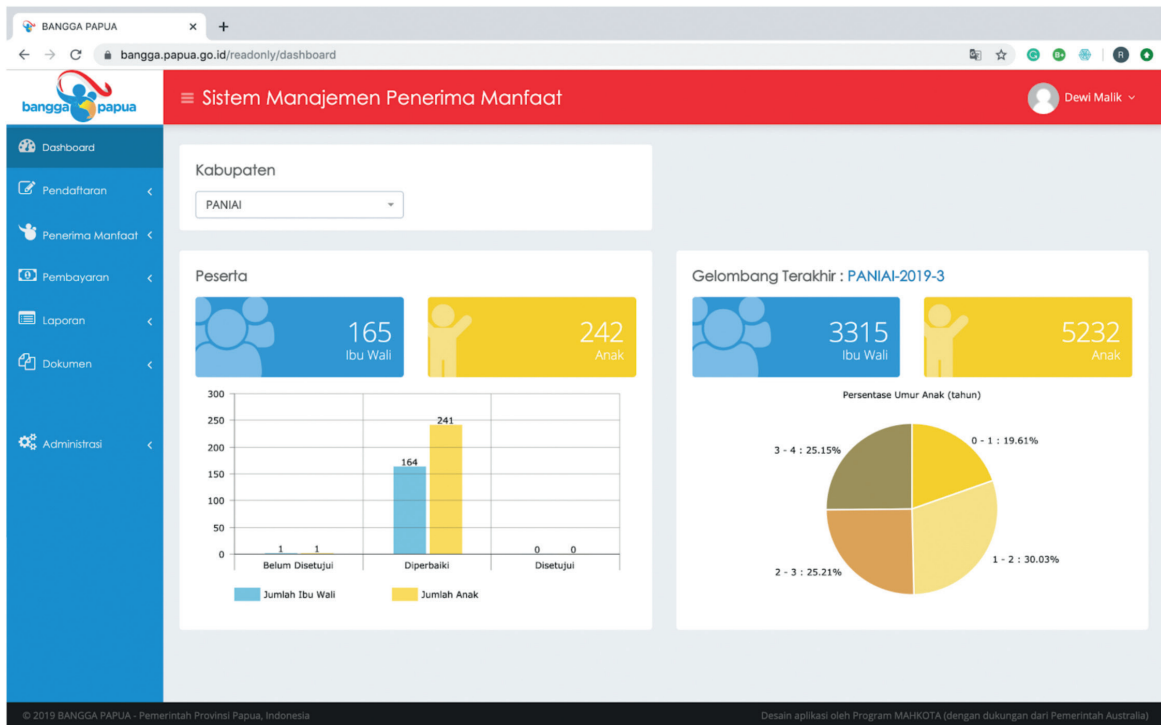


Figure 8: Dashboard Page of the MIS

Some of the information on that page that is deemed relevant could be disclosed to external parties, making it desirable that the management of requests for access to MIS be facilitated.

Application Programming Interface (API)

To support interoperability between the MIS and other related systems, the development of an Application Programming Interface is one of the solutions. The data in the MIS contains much demographic information on the beneficiaries. SIAK, which is managed by the Asmat Disdukcapil, is one of the sources of demographic data used. In addition, data related to aid funds provided to beneficiaries comes from Bank Papua. Therefore, if the BANGGA Papua MIS can be integrated with the Asmat SIAK and Bank Papua through the use of API, data exchange will be able to occur directly between the systems and be properly monitored. This would minimise the need for downloading of data to local computer storage and transfer of files;

for example via email, WhatsApp, or flash drives that cannot be monitored for circulation. The challenge is how the managers and owners of the system could be integrated, and how Asmat SIAK and Bank Papua can develop and provide an API. For this reason, commitment from these parties would also be needed to carry out this work.

Data Import from SIAK

An import feature or data collection in one system from SIAK, on residents who meet the criteria of being beneficiaries, or to update data from registered beneficiaries, will help the Asmat Joint Secretariat to ensure that beneficiaries are the correctly entitled individuals. This will speed up the registration process for BANGGA Papua participants, and will reduce the risk of human error and manipulation in entering data into the MIS. Data import that occur in this way can be monitored, so they are easy to audit.

Data Validation to the Dukcapil

Ensuring that the data in the MIS is correct is important for the Asmat Joint Secretariat. For this reason, if the data validation service to the central Dukcapil system can be used, it would be valuable to accommodate this in the MIS. The Asmat Joint Secretariat could use this feature by sending data, such as name, citizen ID number, and citizen ID photo to the Dukcapil system, and it would be able to confirm whether the data for the person's name is properly registered. This feature would make it easier for the Asmat Joint Secretariat to get data that is clean from duplication or incomplete.

User Log

User activity in the MIS needs to be recorded in log form to make it easier for MIS managers to carry out periodic checks, and to identify if a user is suspected of misusing the system. The user activity to be logged may consist of logins, data entered, data downloaded, and visits to other important pages in the MIS. Apart from this data, MIS managers could also analyse user activity in the MIS; for example, who is the most logged in user, or how many users are accessing a particular page.

5.2 Fingerprint Verification Platform

The use of biometrics would take the beneficiary verification process to the next level. Verification is needed to answer the question of whether a person who is a beneficiary is correct and honest in their declarations to the program, so that BANGGA Papua can be 100% certain that a record matches a beneficiary. The selection of fingerprints as the biometric used is based on practices that have been used already in the BANGGA Papua program, where beneficiaries are asked to apply their fingerprints to the application form and in their account book.

With this platform, the Asmat Joint Secretariat could verify beneficiaries directly with the person in front of them, not just with the person's physical documents. Other related parties, such as Bank Papua and BANGGA Papua Supermarket could also use this platform to meet their Know Your Customer (KYC) needs for BANGGA PAPUA beneficiaries.

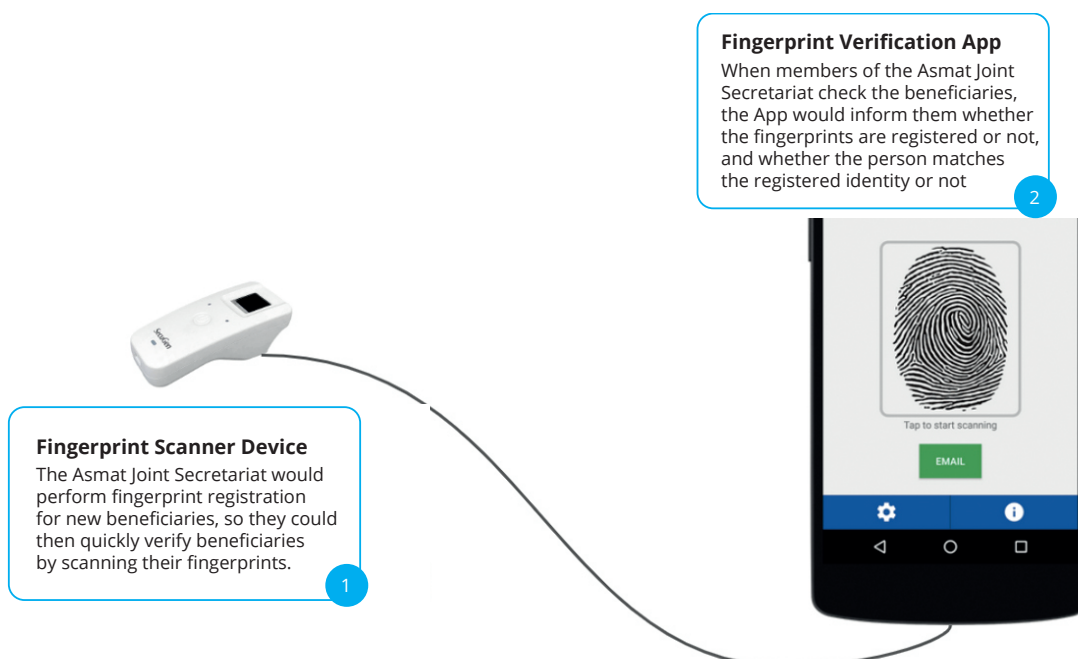


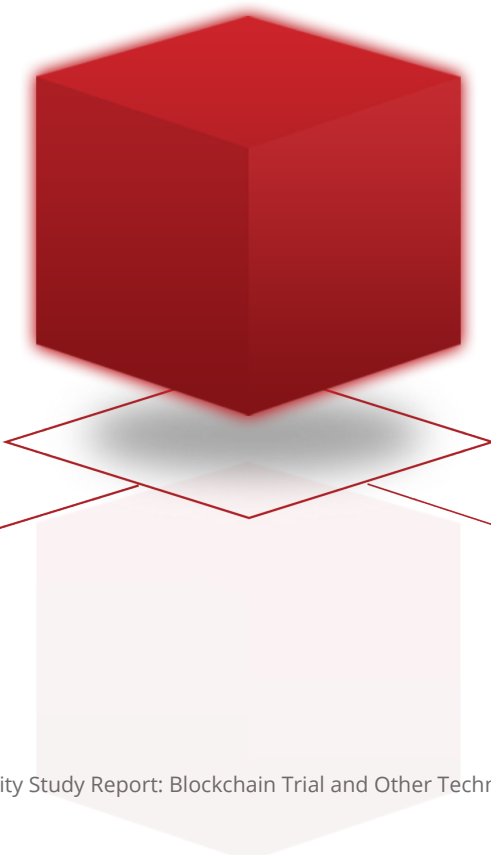
Figure 9: Fingerprint Scanner and Verification App

