

# Developing IV-Lab (Innovation Lab) for Acceleration Rural Community in Business Through Optimizing the Role of BUMDes

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## ABSTRACT

The village's potential will be developed in accordance with the village's potential to empower the community's economy and realize community welfare. The government gives the development of BUMDes and the expectations to this institution. Unfortunately, the amount of budget received by BUMDes is not accompanied by the increasing performance of BUMDes. In total, 1,670 BUMDes do not contribute to village income. In addition, 2,188 BUMDes have not been operating. The existence of the COVID-19 pandemic has also forced the rapid movement of people, including in rural areas, to get used to being friendly with developing technology. Virtual lab provides a number of benefits in sharing resources, as well as saving time and money. In its development IV-lab took Part of the DevOps method or framework. There are 7 phases in DevOps process including plan, develop, build, test, deploy, operating, and monitor. This website uses DevOps(development and Operation) that very suitable method for developing the website. Future development will be added augmented reality for increasing value and attractiveness.

**Keywords:** BUMDes, IV-Lab, TAM

## 1. INTRODUCTION

One of the main targets of national development in improving the community's welfare is at the village point. Villages have considerable potential to be developed. Following the enactment of Law Number 6 of 2014 concerning villages, there is an opportunity for each village to develop every potential it has independently in line with their individual needs to create community welfare. According to Sholeh [1], village potential is the power, strength, ability and ownership of the village to develop and manage natural (physical) or human (non-physical) resources that are stored and contained in the village. The village's potential will be developed in accordance with the village's potential to empower the community's economy and realize community welfare.

Gini ratio is a tool for measuring how effective the utilization of villages in the economic sector. Based on the Central Statistics Agency data, the Gini ratio in rural areas in March 2020 was recorded at 0.317, up from the Gini ratio in September 2019 of 0.315 [2]. A high Gini ratio illustrates that there is still economic inequality between the rich and the poor in an area. This indicates

that the optimization of village potential for the economy still needs to be intensified. One way that can be done in increasing original village income is to form an institution, namely BUMDes (Badan Usaha Milik Desa), with cooperative, emancipatory, participatory, accountable, transparent and sustainable principles from the village community

The government gives the development of BUMDes and the expectations to this institution. In fact, it still does not provide optimal results. In 2019 BUMDes received a budget of 70 trillion, this fund will increase in 2020 to 72 trillion rupiahs. Unfortunately, the amount of budget received by BUMDes is not accompanied by the increasing performance of BUMDes. In total, 1,670 BUMDes do not contribute to village income. In addition, 2,188 BUMDes have not been operating until now[3]. BUMDes activities in villages are generally still minimal, the innovations provided by BUMDes management are still not able to improve their performance. The problem is that until now, various data indicate that most BUMDes are still standing and do not have productive business activities. This picture shows that active BUMDes is very important in improving the

economy of rural communities, which leads to an increase in community welfare. The existence of BUMDes should be an essential concern of the government [3].

The lack of innovation in BUMDes products is often the reason for the decline of BUMDes. At the same time, product innovation can increase product (business) diversification opportunities and reduce BUMDes business risks. According to Mammen, Alessandri, and Weis [4] in their research found that product diversification can reduce business risk. Many literature studies examine diversification as a strategy for business growth and competitiveness[5]. Involvement in different business lines offers organizations greater market power through multimarket competition [6] and reduced risk [7].

Seeing the urgency of the problem in BUMDes, the researchers realized that there was a need for innovation by BUMDes. Innovation can be strengthened by the implementation of information technology that can be utilized in BUMDes. This is also supported by internet access that is increasingly evenly distributed in rural areas. The use of internet access as a medium for disseminating information related to village information is one of the efforts to establish a digital village. The application of this digital village has been successfully implemented in several regions in Indonesia.

