

Web Development Prototype on Land and Building Tax Revenue Features (Case Study: Bekasi City)

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Abstract—Bekasi's land and building tax revenue have not yet reached its annual target. This is caused by a bureaucratic complicated warning and payments. The information was obtained from the official body of the city of Bekasi in the form of tax revenue data and interviews. This research contains an official web development feature design for Bekasi city. These features are online land and building tax payments and visualization of tax revenue with Geographic Information Systems. The design was made using the Rapid Application Development method and using UML tools and tested with COBIT 4.1. Activity diagrams and use-case diagrams are used to determine user behavior. The prototype was made with Adobe XD. The COBIT domain used is Delivery and Support, namely DS1, DS4 and DS7. The assessment results show that with the prototype, respondents can understand the information provided, know the stages of payment, and agree that development is needed.

Keywords—RAD, Prototype, COBIT

I. INTRODUCTION

In the State of Indonesia, there is Law no. 32 of 2004 concerning Regional Government and Law Number 33 of 2004 which is a regulation concerning Financial Balance between the Central Government and Regional Governments. Both of these laws aim to provide a solid foothold for the process of autonomy and empowerment in the regions, including in the freedom of management of the authority in the area of finance and regional income [1].

Local Own Revenue (PAD) in the land and building tax sector of the city of Bekasi only reached 48.56 percent of the target set in 2018 [2]. It is known that the billing procedure to the payment of tax in the city is still carried out conventionally. Besides, there are invalid regional data in the tax data that can affect the estimated revenue target. These things were identified as one of the obstacles in the Bekasi city government to meet the PAD target.

In this research, an official web application development plan for Bekasi was conducted. The development in question is the provision of online payment features and visualization of the land and building tax revenue data with Geographic Information Systems. The visualization feature can facilitate the monitoring of related parties to encourage tax collection from taxpayers in the urban areas of Bekasi. This section is followed by related work in section II, literature reviews in section III, methodology in section IV, results and discussions in section V, the conclusion in section VI.

II. RELATED WORK

In Manuhutu's research, design and implementation are carried out using a prototype model. The research was

conducted on the information system of the English Literature Program at Victory University of Sorong, Indonesia. The study only carried out black-box testing [3].

Bharanikumar and Dhanalakshmi, interpreted the multi-scale effect of land-use change, describing the relative influence of the location (e.g quality of views, residential roads) and situation variables (e.g highways and district roads) at different scales using Geographic Information System [4].

Rendra used COBIT 4.1 to conduct an audit of the academic information system at IAIN Raden Intan Lampung. COBIT domains used are Delivery and Support (DS3, DS5, and DS7). The results of his research go to maturity level 4 [5].

III. LITERATURE REVIEW

A. Geographic Information System

Geographic information system are transforming all the activities and disciplines that formerly used maps as the basis for decision making [6].

B. Rapid Application Development

RAD is frequently discussed in terms of incremental prototyping and phased deliverables. Prototyping is essentially the process of building a system in an iterative way. The developers, after some initial investigation, construct a working model that they demonstrate to a representative user group. The developers and the users then discuss the prototype, agreeing on enhancements and amendments. This cycle of inspection-discussion amendment is usually repeated at least three times in RAD projects, until the user is satisfied with the system. In

RAD, prototyping may be used at any stage of development: requirements gathering; application design; application build; testing; delivery[7]. The model can be seen in Figure 1.