This platform would consist of two main components: a fingerprint scanning device, and a fingerprint verification application, as shown in Figure 9. It would require fingerprint recording of the beneficiary at the first step of the process. This could occur when a beneficiary puts their fingerprint on the BANGGA Papua application form. The scanning device would be used both during initial recording of a beneficiary, and when verification is needed. For this scanning device to work, a fingerprint verification application would be needed, to read the results from the

scanner device and match it to the database. These applications could be in the form of web-based applications or mobile applications. The beneficiary would inform the program of their name and other information, such as their citizen ID number, and then a fingerprint scan would be carried out. The resulting output would be designed to express two possible outcomes; for example, 'yes' or 'no'. The answer 'yes' would show that the fingerprint read matches the person's fingerprint with the National ID Number (NIK) that was submitted. The answer 'no' would indicate that the fingerprint read did not belong to the person with the NIK that was submitted.

5.3 BANGGA Papua Supermarket Platform

To find out how beneficiaries spend their funds from the program, it is necessary to be able to record the transactions that occur. BANGGA Papua Supermarket therefore requires a system that can accommodate this data collection, while also facilitating the operations of the supermarket manager. The proposed point-of-sale (POS) system has been widely used, not only in premium shopping places, but has also been adopted in basic shops. Many third-party providers of similar systems exist, so the fees charged have become increasingly competitive.



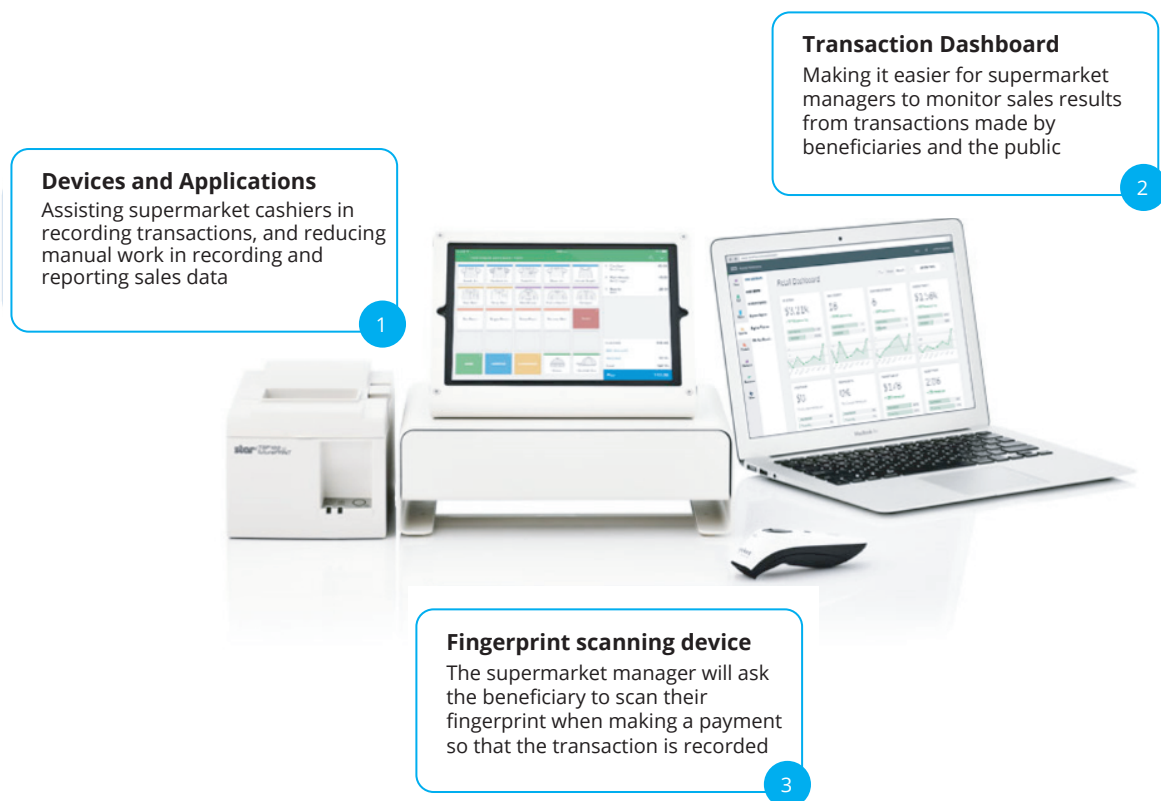


Figure 10: Components of the BANGGA Papua Supermarket Platform

As can be seen in Figure 10, the main components of this platform would be the POS devices and applications. Every time a buyer came to the cashier, the cashier would enter information on the items spent one-by-one, via the touch screen or barcode scanner. Applications that are already integrated would calculate how much is to be paid. Each transaction would be recorded as soon as the transaction occurred, including what items were purchased, the price of each item, the total money that needed to be paid, the method of payment such as cash, and how much change was given to the buyer.

This would help officers and supermarket managers to administer the operation of buying and selling, and the complete transaction data would become available. The data reporting function could also be assisted by the dashboard feature to calculate how many transactions had occurred, how much was the daily (or other period) income, what items were the most frequently purchased, and so on.

Existing transaction data could also be enriched with the fingerprint verification platform, as previously described. By scanning the fingerprint at the time of payment, the identity of the beneficiary could complement the existing transaction data. The monitoring function for the BANGGA Papua fund usage would thus reach downstream.

5.4 System Design

The three recommendations would be integrated into an overall solution. The overall system architecture can be seen in Figure 11.

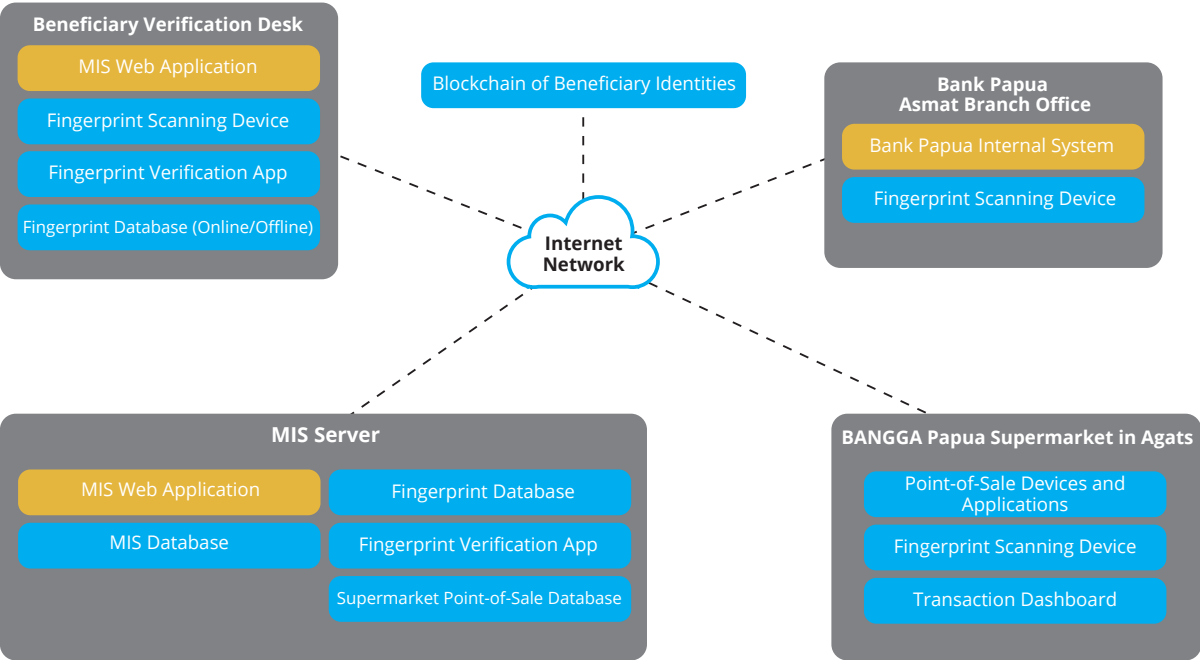
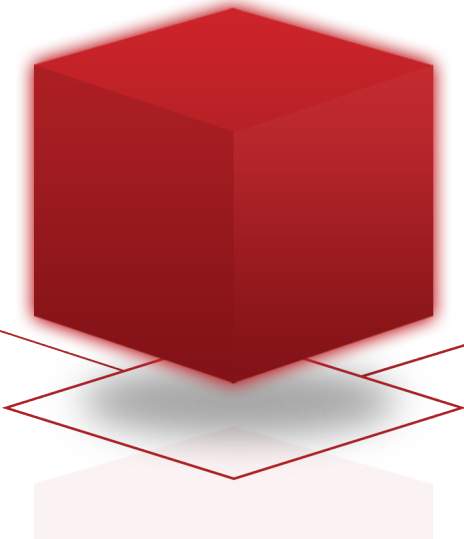


