Original Research Article

Open Data-based Village Potential Mapping Model Design in the Tomini Bay Region in the KKN Course

ABSTRACT

The objectives of this study were: 1) To develop an open data-based village potential mapping model design in the Tomini Bay Region in the KKN course and 2) Test the validity of the open data-based village potential mapping model in the Tomini Bay Region in the KKN course.

The research method used in this study is the Research and Development research method of the Borg & Gall model of model development stages, which include (1) drafting the model, (2) expert and practitioner validation, (3) limited model trial, (4) more comprehensive model trial; and (5) model revision. The subjects of this study were 42 students participating in KKN in the Tomini Bay Region in 5 villages. The quality of the developed product was analyzed with descriptive statistics. The results showed that (1) The design of the open data-based village potential mapping model developed has a very high level of validity with an average value of 0.87 and is feasible to use; (2) The open data-based village potential mapping model developed is practical to use, based on the value of model implementation which reaches an average value of 83.59% with perfect implementation criteria, and gets an excellent response from KKN student participants with an average value of 85.15%,

The open data-based village potential mapping model in the KKN course is declared valid based on the validation results by experts and practitioners and is suitable for use in the field. The open data-based village potential mapping model in KKN courses has met practical criteria in terms of indicators of model syntax implementation and the response of KKN participating students as users.

Keywords: Mapping model, village potential, open data, Tomini Bay Region, service-learning.

INTRODUCTION

Vocational education develops the skills and competencies of learners needed to solve problems both locally and globally, which grows and develops with culture and tradition by paying attention to the regional potential to improve the economy and welfare of the community. According to Sudira [1], vocational/vocational education grows from the community, develops with the culture and traditions of the local community, and pays attention to local wisdom, local excellence, regional potential, community support, community participation, and cooperation, there is a strong consensus between the community and vocational education institutions. The vision of vocational education should be congruent with the vision of the community where vocational education is developed.

However, the development of vocational education in Indonesia has yet to entirely follow the concept proposed by Sudira [1], where vocational education is developed by considering the region's potential. Most vocational education development needs to pay more attention to the region's potential, as in the Tomini Bay Region. Tomini Bay is the largest bay in Indonesia, with an area of more than 6,000,000 hectares (ha) [2], which covers ten districts, 75 sub-districts, 528 villages in three provinces, namely North Sulawesi, Central Sulawesi and Gorontalo [3]. As one of the regions in the Gulf of Tomini, Gorontalo has much potential in the marine and fisheries sector. However, the available study programs are dominated by ICT programs, which is 48.28% [4], and have yet to consider the region's potential fully.

In addition, the development of vocational education in the Tomini Bay region differs from one of the objectives of vocational education: poverty alleviation [1]. Although Tomini Bay has considerable economic potential and social capital, it contrasts with the lives of its people, as shown by the high poverty rate. Of the three provinces within Tomini Bay, each region (district) has a high poverty rate [5].

Strategic, systematic, and sustainable efforts are needed to overcome the problem of high poverty and low HDI levels in the Tomini Bay region. One ongoing effort is to optimize each region's potential in the Tomini Bay area. In line with this, Gorontalo State University (UNG), as one of the State Universities in the Tomini Bay Region, plays a vital role in developing the Tomini Bay Region. One of them is the Community Service program (KKN). In its implementation, students participating in KKN