The adoption of information technology seems to be a necessity to encourage development in rural areas. The existence of the COVID-19 pandemic has also forced the rapid movement of people, including in rural areas, to get used to being friendly with developing technology. In the village economy, the use of the internet is also something that must be developed immediately. Although only 8.9% of industries in Indonesia utilize the Internet of Things (IoT) with massive information dissemination, it does not mean that Indonesia is not ready to face technological trends to develop business. Of course, adoption for rural communities is not an easy thing to do, and it is necessary to analyze the readiness of the villagers to receive access to technology.

Through the benefits obtained from technology, this research will build a platform in the form of a virtual innovation lab specifically for rural communities, especially BUMDes, which is named IV-Lab (Innovation Village Lab).

## 2. LITERATURE REVIEW

### 2.1 Diversification of business

Diversification is one of the strategies that is often carried out in business or business activities, especially in businesses. / companies with several kinds of industrial

sectors run [8]. According to Tjiptono [8] diversification is a form of effort to seek and develop new markets or products to gain business or sales growth. Diversification strategy focuses more on an action that can gain a competitive advantage by selecting and managing different business groups [9]. Diversification can be done according to the conditions and goals that they want to target. Each company is free to market its products. For example, dairy farms sell their livestock to several competing dairy companies. This diversification is called vertical diversification (from top to bottom). In contrast, horizontal diversification is more concentric (adding new existing products related to the facilities, network and marketing of previous products as well as conglomerates (adding new types of products that have nothing to do with the existing ones). The purpose of the diversification strategy was put forward by Haberberg and Rieple who said that an increase in resources for operational activities, increased efficiency, and increased strength was an increase in performance through a diversification strategy in dealing with competitors [9].

### 2.2 Technology Acceptance Model

There are several models built to understand and analyze the factors that influence the acceptance of the use of technology, such as TPB (Theory of Planned Behavior), TRA (Theory of Reasoned Action), and TAM (Technology Acceptance Model). The TAM model is a model adopted from TRA that states the premise's similarity, that a person's reaction and perception of something will reflect that person's attitude and behaviour [10]. The TMA model was developed from TRA, and previous researchers considered that TRA studies were still in general, while TMA explained the behaviour of using information systems in more detail [11]. In TMA, there are two critical factors in accepting information systems, namely perceived usefulness and perceived ease of use[12]. These two things must be based on the individual's intention to participate in the action so that understanding and benefit. With the TMA model, acceptance of the internet with specific dimensions will be explained in detail, affecting internet users easily. TAM defines a theory designed to explain how users understand and use information technology [13]. The modernity and sophistication of today's technology must be designed as well as possible to use maximally and adequately to produce benefits that produce.

### 2.3 BUMDes

BUMDes is an economic or business institution established by the village government. It serves as a social and commercial institution that has an essential role in realizing the community's welfare, village and village government. As a social institution, BUMDes sides with the community's interests by contributing to social services in the village. In comparison, a commercial institution aims to seek profit by offering

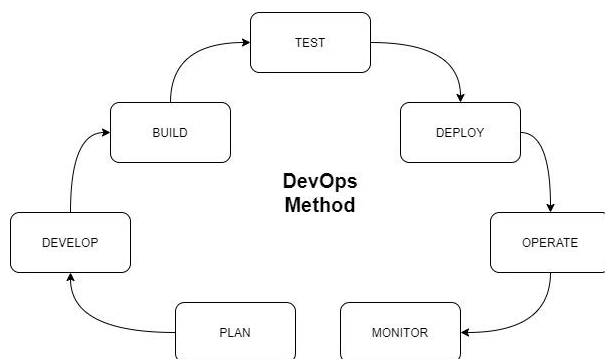
local resources, namely goods and services, to the market. The form of BUMDes can vary in each village in Indonesia, which is tailored to each village's local characteristics, resources, and potentials. Problems in the implementation of BUMDes include: (a) the village government is not maximal in empowering the community to develop BUMDes; (b) lack of participation from the village community in the optimal management of BUMDes; (c) the absence of BUMDes following the planning [14].

## 2.4 Virtual Lab

Virtual labs provide a number of benefits in sharing resources, as well as saving time and money. In the world of education students have the opportunity to study as often as they want, as well as the ability to conduct experiments that would be too dangerous or inappropriate in a real laboratory [15]. Sophisticated instructors can help remote users have opportunities in real time. This emerging development is also part of the mixed learning revolution in education that seeks to provide students with convenient options for accessing learning materials [16].