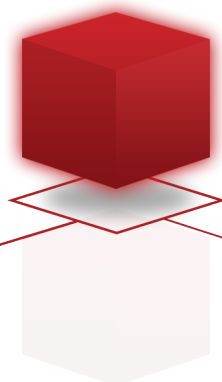
Figure 11: System Architecture

The yellow boxes represent existing systems, such as the MIS web application, the MIS database, and the Bank Papua internal system, while the blue boxes represent proposals for new systems to be developed. The black boxes describe where these systems would be located.



It should be noted that blockchain technology is not directly recommended as the main solution, because there are other approaches and technologies that are simpler and more effective to answer the particular challenges and obstacles faced in implementing the BANGGA Papua program. The application of blockchain technology requires more advanced facilities and infrastructure, such as reliable and faster internet connectivity, as well as human resources with skills in various fields related to information technology.

However, if the three recommended solutions can be implemented, the data obtained will be more comprehensive. The implementation of the BANGGA Papua program would be easier for the Joint Secretariat, more scalable in anticipation of additional program locations, and would further improve the customer and participant experience for the beneficiaries. The data collected as part of verifying the identity of beneficiaries could be stored in a blockchain network, which could only be accessed on a limited basis. If there were those, either program implementers or beneficiaries, who wanted to misuse the system, they would be recorded and the traces could be seen upon conducting an audit.



FEASIBILITY ANALYSIS

We analysed the three recommended solution or use-case, based on the feasibility and weighting aspects that are assumed in Table 1 below.

Table 1: Aspects of Feasibility and Calculation Weightings

Aspect of Feasibility	Weighting
Technical	25%
Operational	40%
Economy	35%

The technical aspect describes whether the solution is easy to build and develop, so that it is feasible to implement. If a similar solution is already available from a third-party provider, it will also be taken into consideration.

The operational aspect looks at how many stakeholders in the current system are involved and affected, how supported these stakeholders are, and also considers

how easy the solution is to use by end users (in this case, the main user is the Joint Secretariat of Asmat). It was also reviewed how quickly the solution could be developed to be suitable for use in the field.

The economic aspect describes how affordable it is to create, develop, and implement these solutions.

Each solution was given an assessment with three different categories. A score of 1, 2, or 3, respectively, indicates that the solution has low, medium, or high feasibility.

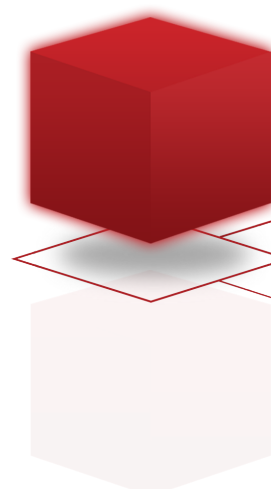
6.1 Development of BANGGA Papua MIS

Technical Aspect

Working on this solution would require human resources with a background and skills in web development, including system analysts, UI/UX designers, front-end developers, and back-end developers. By using the services of Wappalyzer, it can be seen that some of the technologies currently used in the BANGGA Papua MIS are as follows:

- PHP
- Laravel
- Bootstrap
- jQuery
- Datatable
- Google Font API
- DataTables
- Apache
- Ubuntu

The Beneficiary nomination features could be in the form of an online form and/or uploading Excel/CSV files. Both of these could be developed directly on the web or using tools from third parties. The user access request feature could also be extended directly



in the MIS. This could take the form of creating a new web page for visitors to request access, which is linked to existing MIS user management. The MIS administrator could view and approve if web visitors were eligible to gain access to any part of the MIS.

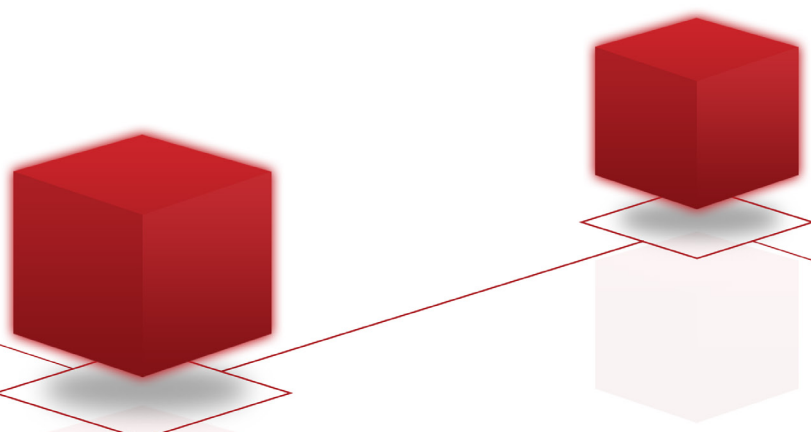
For API development features, data import from SIAK and data validation in SIAK would have a higher complexity. An investigation would need to occur first, which included but was not limited to the technology used in Asmat SIAK, the need for a staging environment at SIAK to extract data from MIS, and the operational reliability of SIAK if there was intervention from MIS.

Operational Aspect

The addition of new features for the MIS must first obtain approval from the person in charge or the owner of the BANGGA Papua MIS. Currently, the MIS has been developed, managed, and maintained by agencies other than KOMPAK. Therefore, it would need the support and decisions from those agencies to want to develop the BANGGA Papua MIS to the next stage.

The existence of any new feature in the MIS would require training for members of the Asmat Joint Secretariat. This training would be aimed specifically at Joint Secretariat members in the data and MIS fields, as well as other parties who have access to the MIS to carry out tasks related to participant registration and data checking of beneficiaries.

With the beneficiary nomination feature, the role of the MIS administrator would be greater, for them to process and respond to incoming nominations. This would also apply to new MIS user access requests. However, the existence of data import features from SIAK and data validation would help the Asmat Joint Secretariat team's work, so that data management related to the identities of beneficiaries could become faster and more measurable. The last added feature would be the user activity log, which would make it easier for the MIS administrator to carry out audits either periodically or incidentally. Any suspicious activity that occurred in the MIS could be detected early, so that misuse of access by users could be minimised.



It should also be noted that with the addition of new features, the complexity of the MIS would be even higher. This implies higher maintenance costs, and the resulting data would increase, so the computational and data storage capacity would also need to be higher.

Economic Aspect

The development of the BANGGA Papua MIS has been estimated to involve the following costs:

Table 2: Estimated Development Cost of BANGGA Papua MIS

Skill	Person-Day	Unit Price (IDR)	Cost (IDR)
<i>Project Manager</i>	14	1,500,000	21,000,000
<i>System Analyst</i>	15	1,500,000	22,500,000
<i>UI/UX Designer</i>	8	1,000,000	8,000,000
<i>Front-end Developer</i>	10	1,000,000	10,000,000
<i>Back-end Developer</i>	20	1,000,000	20,000,000
Total Cost (IDR)			61,500,000

Further detail about the features that are proposed for development are set out in Table 3 below.

