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Original Research

Health Disaster Preparedness Using Android Mobile Based Application Case Mount Bromo Eruption

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ABSTRACT

Introduction: In the last 10 years, Mount Bromo has erupted four times; 2004, 2010, 2015 and 2019. However, it is unique that people at Tengger are reluctant to evacuate even though Mount Bromo is erupting and releasing volcanic material such as stones and dust.

Methods: This research is a quantitative study, using correlative analytic observational design and cross sectional approach with pourposife sample of 120 taken from online questionare results of bivariate analysis using gamma correlation test obtained the results of knowledge factors (p=0.005; r=0.27) attitude (p=0.000; r=0.45), means of infrastructure (p=0.000; r=0.58), and android application (p=0.000; r=0.59) for health preparedness.

Results: Knowledge, attitude, infrastructure and android application factors can influence health preparedness in disaster risk reduction in Bromo area.Using the smartphone application as the Mount Bromo information facilities are one of an effort so that people and tourists can activate if an eruption occurs. There is important health preparedness about features made in the application such as distribution shelters, evacuation routes, health centres, photos, videos, and primary health care information.

Conclusion: Assessment results to the application interface, the information conveyed, and the features offered showed that the application was very useful and gives a new perspective in conveying accurate information to the public and also tourists. The health preparedness community level is also quite good with the services provided by the Bromo alert application.

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INTRODUCTION

Mount Bromo is favourite place for tourism destination (local and foreign tourist). "Bromo Alert" Applications created and launched, to become one of the references to the public related to the important information in the Mount Bromo area. Bromo Alert Applications is an application based on Android. This application is only available on the Google Play Store and will not be found on Apple's App Store.

In the 10 years past, Mount Bromo in East Java often occurs eruption, start from 2010, 2015 to 2019. The application is one of the efforts for the public to know the Mount Bromo current condition, and how to prepare against the Mount Bromo eruption hazard. Figure 1 is an application interface with the smartphone's view and conncet with primary health facility.