## 3. RESEARCH METHOD

In this paper, research is focused on developing a platform named IVLab. In its development IVLab took Part of the DevOps method [17]. There are 7 stages of development in the use of this method.



### Step 1: Plan (Plan).

In this plan step, the development team learns the purpose of the IV Lab, after getting the goal, it is continued with quiet learning of the target user, which for IVLab itself the target user is the Village Owned Enterprise (BUMDes) in each village. With the goal and target user obtained, the System Design process is carried out on IVLab to take the form of WireFrame, Database, Flow Diagram and UI Design. This step is a core process and takes time, as the DevOps steps after this will relate to the Planning Step.

### Step 2: Develop (Development).

In this second stage, it begins with the development of

the display side (Frontend Developing) by pivoting on Wireframe and UI Design. Because the platform runs on a Web Platform, the display and interaction of applications uses the Hypertext Markup Language (HTML) as a page builder and the elements in it, Cascading Stylesheet (CSS) as a beautification of the page and the elements in it, and Javascript (JS) as an interaction provider. between components on the web. After that, it is continued by providing functionality to each component, as well as structuring controllers for sending and receiving data on the website, usually called Backend Development (Backend Developing). In terms of the backend, IVLab uses the PHP language which is assisted by one of the well-known frameworks, Laravel. After this stage, you could say the application is ready, but it is still not ready to use.

### Step 3: Build (Development).

At this stage the application is in the form of an almost finished application which has a look and functionality. However, the web application has not been installed on the server where this application will air later. At the time of installation, required architectural adjustments, database configurations, and even source code adjustments, with the server that will be occupied later.

### Step 4: Test (Testing).

In this development, the testing referred to here is still in the stage of finding bugs and some malfunctions that exist in each application feature. At this stage will also be tested for the level of security and validation in the processing of incoming and outgoing data on the website later (Pentest). Usually, at this stage there will be a lot of changes, especially in the backend.

### Step 5: Deploy

After the testing phase, the application is installed on the VPS followed by the specified domain. The state of the application is ready to use and the data traffic is safe. At this stage, the possibility that the application will malfunction or send data that does not match the validation is very small. When the application is deployed to the server, the application performance will also depend on the VPS performance. The ups and downs of VPS usually depend on the fairness of using the application.

### Step 6: Operate

At this stage, the tested and deployed application is ready to operate with various specified access rights. In IVLab itself, there are only two access rights, namely admin/superuser with a registered BUMDes (Village Owned Enterprise) user.

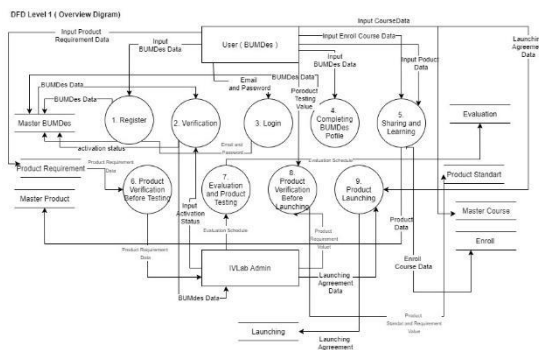
### Step 7 : Monitor

Monitoring is the final stage of DevOps development, at this stage IVLab will be monitored by the development team in terms of data traffic and application performance

installed in the VPS. Even though at this stage the percentage of malfunctions is relatively small, it still has to be monitored and cared for (maintenance), this is because there is still such a thing as human error (misuse). In addition, this stage is also an insight generator for the development team to be able to create or upgrade existing features on the platform, which makes the application more powerful to use.

## 4. RESULT AND DISCUSSION

In IVLab there are several main features that are the axis of achieving the goals of developing this website. Broadly speaking, IVLab itself prioritizes the incubation function which will produce new products that can be useful for BUMDes in the future.