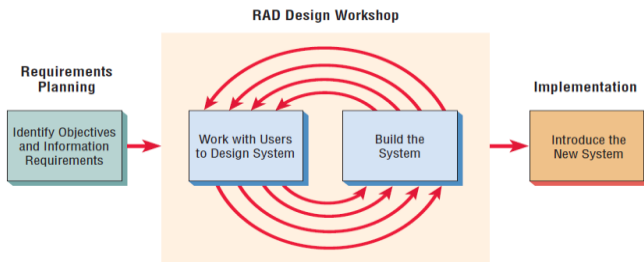


Figure 1. RAD model [8]

The stages of RAD model consist of

1. Requirements Planning- In this phase, the user and the analyzer meet to identify the application or system objectives and to identify the information requirements arising from those objectives. The orientation in this phase is solving company problems. Although information technology and systems can direct a portion of the proposed system, the focus will always remain on efforts to achieve company goals.
2. RAD Design Workshop (RAD Design Workshop)- This phase is the phase to design and improve which can be described as a workshop. Analyzers and programmers can work to build and show users visual designs and work patterns. This design workshop can be held for several days depending on the size of the application to be developed. During the RAD design workshop, users respond to existing prototypes and the analyst refines modules designed based on user responses. If the developer is an experienced developer or user, it can be assessed that this creative effort can encourage development to an accelerated level.
3. Implementation- In this implementation phase, the analyst works intensively with users during the workshop and designs the business and non-technical aspects of the company. As soon as these aspects are agreed upon and systems are built and filtered, new systems or parts of the system are prototyped as a trial step and then introduced to the organization as shown in Figure 1.

C. Delivery and Support

Delivery and support focuses on aspects of the output of IT. This area covers areas such as the execution of applications in IT systems and their results, and also the support process that enables the execution of effective and efficient IT systems. This support process includes training and security issues. Delivery and Support (DS) has 13 items, as shown in Table 1[9].

Table 1. DS items

IT Process	Description
DS1	Define and manage service levels
DS2	Manage third-party services

IT Process	Description
DS3	Manage performance and capacity
DS4	Ensuring ongoing service
DS5	Ensuring system security
DS6	Identify and allocate costs
DS7	Educate and train users
DS8	Manage service desks and incidents
DS9	Manage configuration
DS10	Manage problems
DS11	Manage data
DS12	Manage the physical environment
DS13	Manage operations

IV. METHODOLOGY

The object of this research is The Bekasi city land and building tax revenue. The research methodology consists of planning needs, RAD workshop design, prototyping, and testing, illustrated in Figure 2.

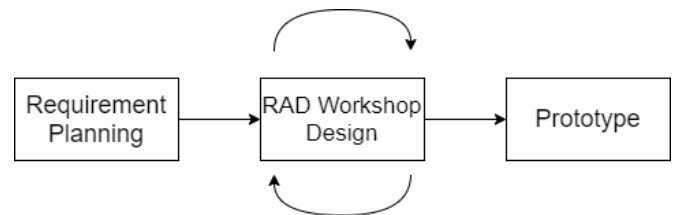


Figure 2. Research methodology

A. Requirement Planning

At this stage, the primary and secondary data were collected. Primary data were obtained from the Bekasi City Revenue Agency. Meanwhile, secondary data obtained from news and literature notes about the object of research.

The Bekasi City has an area of about 210.49 km², with the boundaries of Bekasi City being as follows north of Bekasi Regency, south of Bogor Regency and Depok City, west of DKI Jakarta Province, and east of Bekasi Regency. Geographic location: 106.48'28 '' - 107.27'29 '' East Longitude and 6.10'6 '' - 6o30'6 '' South Latitude. The current population of Bekasi City is more than 2.2 million people spread across 12 districts, namely Pondok Gede District, Jati Sampurna, Jati Asih, Bantar Gebang, East Bekasi, Rawa Lumbu, South Bekasi, West Bekasi, Medan Satria, North Bekasi , Mustika Jaya, Pondok Melati.

B. RAD Workshop Design

RAD Workshop Design conducted in this research is, modeling for behavior. The design uses several parts of the Unified Modeling Language (UML), namely use-case diagrams and activity diagrams, as shown in figure 3.