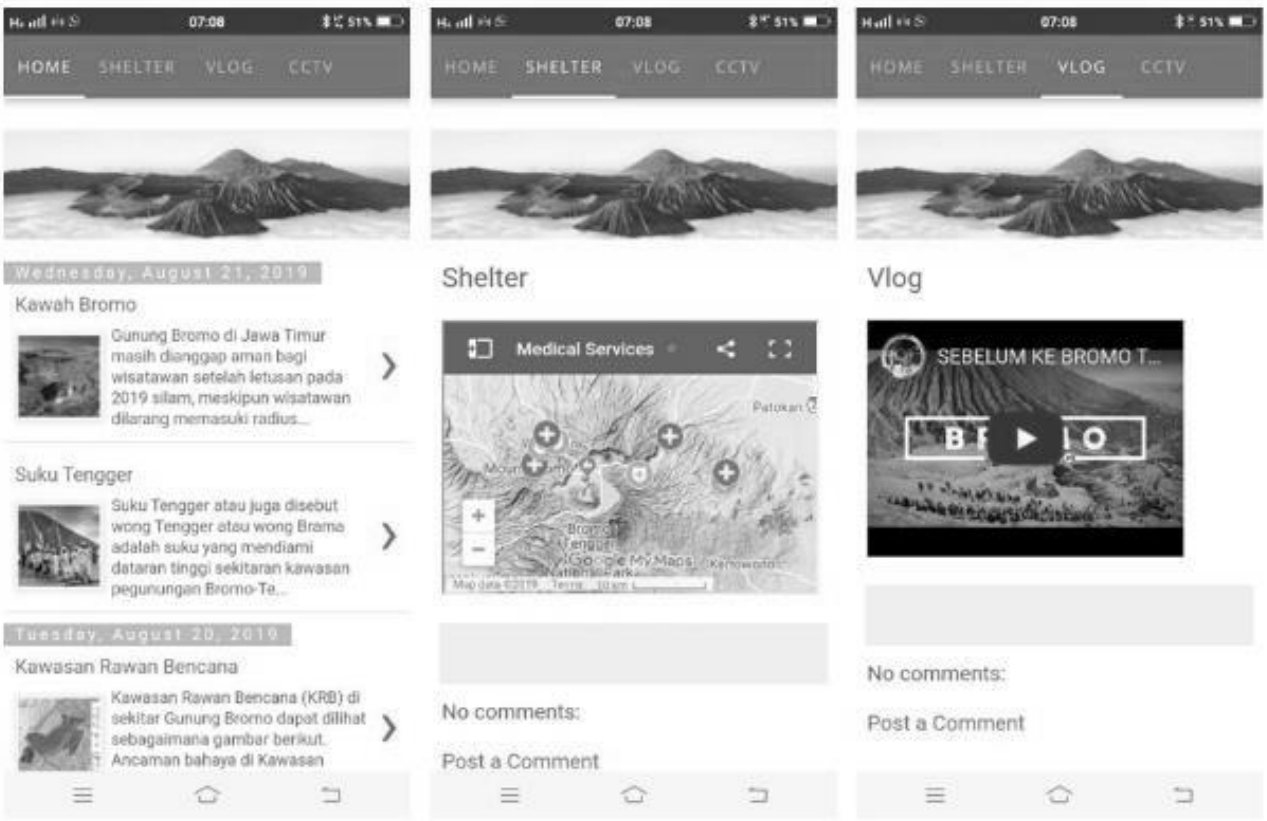


Figure 1. Application Interface with Smartphone's

MATERIALS AND METHODS

This research is a quantitative study, using correlative analytic observational design and cross sectional approach with pourposife sample of 120 taken from online questionare results of bivariate analysis using gamma correlation test obtained the results of knowledge factors (p=0.005; r=0.27) attitude (p=0.000; r=0.45), means of infrastructure (p=0.000; r=0.58), and android application (p=0.000; r=0.59) for health preparedness. Knowledge, attitude, infrastructure and android application factors can influence health preparedness in disaster risk reduction in Bromo area.Using the smartphone application as the Mount Bromo information facilities are one of an effort so that people and tourists can activate if an eruption occurs.

There are two important parts in conducting this research, namely (1) making an android application and (2) product feasibility testing. Explanation of android application with the name Bromo Alert will be described in the explanation below, as well as methods of product assessment feasibility is described more detail in sub-chapter below.

Android Application

Applications Bromo Alert has several features, namely, the weblog features at Home, Shelter, Vlog, and CCTV. In launching this application, all the information and field findings results are the result of research that is conducted by a team of researchers from the Department of Regional and Urban Planning, Universitas Brawijaya, Malang. The most major information and news that is presented in the application is the result of the research. A description of the features in the application as follows:

Home

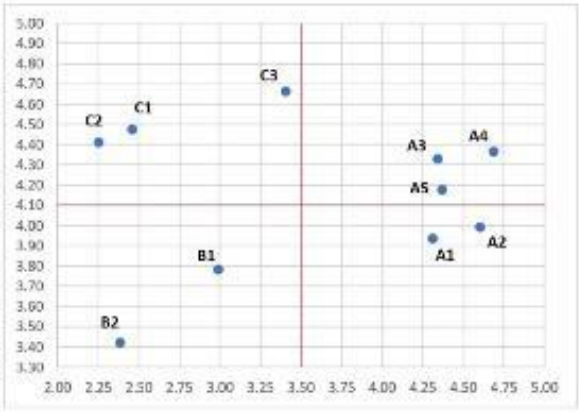
This feature is the information related to Mount Bromo such as the history and eruption events of Mount Bromo, how eruptions occur, favorite tourism destination (major spot of Penanjakan to see the sunrise, Whispering Sand, Teletubbies Hill, Mount Batok, and so on). These features appear in the format of a weblog which the material will be displayed in such a form, the news will appear in the layer of smartphones based on the latest manuscripts was posted last time.

Shelter

This feature is one of an important part of this application. Is a collection of shelter distribution with attributes such as the shelters distribution, public infrastructure distribution, and the nearest residential area. The shelter distribution map and the evacuation route can be accessed by scanning the available QR Code at each location. Examples of the use of QR code and an evacuation map to primary health facility. By scanning the QR Code that exists at the shelter points specified in the potential location such as hall village, lodging, open space, mosques, schools, health centers, and temples, so public can

Table 1. The Result of Importance-Performance Analysis

No	Code	Attribute	Coordinate of Atribute $X=\frac{\sum x}{K}$	$Y=\frac{\sum y}{K}$	GAP Perf-Imp
	A	**Interface of App**			
1	A.1	User friendly	4.31	3.94	0.37
2	A.2	Eye catching	4.60	3.99	0.61
3	A.3	Nice colors	4.34	4.33	0.01
4	A.4	Icon of App	4.69	4.37	0.32
5	A.5	Name of App	4.37	4.18	0.19
	B	**Feed Back Features**			
6	B.1	Comments	2.99	3.78	(0.79)
7	B.2	Notification	2.38	3.42	(1.04)
	C	**Features of App**			
8	C.1	Uniqueness	2.46	4.47	(2.02)
9	C.2	Importance	2.25	4.41	(2.16)
10	C.3	Simple and easy	3.41	4.66	(1.26)



know the shelter distribution that already displayed in lane evacuation map (Murakami, Deguchi, & Cahyaning, 2019).