The diagram above is a Level 1 DFD for the use of the IVLab application. Which in the diagram will explain the entities, processes, databases, and data traffic that runs. There are 9 main processes in this application, :

- **Register.** The user (BUMDes) inputs data into the Bumdes Master database through this process. This process is intended so that the user has an IVLab account.
- **Verification.** This process is used by IVLab Admin to verify the validity or invalidity of the BUMDes data entered in the Register process. Admin sends *Activation Status* data through this process to the Bumdes Master database.
- **Login.** User (BUMDes) log in by entering email and password, to be checked on the BUMDes Master database. If the data is found and the activation status data has been obtained from the admin, then the login is said to be successful and the user can do activities and enjoy the natural features of IVLab.
- **Completing BUMDes Profile.** The database used in this process is still the BUMDes Master. This process aims to facilitate users (BUMDes) in order to complete their identity in IVLab.
- **Sharing and Learning.** In this process the user (BUMDes) can share product and course data. In addition to sharing, users can also get product data and course data from other users for the purpose of learning and sharing. Because this process is the

main feature of IVLab, almost all databases are used in this process.

- **Product Verification Before Testing.** After learning and sharing, users can also test their learning outcomes in this process by sending product data to the Product Requirements database. After the requirements are validated by the admin and course provider users, the next process can be continued.
- **Evaluation and Product Testing.** From the previous verification process, if successful, this process will provide user data in the form of the date of the test / product testing of learning outcomes taken from the Evaluation database. From this process, the output is in the form of test data carried out by the admin and user of the course provider.
- **Product Verification Before Launching.** This process is based on the output data from the Evaluation and Product Testing process. From this data, the admin and course provider, it will be compared with the data in the standard product database. If the results meet the standards, then the product is ready to be submitted to the Launching process.
- **Product Launching.** Users can enter this process if the product they have developed has passed the Product Evaluation Testing and Verification Before Launching process, and has obtained a Data Launching agreement from the IVLab Admin and the course provider user. Products that have launched will be recapitulated in the Launching database

#### 4.1 Login and Register

This feature is a mandatory thing for users to do in order to carry out all the activities that exist in IVLab. It is also useful for the bearer in the ease of collecting bio data from BUMDes. In addition, it also makes it easier to validate the data for each BUMDes. Login and register using OTP email assistance, as a form of active validation of whether or not email is a unique input when logging into this application. In this application, the initial register is designed with little input, in which the completeness of the data will be filled in at the stage after registration. This is to make it easier for users when they want to have me in a short way.

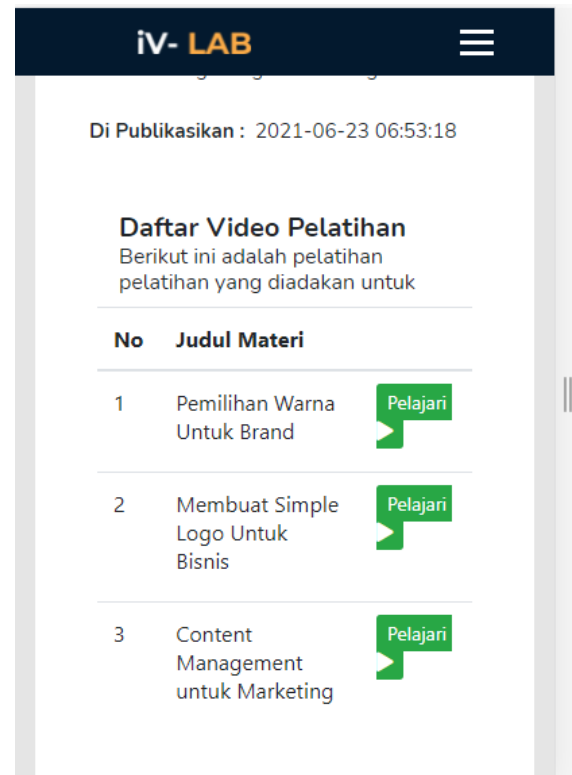
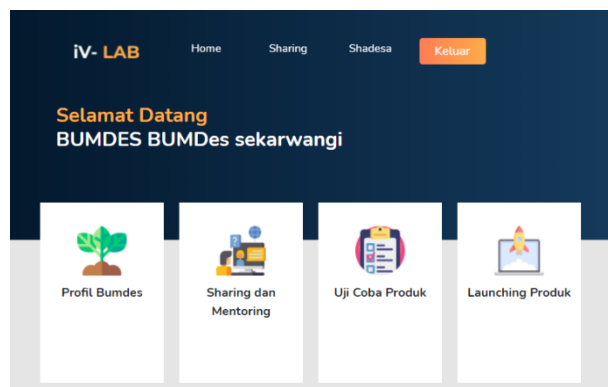
#### 4.2 User Dashboard