Table 3: Features and Descriptions of the Development of the BANGGA Papua MIS

Feature	Description
Beneficiary Nomination	Users can nominate the names of beneficiaries, with other detailed information as needed, through a form in the MIS
	Users can view a list of nominated beneficiary names and details, and check, process, and approve or reject the nominations
User Access Request	Visitors can request access to the MIS by indicating their intention and purpose
	Users can view a list of access requests, and check, process, and approve or reject these requests

Feature	Description
Application Programming Interface	The MIS can process data requests and receive responses from the Asmat SIAK
	The MIS can process data requests and receive responses from Bank Papua
Data Import from SIAK	Users can import data from the Asmat SIAK
Data Validation	Users can view a list of beneficiary names that are invalid or duplicated

6.2 Fingerprint Verification Platform

Technical Aspect

As mentioned in the previous explanation of this solution, there would be two main components, including a fingerprint scanning device, and a fingerprint verification application. The fingerprint scanning device required is one that can acquire fingerprint data and send it to a computer for further processing. Currently, these devices are available on the market. Figures 12, 13, and 14 are examples of fingerprint scanning devices that are sold on Tokopedia.

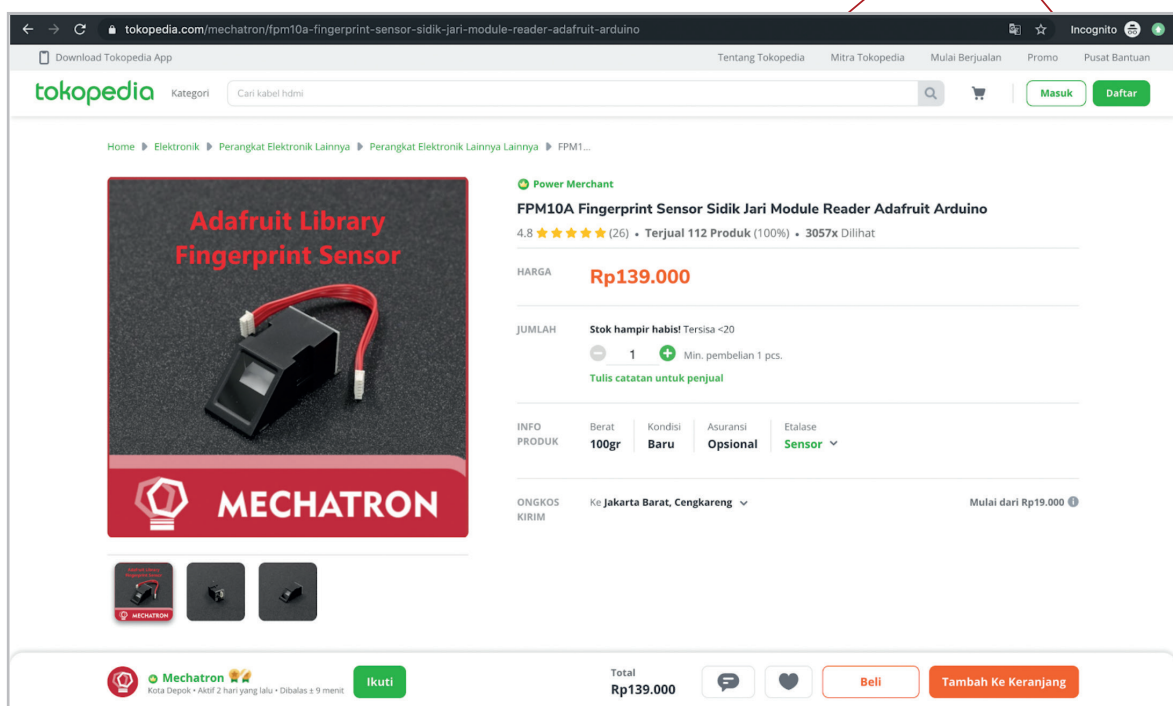


Figure 12: Fingerprint Sensor Module

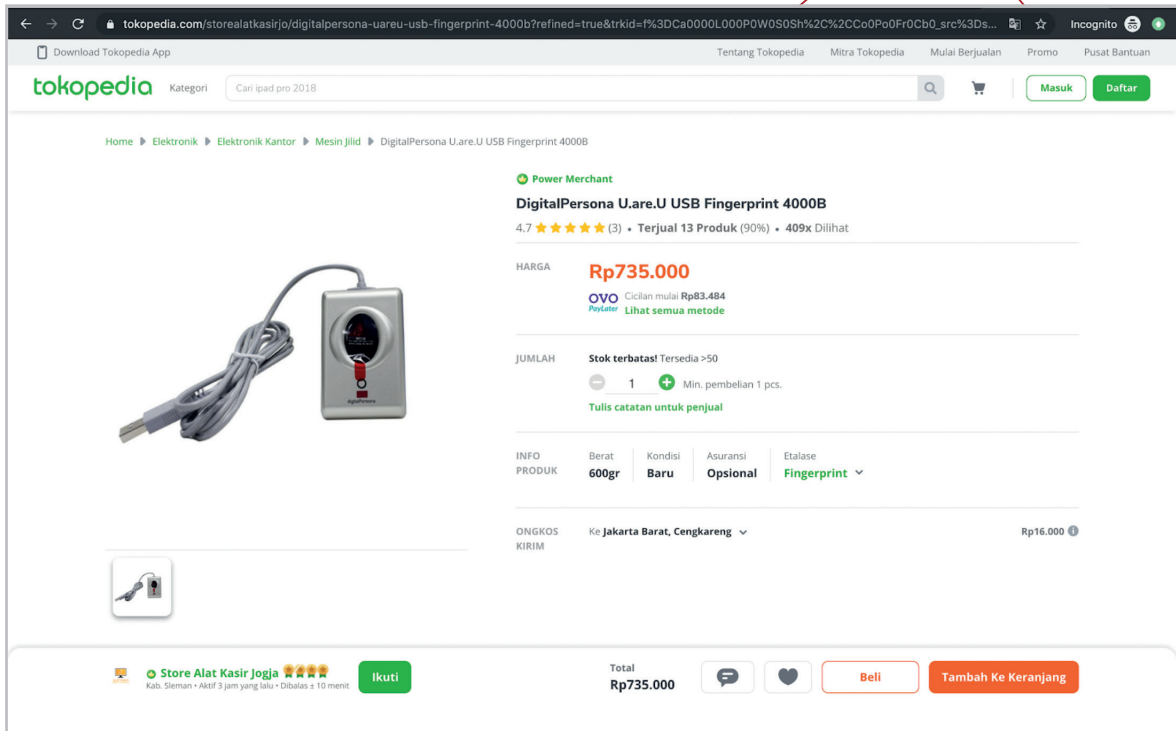


Figure 13: DigitalPersona USB Fingerprint Scanner Device

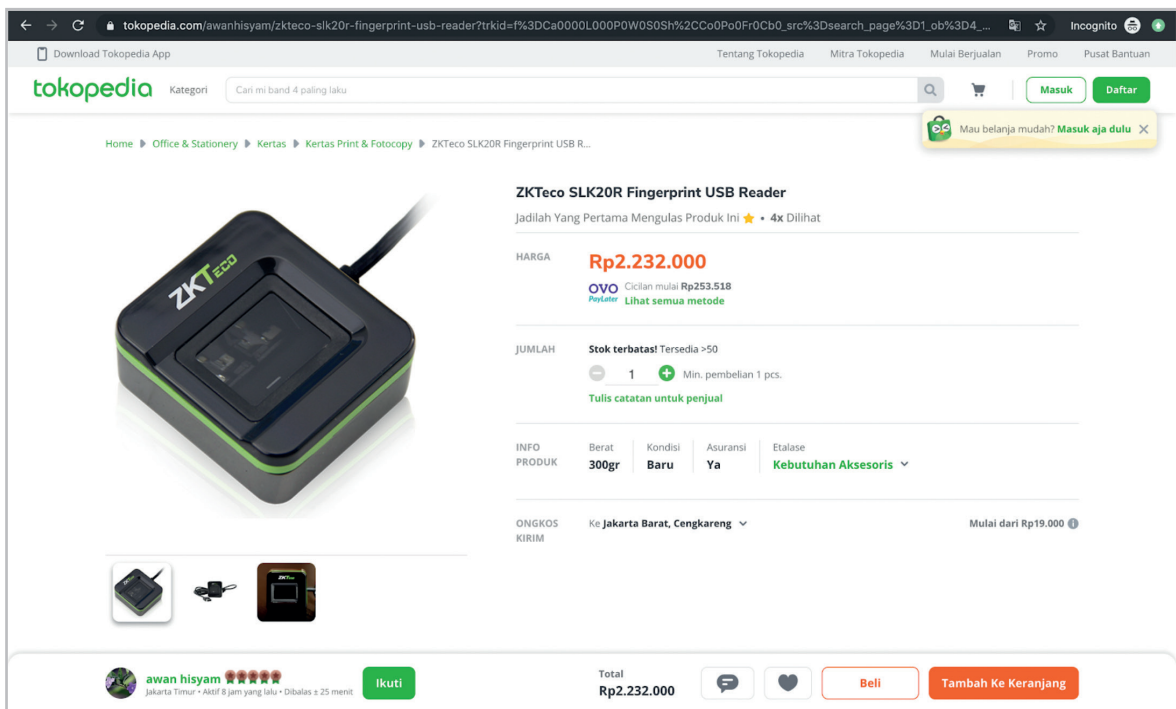


Figure 14: ZKTeco USB Fingerprint Scanner Device

Fingerprint scanning devices are responsible for obtaining fingerprints in digital form. After that, a computer program is needed to be able to recognise whether the scanned fingerprint matches the previously registered fingerprint. Fingerprint recognition technology is readily available and service providers that handle such