In the shelter feature also provided information about the shelter, such as building name, building location, floors number, capacity, and it is located at the zone of Disaster's Prone Area. On the shelter features are also providing direction facilities, where the application customers can easily reach the shelter with click button direction and the user will be guided by the map-based application to reach the shelter location along with a description of travel time that is required. This shelter information can show the travel time that required to reach the shelter by using google maps technology. With google maps facilities the meeting of the two points will be immediately known how the travel distance from the location point is toward the shelter point or to the public service point. Direction service provided in the shelter feature and the feature is inherent in the application and can be used well as long the internet signal at the location

Vlog

In the following feature, the information that will be obtained by the user is a video that has been uploaded by vloggers of Mount Bromo tourist. From this vlog, the tourist will receive information in a different form, especially for the foreign tourist. Deliberately displayed in the form of a vlog, due to the tendency of generation Y and Z who are more active in using smartphones. The intensity of the community in using smartphones, not only in the form of news, blogs, or social media but also access videos on the YouTube page.

CCTV

This feature is a means for the public to know the current and updated condition, especially the view that instantly shows the latest Mount Bromo condition in LIVE. In the activities of implementation plan, the cameras will be scattered at some point which is flanked directly to the Mount Bromo. By knowing the current condition of observed Mount Bromo, expected that the public will be more beware and avoid hoax news who often associate the condition after the eruption of Mount Bromo with another issue. If the Mount Bromo eruption happened, people just have to look at the CCTV that can be viewed through applications Bromo Alert, so that the public can be spared from hoax news exaggerated by people who do not take responsibility.

Assessment and Analysis

To assess the android application feasibility, the team did some assessment methods they are Importance Performance Analysis (IPA) and GAP Analysis

Importance Performance Analysis (IPA)

Since Matrilla and James researching IPA methods in 1977, IPA framework has been popular among the researchers in the study of service quality (Ennew, Reed, & Binks, 1993). Simple tools such as Importance-Performance Analysis are very simple in applications to evaluate service quality. In this analysis, examining not only analyze the performance attributes, but also the importance of items such as determinant factors in satisfaction for the respondent (De Jesus Henriques Silva & Fernandes, 2011). IPA method has proven to be a tool that applies common that just to interpret the results in the wide use between the researchers in various fields and many research subjects. IPA is a way to promote the effective development strategy because the method is to facilitate the attributes interpretation and improve usability in decision-making and also determine the strategy (Abalo, Varela, & Manzano, 2007).

There is a significant relationship between service quality and service user satisfaction which has an influence on decisions for the continued use of services. When someone decided to choose that person believes and look for the best quality service which was promised by the services provider. Customers were satisfied with the service quality that he got, would recommend to others to use the service so it can gain the service experience satisfaction that is equally or even better (Cronin. Jr & Taylor, 1992).

The assessment level result of important service attributes in IPA methods is plotted a vertical axis (y) and the assessment level result of performance

attributes is plotted a horizontal axis (x). The value of the service level and interest divides the grid into the four quadrants; Q1 (Keep up the Good Work), Q2 (Concentrate Here), Q3 (Low Priority), and Q4 (Possible Overkill). Although IPA method has been regarded as an effective technique, many researchers propose several approaches and conceptions are modified, based on two implicit assumptions about traditional IPA methods (Lin, Chan, & Tsai, 2009). In this study, sub-attributes were collected in three group of variables: (1) visual aspects of the application, (2) responses from users, and (3) main features quality of the application. There were around 110 respondents in the study to test the feasibility of the Bromo Alert application with 5 levels of assessment: 1 for the worst value and 5 for the best.

