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Integrated innovation of East Java digital village based on collaboration of regional potential and local market evolution supply chain

Subagyo
Faculty of Economics and Business, Universitas Negeri Malang, Malang, Indonesia
*Corresponding author email: subagyo.fe@um.ac.id

Buyung Adi Dharma
Faculty of Economics and Business, Universitas Negeri Malang, Malang, Indonesia
Email: buyung.adi.fe@um.ac.id

Andi Basuki
Faculty of Economics and Business, Universitas Negeri Malang, Malang, Indonesia
Email: andi.basuki.fe@um.ac.id

Hendra Susanto
Faculty of Economics and Business, Universitas Negeri Malang, Malang, Indonesia
Email: hendrabio@um.ac.id

Ari Gunawan
Faculty of Economics and Business, Universitas Negeri Malang, Malang, Indonesia
Email: arigunawan96@gmail.com

***Abstract*---**Development in Indonesia is inevitable from the residual problems of development in rural areas. However, the various solutions that have been carried out still have various shortcomings, this is due to the lack of integration of the technology used to map the potential of the village and its realization, as well as the lack of use of technology in terms of optimizing the potential of the village owned. This study aims to clearly map the natural potential of the village and form the best supply chain flow to be able to deliver product processing results from mapping and processing results through

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digital market penetration that can increase village potential and improve village welfare. The research method used in the development of this research is the design thinking process. The results of this study are a digital village system in which there is a feature of searching for village data, presenting menus such as visualizations and infographics. The use of this research development product can increase automation in mapping village potential and supply chain flows that are right on target.

***Keywords*---**village, rural, development, technology.

Introduction

Development in Indonesia is inevitable from the residual problems of development in rural areas (Irawan & Salam, n.d.). This is evident from the increasing gap (Gini Ratio) that occurred in 2021 of 0.381. This means that 1 percent of the population in Indonesia controls up to 38 percent of the total wealth in Indonesia. (Nurdiana et al., 2022) To be able to improve development and reduce inequality, the development of villages and rural areas is an important factor in poverty alleviation and reduction of inequality between regions. (Camarero & Oliva, 2019) East Java as one of the development centers in Indonesia also carries out mapping of village potential. (Sari, 2018) Such as the application of penta helix which develops innovation models for the development of village potential through training on managing digital potential from an economic point of view (Inovasi Kebijakan et al., 2019) Another research conducted is the development of the potential of tourism villages and handicraft industries carried out in Ponorogo in Karang Patihan Village, with the results of research on the development of tourism villages that have high economic value. (Sugianto, 2016) Other research on the development of village potential in the Blitar area of East Java through the processing of agricultural products and village food that realizes the creative economy of the village (Hapsari & Santoso, 2021).

However, the various solutions that have been carried out still have various shortcomings, this is due to the lack of integration of the technology used to map the potential of the village and its realization (Widodo et al., 2021), so that the various solutions provided are only temporary development of the village's potential regardless of the sustainability of the solution (Li et al., 2018) . This is evident from the increasing rural poverty rate in East Java, there are 153.63 thousand people in rural areas due to the increasing lagging of the village economy which is influenced by various factors such as education, nature, facilities, and of course the potential of areas that are not utilized properly and optimally (Rahmawati et al., 2021), this is due to the lack of use of technology in terms of optimizing the potential of villages owned (Sinha, 2020).

Mapping and optimizing the potential of technology-based villages has often been carried out in several regions in Indonesia, including research on optimizing the potential of technology-based villages, namely the development of West Java Digital Villages which collaborates with health, multimedia, education, and agriculture that supports the optimization of village potential (Suryani & Nurani,

2019). Other research that discusses the optimization of village potential technologically such as research on mapping the optimization of village potential in Ponorogo on increasing cow milk production with technology. (Purnomo et al., 2020).

Other research on the development of geodatabase-based regional potential which is a data source center that maps village potential completely and comprehensively (Nurdin et al., 2021). Based on these existing problems and solutions, the researcher initiated the development of integrated innovations in mapping village potential with internet of things technology that will map the potential of the region and be mapped through a cloud system that is directly connected to the manufacturing process in the village and integrated directly in its marketing through a digital market supported by an evolutionary supply chain that can optimize according to the potential of the village.

This study aims to clearly map the natural potential of the village and form the best supply chain flow to be able to deliver product processing results from mapping and processing results through digital market penetration that can increase village potential and improve village welfare (Kirowati & Setia, 2018) . This research is very important to support equitable development and optimization of village potential (Rahman & Novitasari, 2018), so as to improve the economy in the grassroots sector in the community which will be able to sustainably increase the expansion of employment and attract investment in development (Rumsari et al., 2019) .

Materials and Methods

The research method used in the development of this research is the design thinking process (Wrigley et al., 2018), this method is a very suitable method to be used in technology-based development, especially in research that is sustainable and on a large scale (Tu et al., 2018). This development method consists of 5 stages as follows:

- *Empathize and Define*
  This stage is the initial stage in the analysis of the needs of developing village potential at the rural level, especially in the fields of farming, MSMEs, tourism, at this stage a Research Operational Design Seminar is also carried out in preparing targets and technical research stages (Shé et al., 2022) .
- *Ideate*
  At this stage, the researcher will formulate research ideas and form a solution design clearly, this stage is expected to produce a minimum viable product that can be used as material for design validation that is developed both in terms of system design and user interface design, which will be validated by experts in their fields (Shé et al., 2022).
- *Prototype*
  At this stage, researchers collaborate with technicians in the process of developing cloud technology programs and mapping the potential of IoT-based villages, at this stage it is expected to be able to produce cloud and IoT devices that are ready to be used in the early stages and are able to

produce a guidebook for the use of the system, so that at this stage there are validation results that are expected to provide complete validation of the results of the initial development that has been carried out (Nakano et al., 2018).