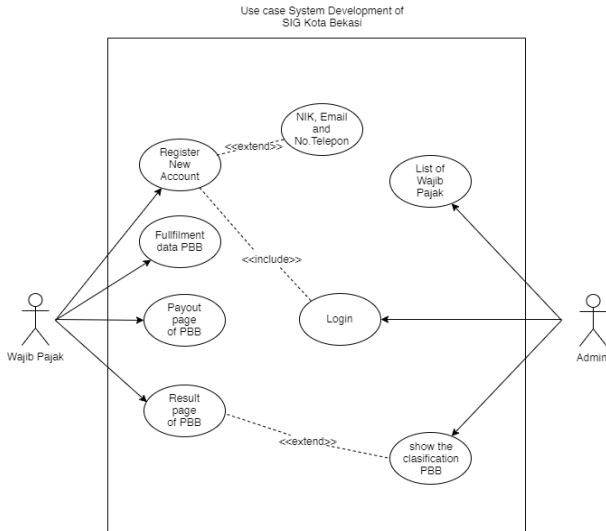


Figure 3. Use-case diagram

In the use-case diagram, there are two actors namely taxpayer and admin. Taxpayers can register accounts using the nationality number, email and telephone number. The account is used to enter the system. After entering, the taxpayer can fill in the land and building tax data, make payments by accessing the *land and building tax payment page*, then the *results page* in sequence. Admins can log in, view the list of taxpayer accounts, and access the *land and building tax classification page*.

The activity diagram consists of 3 layers, namely admin, system and taxpayer. The two actors interact with the system by performing the actions in Figure 4.

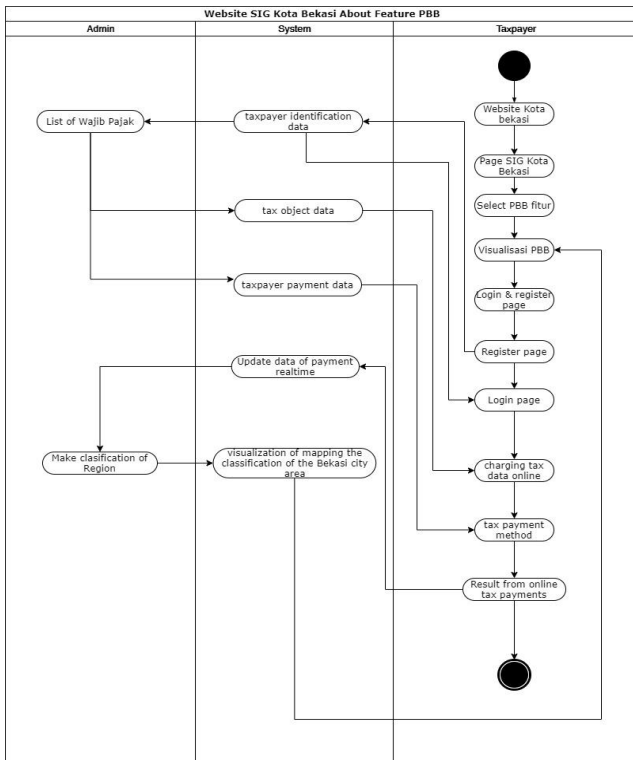


Figure 4. Activity Diagram

C. Prototypes

The stages of making prototypes are making prototype assets, prototype interface design, and prototype sharing. These stages using Adobe XD software.

D. Testing

With prototypes, testing is carried out using the Delivery and Support (DS) aspects. The test is carried out to find out whether the system development prototype can be accepted and implemented. Of the 13 items on the DS aspect, testing only uses 3 aspects: DS1 items determine and manage service levels; Item DS4 ensures continuous service, and item DS7 ensures continuous service.