Gap Analysis

The GAP Analysis is used to determine service levels differences of all used variables in research. With the GAP analysis, it could be to target the required attributes improvement, attributes, and variables that require more attention and also know the application weaknesses based on the user's opinion. The GAP Analysis is expected to produce a recommendation that is appropriate for the application of Bromo Alert service improvement. To assess the feasibility of application of Bromo Alert, the GAP analysis can be used to identify the attributes which have the most important aspect based on the interest value compared with the application performance value.

RESULTS

There is important health preparedness about features made in the application such as distribution shelters, evacuation routes, health centres, photos, videos, and primary health care information. Assessment results to the application interface, the information conveyed, and also the features offered showed that the application was very useful and gives a new perspective in conveying accurate information to the public and also tourists.

The attributes used for IPA assessment are (1) application interface; user-friendly, eye-catching, color, icon, and application name, (2) feedback from users; comment, and notification, (3) main features of application; uniqueness, importance level, and simple. Table 1 below is the result of the calculation based on the respondent's opinion. From Table 1, it can be seen that respondent provide feedback based on their experience using the application of Bromo Alert**.**

The following explanations describe each IPA quadrant following the results in Table 1 above:

"Keep Up The Good Work" Quadrant (I)

According to respondents, the application display color is very good, with the application name that is easy-knowing, as well as the application icon selection.

"Concentrate Here" Quadrant (II)

While the application uniqueness, interest and also the application simplicity needs to be increased again. It is seen from the user's satisfaction level are quite low, with a mean only on the value of 2.25 up to 3.41. By thus, need to increase the attribute applications performance.

"Low Priority" Quadrant (III)

Comment and notification attributes are not a service priority of the application. Can be seen in Table 1 above where application public users were sufficient to service these and also not consider that service is important in the application.

"Possible Overkill" Quadrant (IV)

In this quadrant, there are two attributes: user-friendly and eye-catching. Based on the results of the questionnaire, this attribute is not very significant. This attribute is quite important for the users and has been offset well by the excellent service of application of Bromo Alert.

While GAP with quite significant value based on the questionnaire results, there is main features attribute of the application such as uniqueness attribute, importance levels, and application simplicity. The value difference was quite big and require little services improvement effort. The GAP value difference that occurs on the attributes of this until 2.16 on importance level attribute and 2.02 at the uniqueness attribute, it shows that users feel less satisfied with these attributes. By knowing the GAP was pretty much on the interest level and the service level given by the application, then the services increase concentration can be focused on the attributes mentioned above. While other attribute inclined already provide better services even exceed the application user expectation level.

DISCUSSION

In recent years, process-oriented concepts have been replaced by a more sophisticated integrative risk management or ideas towards a so-called risk society, risk culture or risk governance framework. However,similar to other natural hazard disaster risks, volcanic risks remain to be connoted with negative impacts on society. But as shown in this paper, all these (traditional) risk perspectives cannot explain the perception and decision making in the Bromo human– volcano system found in his research at Mt. Pinatubo that high perception of risk does not discourage people from living in hazard-prone areas. In this sense, only an open-risk concept which allows including both potential positive and negative outcomes can help to explain the attitude of the local population in the Mt. Bromo region**.**

CONCLUSION

Based on the assessment results using IPA and GAP Analysis methods, it can be seen how the application users opinions based on the attributes and variables used as assessment material on the application of Bromo Alert. Visually, the user application was very satisfied with the whole application's appearance. This is shown from the visual display attributes position that is in quadrant I and IV. While the attributes that require a lot of improvement are in the main function's attributes such as the application importance level, the ease, and simplicity of application use, and application uniqueness. Users want the attributes performance can be increased again because for them the attributes are the main features that should be able to serve for the user application.

Android-base application with the name Bromo Alert is an information digital means related to tourism area Mount Bromo as well as efforts to improve the community capacity and tourist in terms of preparedness Bromo eruption disaster. We think it is important because the Mount Bromo area is one of the main destination's tourists in East Java with high-level visits. Application is expected to be able to provide education to the user application, this would only be an impact on the increasing awareness and society preparedness when Mount Bromo eruption. Others preventive effort can learn and read through the application of Bromo Alert as a reference for the user application from the public and the tourist also. The health preparedness community level is also quite good with the services provided by the Bromo alert application.

CONFLICT OF INTEREST

This study does not have the potential to cause a conflict of interest. This study only links two variables and does not cause physical harm to respondents. All participants gave written informed consent before participating, and confidentiality of identity was protected.

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