explore and map the village's potential. Data on village potential is needed to plan village programs included in the Village Medium-Term Development Plan (RPJMDes).
Based on preliminary research on KKN student participants [6], information was obtained regarding implementing village potential mapping. KKN students conduct various community activities based on the results of the analysis of community problems and needs. In addition, KKN students and the village government explore and map the village's potential. Village potential data is needed in planning village programs that will later be included in the Village Medium-Term Development Plan (RPJMDes). However, the village potential data collected by KKN participants has yet to be managed optimally by the village and UNG. Village potential data is archived by the village either through the village potential board or other media, which are generally offline.
Meanwhile, UNG receives potential data collected by students through KKN reports. As a result, the village potential data is relatively only known by the village. In contrast, if other parties can access it, it can develop the village's potential, including vocational education following the village's potential.
Based on these issues, a village potential mapping model is needed to integrate potential data from villages in the Tomini Bay Region and can be openly accessed by stakeholders and the general public. Several studies related to village potential mapping have been conducted [7] and [8]. Meanwhile, research related to the utilization of open data has been conducted [9], []10], and [4]. In general, village potential mapping is conducted using participatory methods, which include spatial, social, and sectoral mapping [7]. The stages of the participatory method consist of Mapping planning meetings, village boundary agreement and understanding meetings, mapping technical training, survey or transect (field data collection), data processing and drawing, verification of survey results, data/drawing corrections if needed, and signing of minutes, map printing, and map endorsement. Potential mapping is also done using digitization methods and information systems such as [8]. Some of these mapping methods have generally been successful in mapping the potential of villages and regions but have yet to fully meet the needs of developing the Tomini Bay Special Economic Zone. These data are integrated and accessible to stakeholders.
This research aims to design an open data-based mapping model of village potential in the Tomini Bay Region in the KKN course and test the model's validity. This village potential mapping model is based on open data, which is data that is free to use, reuse, and redistribute by everyone, only depending on the requirements of its nature and shareability [11]. The open data-based village potential mapping model to be developed is a village potential mapping model that uses a support system in the form of a website that provides village potential data that the public can access in an open and detailed manner. This website contains the potential of villages in the Tomini Bay area. Each village has access to input their village potential data. The village potential data inputted by each village is integrated into one Tomini Bay Area village potential website. So that when accessing the website, the general public can view, use, reuse, and disseminate village potential data in the Tomini Bay Area. KKN UNG students will use this website to collect, extract, and map village potential in the Tomini Bay Region. Likewise, the village government can map village potential through the website.

METHOD

The method used in this research is the development method of the Borg and Gall model [12], namely the planning and development of the preliminary form of the product. The design stage of this open data-based village potential mapping model consists of (1) preparing the initial design (draft) of the model; (2) expert and practitioner validation; (3) limited model trial; (4) more comprehensive model trial; and (5) model revision.

Research procedure

The research procedure of open data-based village potential mapping model design in detail includes the following activities:

1. Developing the initial design (draft) of the model.A draft model of open data-based village potential mapping in the KKN course was produced at this stage.
2. Expert and practitioner validation. Expert validation was conducted to assess the feasibility of the draft model, both in terms of the conceptual and theoretical foundations used. It was also discussed with KKN field supervisors to assess the practical feasibility of the model. The draft model and other instruments were improved based on the validation results.
3. Limited model testing (preliminary field test). A class trial whose primary purpose is to test the feasibility of implementing the steps of the mapping model.

4. Wider model testing. I am testing in the form of trials in the broader class, whose purpose is to determine the feasibility of implementing the model syntax and, more broadly, to analyze the usefulness of the village potential mapping model.

Research Data

The data required in this research stage include model validity and practicality data. The data source at this stage is primary data derived from 6 instrument experts, 3 model/media experts, and 42 students participating in KKN. The data collection techniques used in this research are questionnaires and observation. Data analysis conducted in this research is descriptive-quantitative data analysis, which includes instrument validity analysis, model validity analysis, and model practicality analysis.

RESULTS AND DISCUSSION

Results

Open data-based village potential mapping model

This village potential mapping model consists of 5 (five) principal components, namely: syntax, social system, reaction principle, support system, instructional impact, and accompanying impact.

Model syntax

In general, the syntax of the open data-based village potential mapping model consists of 10 (ten) stages, namely: (1) Determination of the mapping location, (2) Training on the use of the village potential mapping application, (3) Mapping planning deliberation, (4) Mapping technical training, (5) Field data collection (survey), (6) Processing of survey data, (7) Verification of survey data, (8) Data input on the Village Potential Mapping Application, (9) Data validation, and (10) Publish village potential data. An explanation of each syntax is shown in Table 1.