Three aspects of DS are used :

1. DS1 defines and manages system service levels. Define and document frameworks that provide formal service level management processes between customers and service providers. The framework must maintain continuous alignment with business needs and priorities and facilitate mutual understanding between customers and providers. The framework includes processes for creating service requirements, service definitions, SLA (Service Level Agreements) service level agreements, OLA (Operational Level Agreements) operational level agreements and sources of funding. This attribute must be arranged in the service catalog. This framework must determine the organizational structure for service level management, which includes the roles, duties, and responsibilities of internal and external service providers and customers.
2. The main focus of the DS4 process is to provide system services that are sustainable. Where these services require development, maintenance, and testing. So that an effective and continuous service process will minimize the possibility and impact of the main service interruption of the Bekasi City GIS website on the land and building tax sector's PAD.
3. DS7 is about educating and training users. The development of the system was made due to the unavailability of land and building tax payments online on the Bekasi city website. With a prototype, taxpayers can understand how to pay these taxes online on the system.

Testing is done by showing a video design trailer to the respondent, then filling out the questionnaire by the respondent. The questions in the questionnaire are in Table 1. Questions 1 to 5 in the DS1 domain, 6 to 10 in the DS4 domain, and 11 to 15 in the DS7 domain. Questions are answered by choosing numbers 1 through 5, where 1 is very ignorant, ununderstood, insufficient, unnecessary, or bad. Whereas 5 is very knowing, understanding, sufficient, necessary, or good. Criteria for respondents aged at least 18 years and have made the land and building tax payments, as shown in Table 2.

Table 2. The questionnaire

No.	Questions
1.	Do respondents know what online land and building tax payments are?
2.	Does the respondent understand the land and building tax payment method online after seeing the attached prototype video?
3.	Do respondents know how to access the feature?
4.	Is enough information on the land and building tax payment feature online after seeing the attached prototype video?
5.	Is enough information on the Visualization of Bekasi City area grouping after seeing the attached prototype video?
6.	Is there a need for the development of the land and building tax online payments after viewing the attached prototype video?
7.	Is there a need for a special website for payment services and information on the land and building tax online payment after seeing the attached prototype video?
8.	Does it need to improve the mapping information of the Bekasi City area based on the land and building online payments after seeing the attached prototype video?
9.	Is there a need for these features in a mobile application to facilitate the land and building online payments?
10.	Is there a need for these features in the mobile application to facilitate the land and building online payments?
11.	Do respondents know the stages of the land and building online payments based on the attached prototype video?
12.	Do respondents know how to pay using a virtual account?
13.	Do respondents know how to see the regional grouping on online payments based on visualization on the attached prototype video?
14.	Do respondents know how to access the Bekasi City GIS website?
15.	Does the respondent know how to create an account after seeing the attached prototype video?

V. RESULTS AND DISCUSSION

The results of the study were mockups and COBIT questionnaire results. The prototype has 5 pages, namely the registration page, the online form of tax payment, the choice of bank payment, the page of payment results, and the visualization of the tax revenue.