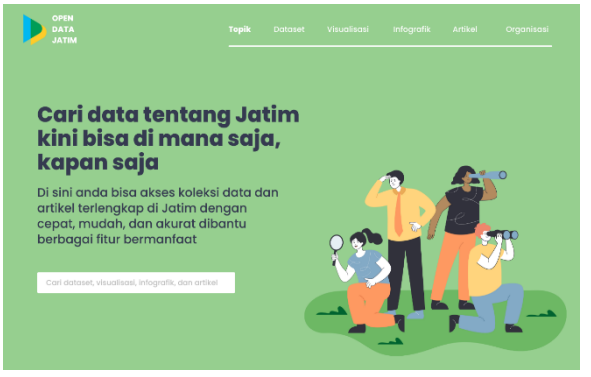
- *Test*
  At this stage, product trials will be carried out on a small scale, field scale, to large scale in several village areas, this stage is expected to be able to test the smoothness of users through usability testing products, data collection from various testing scales, and data analysis results that can be used in the next stage (Nakano et al., 2018).
- *Finishing*
  At this stage of completion, the researcher will evaluate the preparation of the final report, preparation of the results of processing and data analysis towards the publication of indexed international journals and the preparation of Intellectual Property Rights, at this stage the researcher will also evaluate the final development of the platform (Kim, 2019).

Results and Discussions

The following are the findings of the research which are solutions to the two urgency raised in the study, namely 1) optimization of mapping the natural potential of villages and the formation of supply chain flows using the system, and 2) increasing village potential and village welfare.

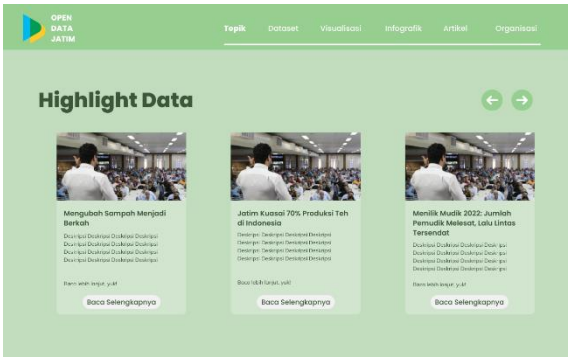
Result

Digital Village System
Homepage



The initial display on this digital village mapping system includes various menus such as datasets, visualizations, infographics, articles, and organizations. The data presented in the system can be used as information to carry out further mapping.

Data



The data highlight display menu is to present important information data on village mapping.

Search

This data search view is grouped into several categories of data that the village has. With this search, it makes it easier for certain information that requires special keywords.

Expert Validation

A recapitulation of the validation results carried out by media experts and material experts is presented in the following table.

Table 1
Expert validation recapitulation

No	Indicators	Media Expert	Material Expert
		Total Score	Total Score
	Ease	19	-
	Serving	37	-
	Uses	-	24

Presentation of Material	-	24
Sum (Σx)	56	48
Percentage ((Σx/Σi ×100%)	93,3%	96%
Information	Very Valid/ Very Worthy	Very Valid/ Very Worthy

Discussion

Comparison of the results of a similar study by (Nurdin et al., 2021) that participatory digital databases have the potential to be used to inventory and collect complete, complete, and detailed village/kelurahan potential. Based on the previous research, villages can carry out thematic mapping independently in accordance with the standards issued by BIG. This village boundary map becomes a regional village boundary to build a standard database of village potential. The results of the study (Limbanadi et al., 2018) explained that the web-based Village Potential Mapping application can help find out the various regional potentials in South Minahasa Regency, so as to provide convenience for the community, be it investors, the general public or other regional governments or the center to find out all the social, economic, and cultural potentials that exist in the South Minahasa Regency area.

Mapping the natural potential of the village can be optimized using the results of this study. In addition, the flow of the supply chain of product processing products to several areas in the village can be right on target so as to improve the welfare of the village. The system of mapping the potential of the village and its penetration in digital marketing has a lot of good influence on the village. This is in accordance with the theory (Limbanadi et al., 2018) that the purpose of building an information system is, among others, to make it easier for humans to access, process, and carry out other data processing mechanisms. The existence of an information system can improve maximum performance of an agency and can apply increasingly advanced technological developments. The results of this study can be followed up on the evolution of supply chain in various villages throughout the City Regency in East Java.

Conclusion

The village potential mapping system (digital village) according to the design of the research product can be realized with various features in the system. The supply chain flow for the results of processing village products can be distributed according to the target through the system that has been developed. The equitable distribution of these results can improve the welfare of the village community and the potential that exists in the village. The next research suggestion is to follow up on supply chain evolution for various villages throughout the City Regency in East Java.

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