Table 1. Open Data-based Village Potential Mapping Model Syntax

Phase	Description
Phase 1: Determination of mapping locations	1. LP2M UNG KKN Centre observes the KKN location in the Tomini Bay Area. 2. The Centre determines the location and informs students through the Faculty. 3. Students register for KKN at LP2M UNG 4. LP2M UNG KKN Centre determines KKN participants for each village 4.
Phase 2: Training on the use of the village potential mapping application	1. The KKN Centre conducts training activities on the use of the village potential mapping application for students and field assistant lecturers (DPL). 2. Admin of the village potential mapping application inputs village data
Phase 3: Village potential mapping planning meeting	1. Students, DPL, village government and community representatives held deliberations regarding village potential mapping activities. 2. The village determines 1 (one) village official as the village operator
Phase 4: Technical training on village potential mapping	1. Training was provided to local government, KKN students, and community representatives. 2. Training included how to categorise village potential, and how to use the village potential mapping application.
Phase 5: Field data collection (survey)	1. Students, village officials, and community members conducted data collection. 2. Data collected includes spatial data, social data, and sectoral data.
Phase 6: Processing of survey data	KKN students and village operators categorised the survey data.
Phase 7: Verification of survey data	Local government verifies the data that has been collected and categorised

Phase 8: Data input in the Village Potential Mapping Application	KKN students and village operators input the verified survey data into the village potential mapping application.
Phase 9: Data validation	Application admin and LP2M UNG KKN Centre validate the village potential data inputted by village operators
Phase 10: Publish village potential data	The application admin and LP2M UNG KKN Centre publish valid village potential data for stakeholders to access.

Social system

The open data-based village potential mapping model facilitates the process of mapping village potential in KKN activities so that there is interaction between KKN students, between KKN students and village governments, between KKN students and communities, between KKN students and open data-based village potential mapping applications, between village governments and open data-based village potential mapping applications, and between district/city governments and open data-based village potential mapping applications.

Reaction principle

The open data-based village potential mapping model has the following reaction principles: (a) KKN field supervisors encourage and excite students in mapping the potential of KKN villages; (b) UNG, in this case the LP2M KKN Centre, creates innovations in the implementation of mapping the potential of KKN villages.

Support system

Implementing the open data-based village potential mapping model has a supporting system: (a) Open data-based village potential mapping applications and (b) Guidelines for using open data-based village potential mapping applications.

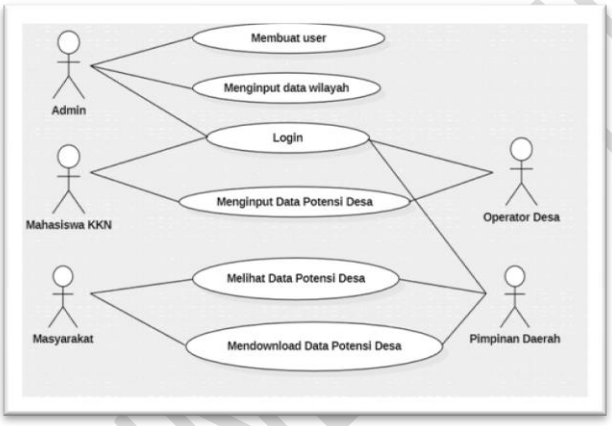

Figure1. Use of Case Diagram Application

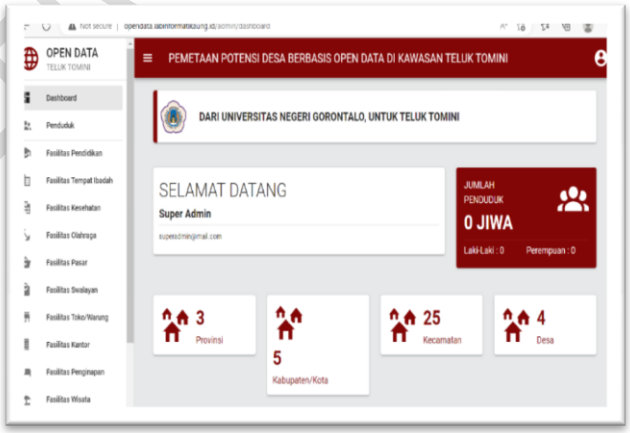

Figure2. Dashboard Admin Page

The open data-based village potential mapping application is a supporting system for the village potential mapping model. This application is designed to be used by KKN student participants to input, store, distribute, and search for information related to village potential. This web-based application is developed using a programming language that runs from the client side and requires a web server and browser. In addition, this application is based on open data, meaning that the available data can be freely used, reused, and redistributed by anyone.

The village potential mapping application is designed to facilitate inputting of village potential data by KKN student participants when implementing the KKN program and by the village when there are changes and additions to the data. This application design is carried out so that the needs in the software process can be well prepared.