recognition processes also exist, including local ones in Indonesia. One of these is ASLI RI, which provides biometric-based verification services. Another option would be for the program to develop its own computer program to recognise the fingerprint lines, thickness, location, direction, and branching of each line. The program could then be run through a web, mobile, or desktop-based application.

Operational Aspect

Beneficiary verification based on biometrics, in this case fingerprints, would be new in the implementation of the program. For this reason, approval from the Provincial Secretariat and the District Secretariat, in this case the Asmat Joint Secretariat, would be required. Beneficiaries should also be asked whether they are willing to have their fingerprints recorded for verification purposes. If this platform was developed outside of MIS, it would be necessary to request data, such as names and citizen ID numbers, of all beneficiaries who have registered with the MIS. As before, it would also be necessary to ask about the willingness of the beneficiaries to have information such as their name and citizen ID number used in this verification platform.

With this platform, the Asmat Joint Secretariat could carry out verification to complete, or even replace, the current verification procedure. While previously the verification relied primarily on checking documents, and initiating a photo check on the ID card with the beneficiary's real face, this system would take a direct in-person approach. The Asmat Joint Secretariat could use this platform to check whether someone is a beneficiary. Then, the identity documents presented by that person would be complementary.

BANGGA Papua's business process could change with a new verification procedure that used fingerprints. The additional components needed are a fingerprint scanning device and a verification application. The printing and preparation of the BANGGA Papua application form by the Joint Secretariat could be eliminated and rely only on using the digital format. The need for printers, ink and paper would be minimal. Bank Papua could also complete the process of checking beneficiaries by using this fingerprint verification platform. The availability of reliable internet access would also be crucial, because it would affect the implementation of the fingerprint verification application. If internet access was properly available, the verification process could

occur in the cloud. Conversely, if there was no internet connection, the verification process could only be run on a limited computer network or be completely offline and local. The implication if the database of the beneficiaries' fingerprints had to be offline or local is that it could be vulnerable to manipulation.

Economic Aspect

Below are the estimated costs required to create a fingerprint verification platform using the self-development option, instead of using a third-party service.

Table 4: Estimated Costs of Developing a Fingerprint Verification Platform

Skill	Person-Day	Unit Price (IDR)	Cost (IDR)
<i>Project Manager</i>	5	1,500,000	7,500,000
<i>System Analyst</i>	8	1,500,000	12,000,000
<i>Hardware Engineer</i>	8	1,200,000	9,600,000
<i>Software Engineer</i>	8	1,200,000	9,600,000
UI/UX Designer	5	1,000,000	5,000,000
<i>Front-end Developer</i>	5	1,000,000	5,000,000
<i>Back-end Developer</i>	8	1,000,000	8,000,000
Scanning Device	1	2,500,000	2,500,000
Total Cost (IDR)			58,700,000

6.3 BANGGA Papua Supermarket Monitoring Platform

Technical Aspect

This monitoring platform would be designed to find out more about the transactions made by beneficiaries at BANGGA Papua Supermarket. The first component would be point-of-sale tools and applications. Currently, there are many third party options to meet these needs, one of which is Moka POS, as shown in Figure 15. Some providers have also included a dashboard feature to make it easier to monitor sales results and income value. This will make it easier for supermarket managers, because they no longer need to manually record and report data.

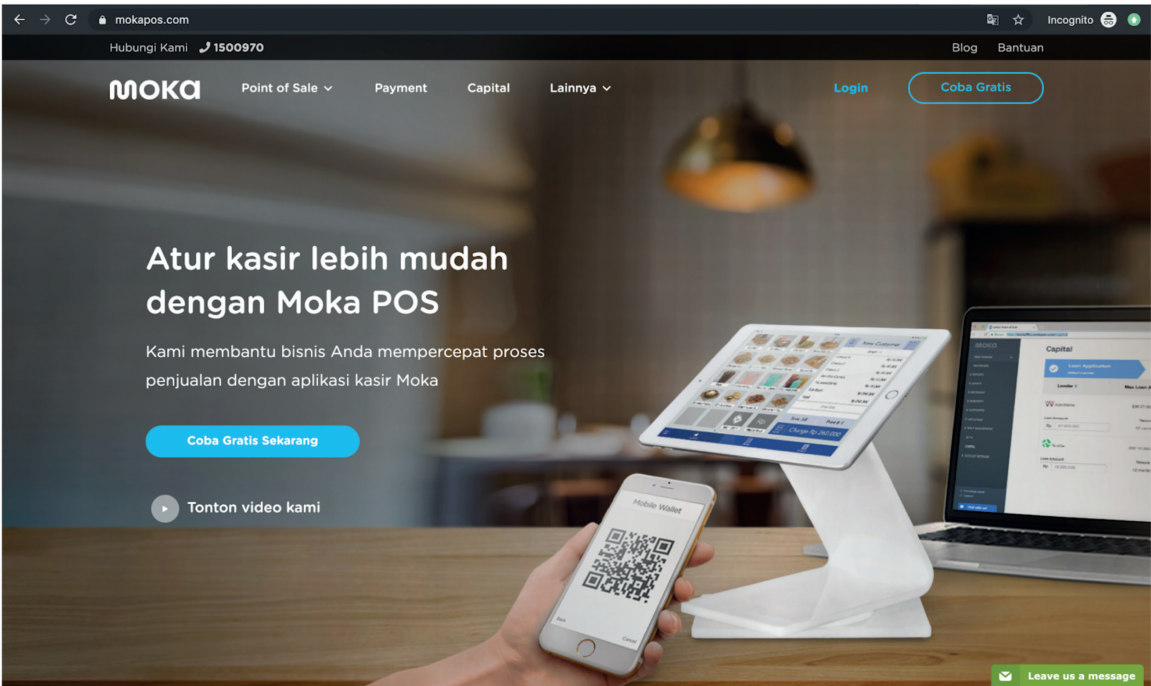


Figure 15: Moka POS

As a result of the technology being widely available, with many POS service providers, the reliability of this kind of solution is high, making it feasible for testing at the BANGGA Papua Supermarket. However, one of the components needed to monitor transactions from beneficiaries is the previously described solution – i.e. the fingerprint verification platform. This would be necessary so that transaction data from the POS system could be enriched with information about whether or not the buyer is a beneficiary.

Operational Aspect

The use of the POS system on this platform would be under the authority of the supermarket manager, because it aims to help buying and selling operations that occur in the supermarket. However, to identify beneficiaries using fingerprint verification, it would be necessary to also coordinate with the owner or manager of the verification platform. It would be necessary to ensure that the platform received approval from the beneficiaries for sharing of data with other parties, which in this case would be users of the supermarket monitoring platform.

Manual or semi-automatic cash registers that are still in use today could be replaced with application-based ones, such as the example shown in the figure on the previous page. When internet access is not available, the POS system could work offline, and would synchronise once the internet was stable again. Shopping receipts could still be printed on paper to give to buyers.

To identify whether the buyer is the beneficiary or not, the supermarket cashier would have to perform an additional procedure. The cashier would need to ask the buyer to confirm they are the beneficiary. If they declare this to be so, the cashier would ask the buyer to have their fingerprints scanned. This might not be an easy request, and there could be resistance from buyers. For this reason, an incentive would be needed, so that beneficiaries who shop there can inform themselves that they are beneficiaries.

Economic Aspect

The estimated cost of using a third-party POS system would be IDR 299,000 per month, per store. The estimated initial cost for equipment in the form of an Android tablet, cash register, receipt printing machine, and fingerprint scanning device would be IDR 15,000,000.