The user dashboard is the center for initiating all activities from IVLab. In this Dashboard, the flow of the use of the IV Lab features will be presented. Starting from completing the BUMDes bio, Sharing and Mentoring, Product Trial, and Product Launching. All the features in IVLab are presented in the form of tab panels in the Dashboard. The system for accessing each feature in the flow is initiated by completing the profile, in the BUMDes Profile tab. Here BUMDes must fill in the data as valid as possible so that it can be approved by the admin and can go to the next stage.

The next tab is sharing and mentoring. In this tab, it allows the user if he wants to make an online sharing through IVLab. In addition, in the tab you can see what training has been enrolled.

The next tab is Product Trial. In this tab, a table of user product testing schedules will be presented to the experts. Users can submit a standard product test schedule by attaching several requirements files specified by the system or from testers.

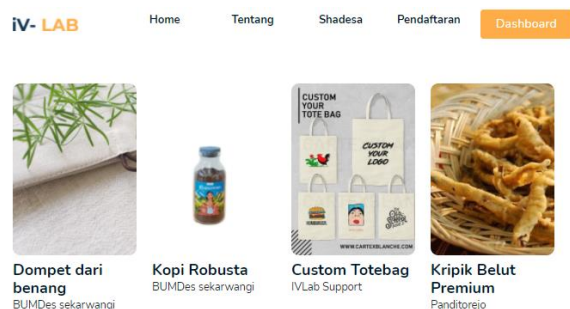
The last tab is Product Launching. This tab is connected to the Product Test tab. Which if in product trials, the product has met the target of the testers and the target of IVLab, then the product will get publication through this launching feature.



#### 4.3 Shadesa

Shadesa is the publication center of the various products in IVLab. The product can be from the launching feature or the original potential from the village of origin of the BUMDes. In Shadesa, a list of products and a list of free classes will be presented that can be enrolled and studied at any time by BUMDes. The Shadesa page is designed with a very simple layout but the elements that are presented are still clear (minimalist design).





## 5. CONCLUSION AND FUTURE DEVELOPMENT

Virtual-Lab will be a web-based digital lab. There are several features such as Shadesa, e-learning, and product practices. This e-learning feature will contain materials on things that can be implemented by village entrepreneurs who are members of BUMDES. The materials that exist for example contain about, how to cultivate fish, how to make attractive packaging, tips on marketing a product, and materials that are able to develop other potentials. All materials will be provided by experienced practitioners in their fields. Village entrepreneurs who are members of Virtual-Lab can also have interactive discussions with practitioners if there are things about the material that is still crammed. Virtual-Lab is also equipped with lab simulations, with this simulation Virtual-Lab users can practice directly easily so that they have a picture of what is happening in the field. The existence of this simulation as a medium to measure understanding and also practice before village entrepreneurs plunge directly into the world, so it is expected to reduce business risks that may occur.

This website uses DevOps (development and Operation) that very suitable method for developing the website. DevOps is able to decrease product system development and provide high level of software continuance. So, this method or framework is effective for building apps quickly.

In future development, this product will be tested in heuristic testing like User Experience test using UEQ (user experience questionnaire) framework. This website also will be developed in form of mobile version. In Addition, future feature will be added like Augmented Reality concept, Live Chat, etc.

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