Instructional and accompanying impacts

The instructional impacts of applying the open data-based village potential mapping model are (a) Increased effectiveness of village potential mapping implementation. Developing an open data-based village potential mapping model is expected to increase the effectiveness of implementing data potential mapping in KKN activities and for village governments. (b) Increased efficiency of village potential mapping.
The application of the open data-based village potential mapping model is expected to have an accompanying impact: (a) Ease of access to village potential and (b) Ease of obtaining information on village potential.

Model validation

Model validation includes an assessment of instrument feasibility by six validators and an assessment of model validity by three experts. The results of model validation are presented in Table 2 and Table 3.

Table 2. Instrument Feasibility Assessment Results

No.	Name of Instrument	Coef. Validity (V) (Criterion ≥ 0.8)		Coef. Reliability (r) (Criteria > 0.7)		Description
		Va	Criteria	PA	Criteria	
1.	Instrument validation sheet for the validity of the potential mapping model	0,93	Highly Valid	0.95	Reliable	Feasible to use
2.	Instrument validation sheet for the validity of the potential mapping model book	0,94	Highly Valid	0,97	Reliable	Feasible to use
3.	Validation sheet of the validity of the potential mapping application	0,94	Highly Valid	0,96	Reliable	Feasible to use
4.	The validation sheet of the validity of the potential mapping application usage guide	0,96	Highly Valid	0,98	Reliable	Feasible to use
5.	The validation sheet of the observation instrument for the implementation of the potential mapping model	0,94	Highly Valid	0,95	Reliable	Feasible to use
6.	Model user response instrument validation sheet	0,96	Highly Valid	0,97	Reliable	Feasible to use
7.	Model effectiveness instrument validation sheet	0,93	Highly Valid	0,94	Reliable	Feasible to use

Table 3 Model validity assessment results

No.	Instruments	Average V	Criteria
1	Problem Identification	0,84	Extremely high validity
2	Determination of Product Type	0,89	Extremely high validity
3	Product Development Objectives	0,70	High validity
4	Model Component Structure	0,83	Extremely high validity
5	Model Completeness	0,93	Extremely high validity
6	Syntax	0,96	Extremely high validity
7	Social System	0,78	High validity
8	Reaction Principle	0,83	Extremely high validity
9	Support System	0,89	Extremely high validity
10	Instructional Impact	0,89	Extremely high validity
11	Accompanying Impact	0,89	Extremely high validity
Average		0,86	Extremely high validity

Limited trial

A limited pilot test was conducted with 15 KKN students from 1 village in Bone Bolango Regency, Gorontalo Province, in the Tomini Bay area. The limited trial included implementing the village

potential mapping model and user responses to the model. Two evaluators, one staff member from LP2M UNG, and one KKN supervisor observed model implementation. The results of the limited trial are presented in Table 4 and Figure 2.

Table 4. Model Implementation Observation Results

No.	Components and Criteria	Observer		Average
		1	2	
1.	Determination of KKN location	3,5	3,25	3,38
2.	Training on the use of the village potential mapping application	4	3	3,5
3.	Village potential mapping planning meeting	3	3	3
4.	Technical training on village potential mapping	3	3,5	3,25
5	Data collection (survey)	4	3	3,5
6.	Processing of survey data	3	4	3,5
7.	Verification of survey data	3	3	3
8.	Data input in the village potential mapping application	4	4	4
9.	Validation of village potential data	3	3	3
10.	Publish village potential data	4	3	3,5
	Average	3,45	3,28	3,36