6.4 Summary of Feasibility Analysis

The three recommended technology-based solutions would not have too many technical obstacles, because there are already products available on the market. However, some would need to be developed more specifically, according to the needs of the program.

From an operational point of view, the development of features related to the BANGGA Papua MIS could be started without relying on the other two solutions. If the fingerprint verification platform was already in place, then the BANGGA Papua Supermarket monitoring platform could be fully developed in terms of identifying the beneficiaries who shop there. From an economic point of view, the cost has

been calculated based on the estimated days needed to perform the work, and the estimated daily cost of the labour.

Of the three recommended solutions, the one with the highest total feasibility score is the third solution, which is the BANGGA Papua Supermarket monitoring platform. A simple comparison between the three solutions can be seen in Figure 16.

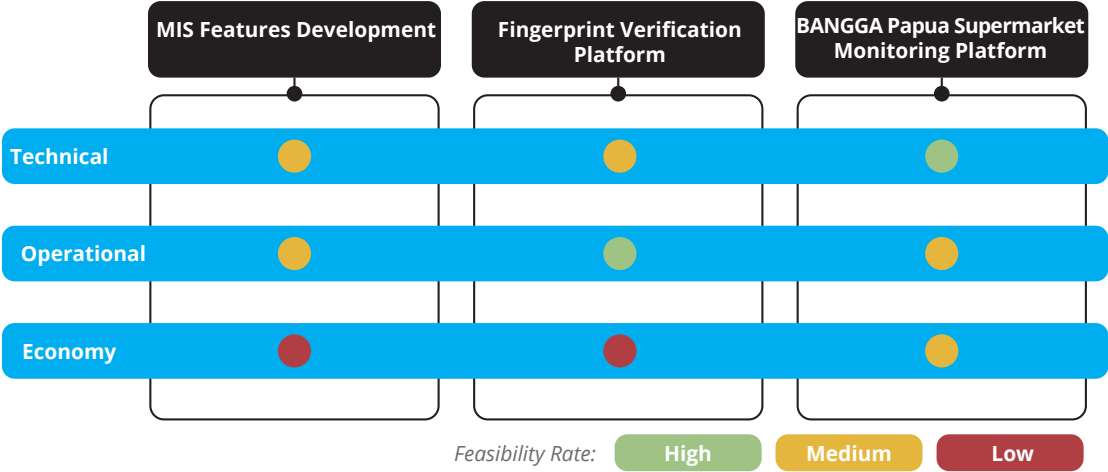
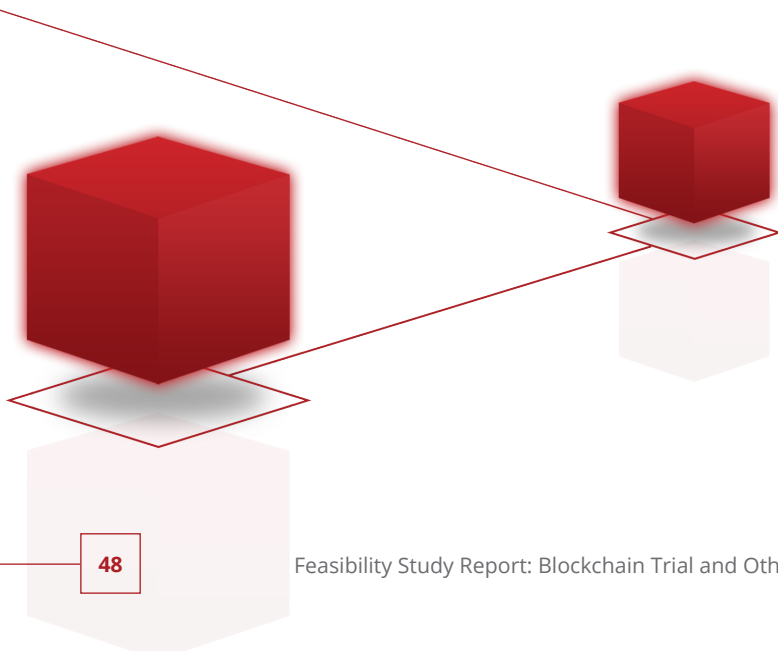


Figure 16: Comparison of Feasibility of Recommended Solutions



07

PRIORITY ANALYSIS

In this section, we analyse the three proposed solutions and rank them in priority using the specified approaches.

7.1 MoSCoW

This method creates four priority categories, including **Must Have**, **Should Have**, **Could Have**, and **Will Not Have**, and can be remembered with the acronym MoSCoW. A solution is categorised as a 'Must Have' if it is necessary for the BANGGA Papua program to be implemented as expected. The 'Should Have' category indicates that the solution is important, but not currently needed. The 'Could Have' category means there is a desire to implement the solution, but it is not yet considered important, while the 'Will Not Have' category indicates that the solution is still not needed, at least for now, so it is not a priority.



If the three recommended solutions are prioritised with this method, the first solution, to develop new features for the MIS, is categorised as a Must Have. This solution would make it easy for the Secretariat to do repetitive work, which is currently prone to human error and data manipulation, and it could shorten the time needed to do the work. As previously explained, in this first solution there are six proposals for developing new features for the MIS. The six features can also be prioritised using this MoSCoW method. The features proposed for nominating beneficiaries and requesting user access request are considered as Should Haves, because they are intended to facilitate the participation of external parties outside the Joint Secretariat. However, the API development feature, the data import feature from SIAK, and the data validation feature are considered Must Haves, because they would have a significant impact on the current process, and would help the Joint Secretariat solve problems related to beneficiary data. The user activity log feature would be categorised as a Could Have, because it is not considered important enough to be implemented immediately, even though it would make it easier for the Joint Secretariat to audit and minimise misuse of the MIS.

The second solution, the fingerprint verification platform, is prioritised as a Should Have, because it is not the most needed solution at this point. However, if implemented, it would provide an improved user experience from both the Secretariat and the beneficiary's perspective, and make the verification process faster and more scalable. There are two main components in this solution, including a fingerprint scanner device and a fingerprint verification application. Both are needed for the platform to work, so in this context the priority for the components of the platform is the same, in the Must Have category, if the solution were to be implemented.

The third recommended solution, for the BANGGA Papua Supermarket monitoring platform, is considered a Could Have priority. This is based on the absence of a standard procedure for monitoring the use of funds. With this platform, it could be seen how the program was being achieved from the downstream side of the beneficiaries. This platform would not have a significant impact if beneficiaries did not shop at the BANGGA Papua Supermarket. On this platform, there are three main components, including POS devices and applications, fingerprint scanning devices, and transaction dashboards. In this context, what are categorised as Must Haves are the POS devices and applications, because they would become the basis for assisting the buying and selling operations. The transaction dashboard is categorised

as a Could Have, because it is a development of the availability of transaction data that originates from the POS application. The fingerprint scanner device is also still categorised as a Could Have, because the platform can run without this feature, but the information on the identity of beneficiaries doing their shopping is not yet available. Figure 17 shows the mapping of recommended solutions and their features or components against the four priority categories of MoSCoW.