A. Prototype



Figure 5. Registration page



Figure 6. The tax form page

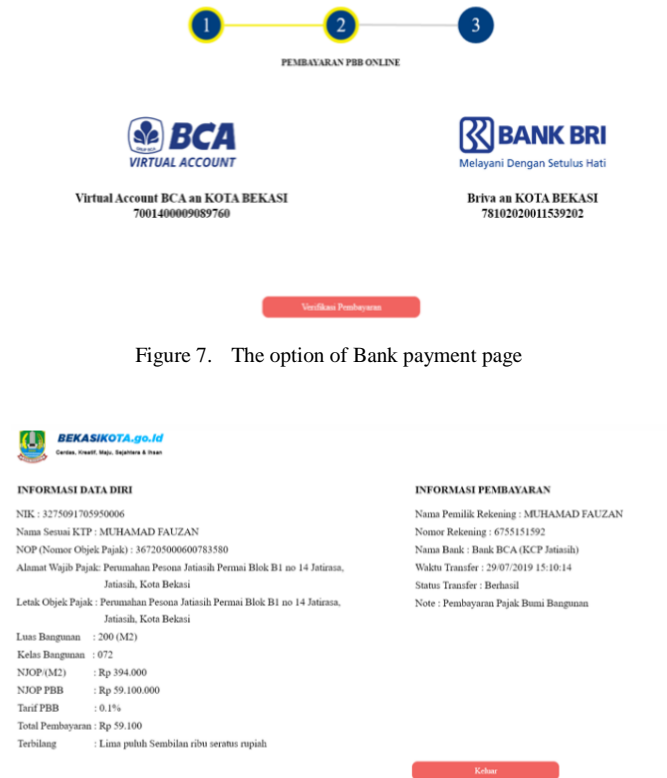


Figure 7. The option of Bank payment page



Figure 8. Payment result page

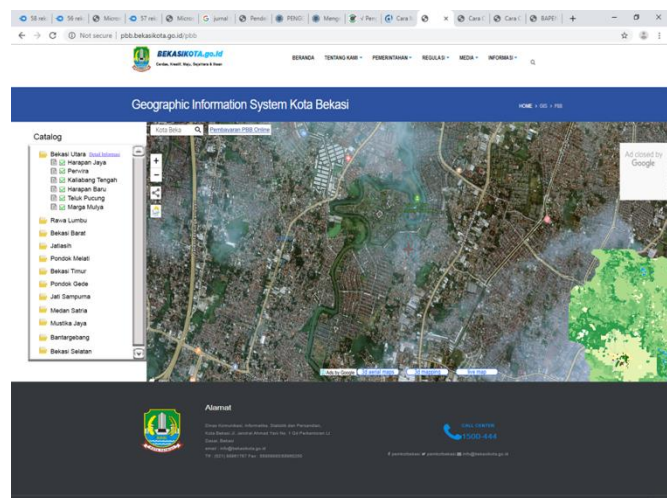


Figure 9. GIS tax avenue

B. Testing

The maturity level consists of 6 levels, namely level 0 (Non-Existent), level 1 (Initial / AdHoc), level 2 (Repeatable), level 3 (Defined Process), level 4 (Managed and Measurable), and level 5 (Optimized). Weight (w) is obtained from the number of answer values (x) multiplied by the respondent who chooses (n). For example, the total weight of question 1 is obtained from 3 multiplied by 1, then added by 4 multiplied by 15, which is 63. The average weight is obtained by dividing the total weight by the total

number of respondents (e.g average weight of question 1 is 63 divided by 16, which is 3.9).

Table 3. Weight calculation

Question	Parameters					Weight
	1	2	3	4	5	
1			1	15		63
2		2	5	8	1	56
3		10	5	1		39
4			12	4		52
5			5	11		59
6				14	2	66
7		4	5	6	1	52
8			2	12	2	64
9		3	9	4		49
10					16	80
11				8	8	72
12		5		9	2	56
13			3	12	1	62
14		1	14	1		48
15			1	8	7	70

Table 4. Maturity level analysis

Domain	Weight Total	Average Weight	Maturity level		GAP
			Expected	Current	
DS1	269	3.36	4.0	3.36	0.64
DS4	311	3.89	4.0	3.89	0.11
DS7	388	4.85	4.0	4.85	-0.85

The results of the questionnaire showed that the assessment of item DS1 still did not meet expectations. The valuation of DS4 items is almost close to expectations and DS7 is better than expectations.

VI. CONCLUSION AND FUTURE SCOPE

The prototype is accepted by respondents with almost all of them producing the maturity in level 4. This shows that respondents can understand the information provided by the system, know the stages of payment on the prototype, and agree that development is indeed needed. The shortcomings of this study are the number of respondents who still could not represent the entire population.

The online payment feature has been developed by the Jakarta government and South Tangerang. The Bekasi city government is expected to implement the feature and GIS as in this design as a reference so that it can support the process of achieving the Bekasi City land and building tax revenue target.

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Authors Profile

Muhamad Fauzan, S.KOM pursued a Masters in Information Systems from the University of Gunadarma, Indonesia in 2020. He currently pursuing a master's degree. He works as a private employee as a UI/UX Senior in the product team. Focusing on the interface display (UI) as well as user experience on a web, mobile and desktop platforms that have been carried out for 2 years.



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