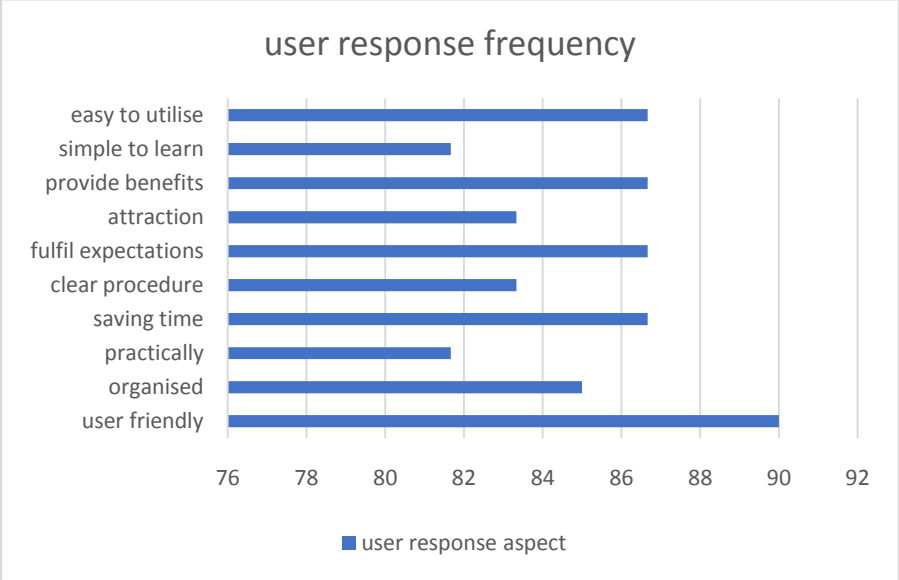

Figure3.Results of Limited Trial User Response

Discussion

The needs analysis results show that the implementation of village potential mapping in KKN courses needs to be carried out correctly and ineffectively. This is due to several factors, including the unavailability of formats and guidelines for the implementation of village potential mapping, the unavailability of media as a tool in mapping village potential, the unavailability of a database of village potential both in the village and in LP2M UNG as KKN manager, and the unavailability of adequate access to village potential for the community. Based on the needs analysis results, a model of mapping village potential in KKN courses is needed to overcome the problem of ineffective implementation of mapping village potential in KKN courses.

Based on the problems obtained through the needs analysis, the conceptual model is designed from the developed model. This conceptual model combines 2 (two) methods of mapping village potential, namely participatory methods and open data methods. Village potential is mapped using participatory methods, including spatial, social, and sectoral mapping [7]. The stages of the participatory method consist of a Mapping planning meeting, village boundary agreement, and understanding meeting, mapping technical training, survey or transect (field data collection), data processing and drawing,

verification of survey results, data/drawing correction if needed and signing of minutes, map printing, and map endorsement.

The mapping of village potential using the open data method means that the village potential obtained through participatory methods is made in the form of data sets as needed. A data set is a structured set of data presented in tabular form from direct input data in the application or data extracted from an existing form of CSV (Comma Separated Values) format. CSV files are plain text files containing numbers and letters and organizing the data in tables or forms. CSV files are commonly used to exchange data, usually when there is a large amount between different opinions. An open data-based allows village potential data to be easily accessed, reused, and redistributed as needed. This follows the concept of Open Data, according to the Open Knowledge Foundation [11], which is data that is free to use, reuse, and redistribute by everyone, depending only on the requirements of its nature and shareability.

Potential mapping with this open data method allows data integration from several agencies such as villages, sub-districts, districts, and even provinces. This can overcome the limitations of mapping village potential with digitization methods that only describe the potential of villages in one district, such as research [8] and [13].

The open data-based village potential mapping model in the KKN course was developed using the Borg & Gall Research & Development Model method, which is grouped into three stages: preliminary research, model development, and model evaluation. The developed model includes 5 (five) model components: syntax, social system, reaction principle, support system, instructional impact, and accompanying impact. This model is equipped with a model book, open data-based village potential mapping application media, and a guide to using open data-based potential mapping application media.

Based on the validity test results, it was found that the open data-based village potential mapping model in the KKN course was in the valid category. The validity test was conducted on the model, model book, open data-based village potential mapping application media, and guidelines for using open data-based village potential mapping application media. The validity test results showed an overall average value of 0.87 with details: the average model of 0.86, model book of 0.88, application media of 0.82, and application usage guide of 0.92. The validity test results show that the developed model is suitable for KKN courses. The model's validity answers the problems that have occurred in the implementation of mapping village potential in KKN courses.

Potential mapping in KKN courses was previously carried out by students who needed specific guidelines on how the mapping was carried out. The general provision is that students participating in KKN must collect potential data in the village's location of KKN. KKN students mapped the village's potential according to their understanding, and there could be different mechanisms and formats for the data collected. As a result, the potential data collected needs to fully meet the needs of LP2M in mapping the potential of each KKN location village. In addition, the village potential data collected needs to be well documented, making it difficult to search and retrieve data when needed.