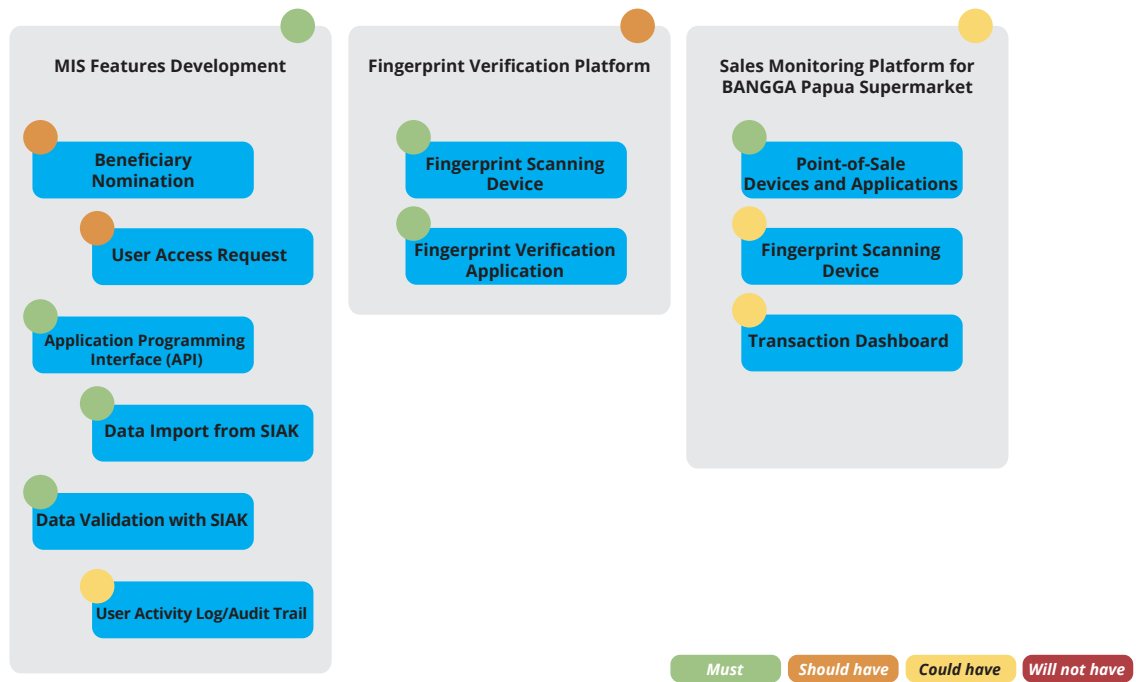


Figure 17: Priority Mapping of Recommended Solutions Based on MoSCoW

7.2 Impact Vs Efforts

The three recommended solutions can also be prioritised by comparing their relative impact and effort. The impact relates to how significant will be the positive impact felt by the beneficiaries, the Joint Secretariat, and other parties involved. The business effort considers how complex the work will be and how much it will cost.

The development of new features in the MIS will have a high impact on the Joint Secretariat team and other external parties, such as the Asmat Disdukcapil, and churches and *puskemas*. However, it will not have an immediate impact on beneficiaries, because this feature targets the operational implementation of the

program. On the other hand, it would take quite a lot of effort to implement the solution. To intervene in the MIS, approval from the partners who are owners and managers of the MIS would be required. The existence of a plan to hand over the MIS to the Papua Provincial Government or the Provincial Secretariat would also require approval from more stakeholders. The integration with the district SIAK, in this case the SIAK for Asmat District, would need to be studied more deeply regarding the bureaucratic processes, and the reliability of SIAK from the technical side.

For the second solution, the fingerprint verification platform, it would have a significant impact not only for the Joint Secretariat, but mainly on beneficiaries. This is because the verification process would be much shorter, so that beneficiaries would not take as long to queue for their turn to be verified by the Joint Secretariat. Bank Papua would also be positively impacted, because it would help to make the KYC process easier. On the other hand, it would take extra effort to implement this solution. The selection of a fingerprint scanning device and the reliability of the verification application must go through a trial first. This would be needed to determine whether the systems that are commercially offered and ready to use are suitable for the needs in the context of BANGGA Papua. If not, further research and development would be required. This process would need to be done in advance to make a final decision between build or buy. After that, it would also be necessary to acquire fingerprint data from all currently registered beneficiaries. Overall, the effort required to implement this solution would be high.

The third solution, which is the BANGGA Papua Supermarket monitoring platform, could be categorised as the solution with the lowest impact. This solution supports the program downstream, after the funds have been distributed. Since this program is unconditional, the focus on monitoring what each beneficiary spends has not been a priority. However, technologies to assist the buying and selling process and recording transactions are widely available in the market. The need for research and development for this solution is not as great, but a pilot stage would still need to be done.

Overall, the MIS development solutions and fingerprint verification platform would have a high impact and a high level of effort, so they can be considered as **Major Projects**. On the other hand, the BANGGA Papua Supermarket monitoring platform would have a low impact and a low level of effort, so it can be categorised only as

a Fill-in Project. Figure 18 shows a comparison between the impact and effort for the **three solutions**.

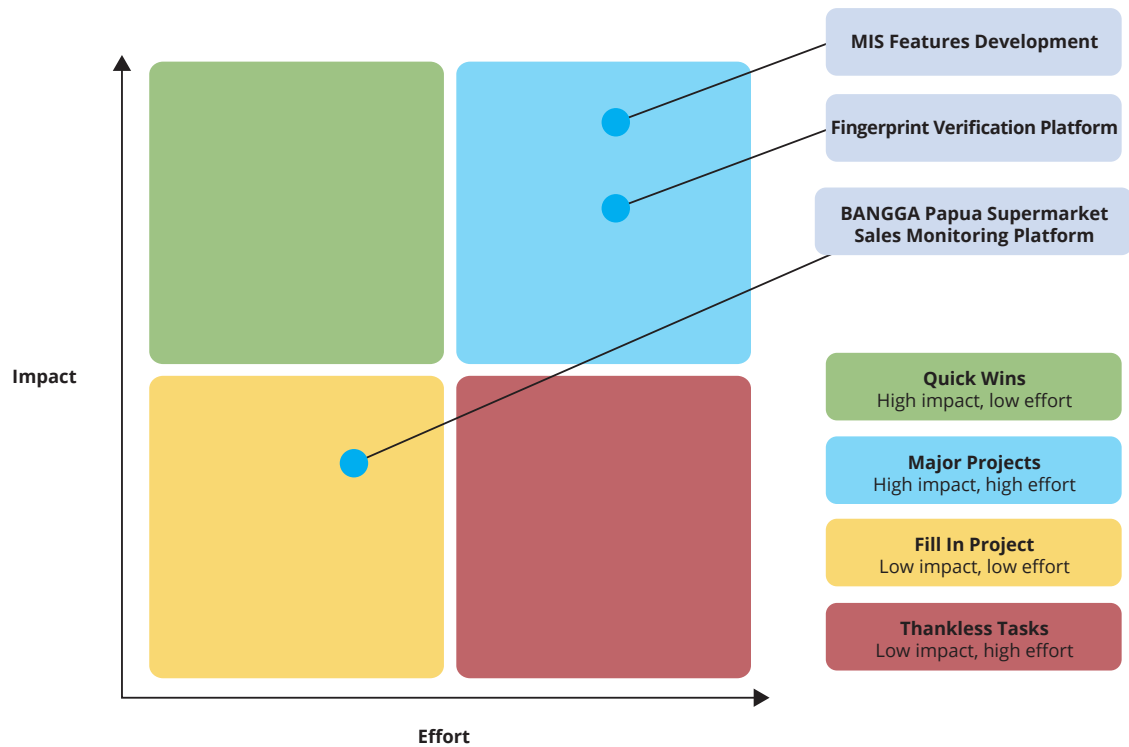


Figure 18: Comparison of the Impact and Effort of the Solutions

7.3 Importance Vs Urgency

The third approach used to determine priorities is to measure the importance and urgency of the recommended solutions. For the first solution, to develop MIS features, it can be categorised as an important solution, as well as urgent. This is based on the identification of previous constraints for which MIS users expect features that can help speed up work, avoid manual input that is prone to errors and manipulation, and will help to check beneficiary data in a more scalable way, so that if the program implementation is expanded by increasing the number of districts it will still be accommodated by program implementers.

The second solution, of the fingerprint verification platform, also has a high level of importance. Currently there are still elements in the community who try to misuse

the existing system to receive funds. If the number of district locations of the program is increased, then the number of beneficiaries will also increase. Without any effort to make the process more scalable, the potential for incorrect disbursement of funds to those who are not eligible will still be high. For that reason, this solution can also be categorised as urgent.

The final solution, of the BANGGA Papua Supermarket monitoring platform, cannot be said to be important, because it does not have a significant impact on the current program implementation. However, the Joint Secretariat should start to focus on monitoring and evaluation, especially on the downstream side. The long process, from participant registration to fund distribution that has been implemented so far, is intended to end up as a benefit for the beneficiaries. If the shopping stage and the use of money are not as effective as they could be, it will be difficult to get feedback for future improvements to the program. As a result, this solution is also considered urgent. A comparison of the **three solutions** in terms of how important or urgent they are can be seen in Figure 19.

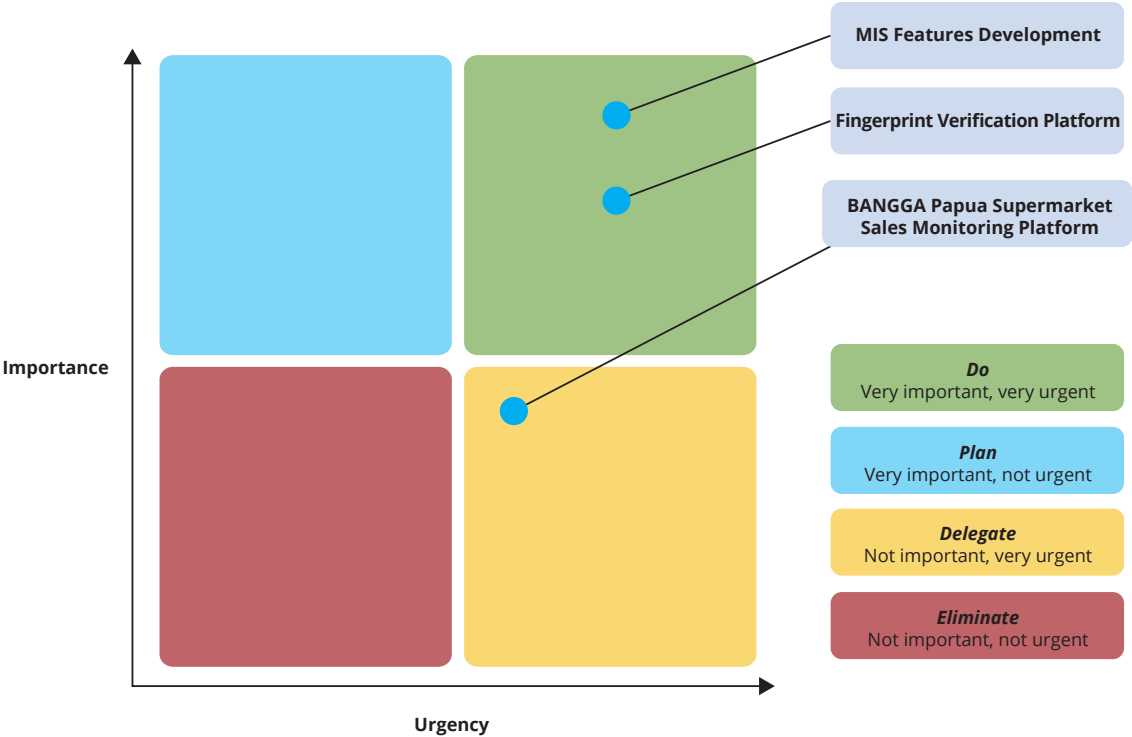


Figure 19: Comparison of the Importance and Urgency of the Solutions

CONCLUSION

This feasibility study is expected to provide an overview of the challenges and obstacles in the implementation of the BANGGA Papua program, especially in Asmat District.

The journey of each stakeholder has identified the current situation, the obstacles faced, and the expected situation. There is still much room for improvement in the implementation of BANGGA Papua program through the application of appropriate technology.

The BANGGA Papua MIS as a beneficiary information system has assisted the Joint Secretariat in the registration stage up to implementation. On the other hand, the MIS can still be improved by developing new features. This has become one of the recommended and most needed solutions to assist the Joint Secretariat at both the provincial and district levels in implementing BANGGA Papua. It can minimise human errors,

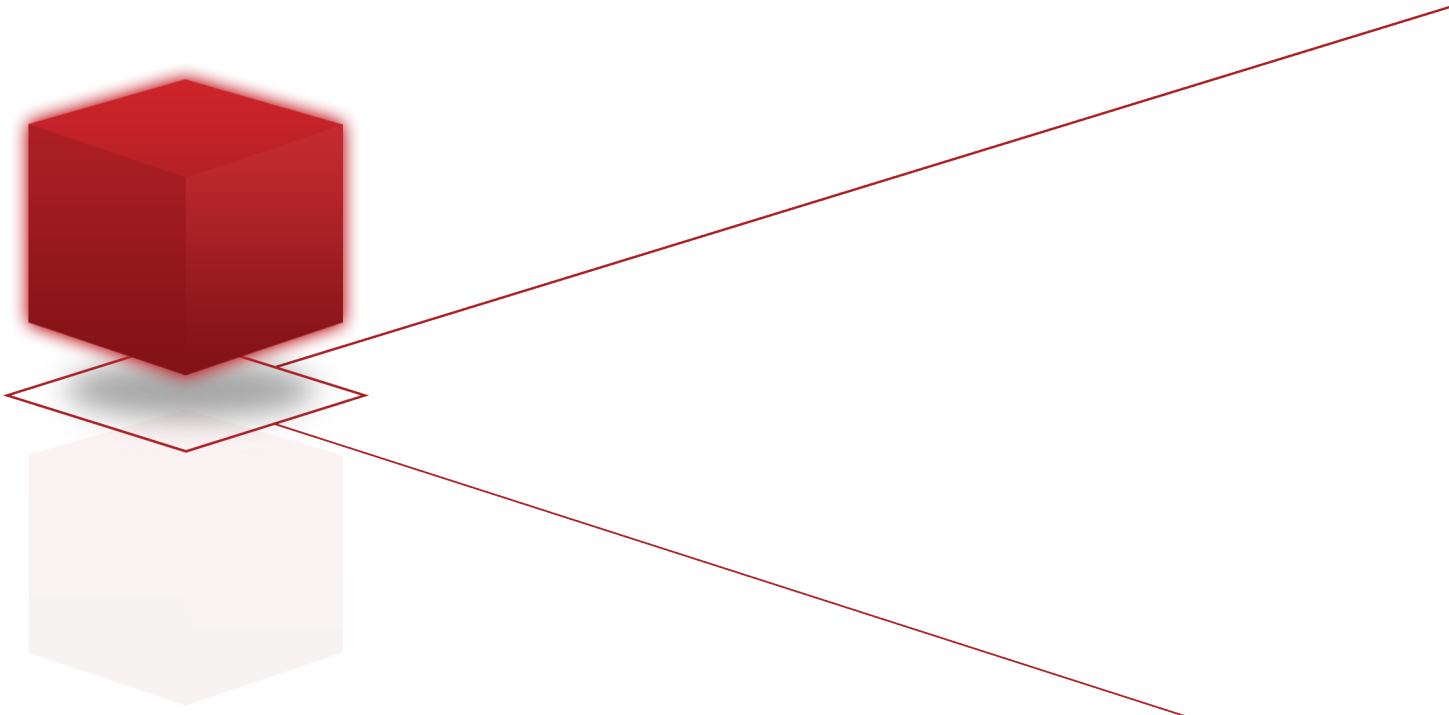
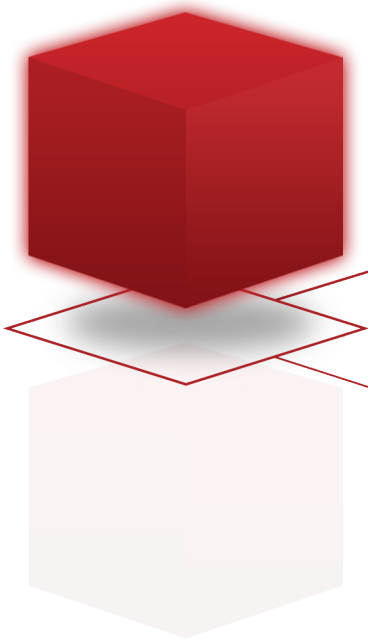
as well as data manipulation, and data leaks. However, since the ownership and management of this MIS is not within KOMPAK's domain, the access and authorisation to develop and manage the application could be an obstacle that must be anticipated in advance.

To make it easier for the Joint Secretariat to speed up the process and improve the quality of beneficiary verification on payment days, another channel is needed to complete the verification process, which is currently heavily document-oriented. The use of biometrics is one of the recommended solutions, in the form of a beneficiary fingerprint verification platform, so the verification process on the day of payment can be shorter and more accurate. The development of this platform can occur independently without having to rely on the MIS, but would involve significant development costs and the acquisition of beneficiaries' data.

The third recommended solution is the BANGGA Papua Supermarket monitoring platform, which is aimed at obtaining information on how beneficiaries are using the funds. This solution is easiest to implement, because there are already plenty of third-party providers, although ideally it would first need to be integrated with a fingerprint verification platform. However, because it would be monitoring the downstream side of the BANGGA Papua program, this solution would not have much impact on the current situation of program implementation.

Blockchain is not yet the main recommended technology solution, considering there are still simpler technologies that could help implement the BANGGA Papua program in Asmat District. However, it is necessary to consider using blockchain technology in terms of storing data related to fingerprint verification activities, so that the accountability of those who use the system can be known.

It is hoped that the recommendations for solutions and analysis that have been discussed in this report can be considered by the relevant BANGGA Papua stakeholders, primarily to improve business processes and improve the experience of beneficiaries, so that the main goal of poverty alleviation in Papua and the birth of a prosperous generation of indigenous Papuans can be achieved.



KOMPAK

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