The findings of this study indicate that the model developed is valid in overcoming the problem of ineffective implementation of village potential mapping. The developed model implements village potential mapping by KKN students more systematically, making it easier for students to collect and map potential village data. KKN students conduct mapping of village potential according to the guidelines provided by LP2M with clear syntax, easy to understand, and easy to apply.

Theoretically and empirically, the open data-based village potential mapping model fulfills practical criteria. Theoretically, the results of expert and practitioner assessments state that the open data-based village potential mapping model can be applied to KKN courses. Empirically, the results of the pilot test show that the open data-based village potential mapping model meets practical criteria in terms of indicators of model implementation and student responses to the developed model. The findings of this study were that 83.59% of KKN students who became research subjects carried out the steps of mapping village potential following the syntax of the developed model very well. In addition, 85.15% of the students who participated in the research responded very well to the developed model.

The effectiveness test of the open data-based village potential mapping model was conducted using the Paired Samples Statistics test, which includes the data normality test and the difference test. Based on the normality test, it can be seen that the Sig. The probability value for the data before is 0.095, and the after is 0.086. Based on the Sig. The probability value shows that the value is more significant than 0.05, so it can be concluded that the data has a normal distribution or is normally distributed. Based on the difference test, the data obtained that the value before open data-based mapping has an average (mean) of 29.51. The data distribution (Std. Deviation) obtained is 3.325 with a standard error of 0.597.

Meanwhile, after using open data-based mapping, the value has an average (mean) of 41.67. Based on the descriptive statistics of the test before and after, it is evident that the test after using open-based mapping has a higher value. Therefore, an open-based mapping model can increase the ease of obtaining data on village potential to prepare KKN programs.

The open data-based village potential mapping model developed is supported by a web portal application that provides village potential data that the public can access in an open and detailed manner. This web portal contains the potential of all villages in the Tomini Bay Region. Each village has access to input their village potential data. The village potential data inputted by each village is integrated with one web portal of the village potential of Tomini Bay Area. So that when accessing the web portal, the general public can view, use, reuse, and disseminate village potential data in the Tomini Bay Region. KKN UNG students who collect, explore, and map village potential in the Tomini Bay Region will use this web portal. Likewise, the village government can map village potential through the web portal. With this open data-based potential mapping model, the community can easily access and obtain the required data on village potential in the Tomini Bay area. In addition, the data generated by this web portal can be reprocessed by the community as needed. This model is expected to help the village government map and develop the potential of natural and human resources to support the development of the Tomini Bay Region.

The open data-based village potential mapping model can be used as one of the considerations in developing vocational education that is closely related to producing work-ready graduates [14][15] needed in developing the Tomini Bay Region. This model can support the achievement of the concept of vocational education. According to Sudira [1], vocational education grows from the community, develops with the culture and traditions of the local community, and pays attention to local wisdom, local excellence, regional potential, community support, community participation, and cooperation; there is a strong consensus between the community and vocational education institutions. Using an open data-based village potential mapping model can overcome the condition that vocational education development needs to pay attention to regional potential [4]. Village potential data that is easily accessible to parties interested in vocational education development can be used as material in making decisions to open vocational education programs that follow the potential of each region. Thus, improving the quality of human resources in the area and the people's economy in the region is possible. This condition can overcome the problem of the high poverty rate in the Tomini Bay Region, which impoverishes the community [16]. The open data-based village potential mapping model indirectly supports the application of data in building a more open, participatory, and innovative government [15]. The application of open data in this village mapping model supports and complements several previous studies in the use of open data that have been conducted [9][10][18][19][20][21][22][23][24][25][26][27][28].

CONCLUSION

The open data-based village potential mapping model combines participatory and open data models in mapping village potential integrated into a web portal application of village potential in the Tomini Bay Region that is easily accessed, used, reused, and redistributed.

The developed open data-based village potential mapping model is valid in overcoming the problem of ineffective implementation of village potential mapping. The developed model implements village potential mapping by KKN students more systematically, making it easier for students to collect and map village potential data. KKN students conduct mapping of village potential according to the guidelines provided by LP2M with clear syntax, easy to understand, and easy to apply.

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