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# Implementation Of Weather Monitoring Application for Cullinary Business Using User Centered Design (UCD)

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ABSTRACT

The weather monitoring is useful for culinary business processes. The development of the internet of things (ioT) can be used for weather monitoring. This study aims to evaluate the use of weather monitoring with IoT applications and mobile applications in the culinary business. The method used begins with asset based community development (ABCD) analysis and continues with model development based on user centered design (UCD). Model implementation testing uses the system usability scale (SUS). Testing with SUS involved employees and owners of the culinary business, Angkringan Gentong, totaling 10 respondents. The test results with SUS were 82.5 and entered grade B, which is acceptable.

Keywords: Weather Monitoring, Internet of Thing (IoT), Mobile Application, Angkringan, System Usability Scale

## I. INTRODUCTION

The influence of weather is very significant on the culinary business. Weather conditions correlate with the popularity of certain types of food. For example, in winter or rainy season, warm and hot food and drinks have a big chance of getting worse. On the other hand, if it is hot or dry season, food that relatively cold has a greater chance of selling [1-4]. Weather monitoring is very necessary for the smooth running of the culinary business. Even though there is weather forecasting from the relevant agencies, sometimes the observation stations are far from the place of business. Local weather monitoring needed to be more valid in determining weathers situations and conditions for culinary businesses. Weather parameters that usually monitored are temperature, air pressure, wind speed and direction, air humidity, rainfall, rainy conditions, cloudy or sunny, sunlight and so on. The development of information technology, with the existence of mobile applications, internet of things (IoT), data science and engineering implemented as tools to assist in weather monitoring [5-7].

The era of industrial revolution 4.0 and society 5.0 marked by the development of bid data, cyber physical systems, artificial intelligence and high performance computing. This development for applications in weather monitoring. Weather monitoring applications

are quite developed and there have been many studies examining this, both on the software and hardware side. Monitoring applications can be predictive and utilize secondary data and some use real time weather data sensors. Weather monitoring applications can also use many platforms such as web applications, mobile applications and responsive applications. The use of data mining, especially predictive and forecasting functions, is widely used for weather monitoring. Various supervised learning algorithms such as neural networks, ANFIS, SVM, linear regression and others. Physical computing, which combines software and hardware, is also widely used in weather monitoring systems [1], [5], [8-10].

The development and implementation of a model or system requires good planning and is aligned with user needs. The User Centered Design (UCD) is a product and application development approach that places users as the main focus at every stage of the development process. By implementing UCD, developers seek to understand user needs, preferences, and challenges from the beginning to the end of the development process. UCD allows developers to gain a deep understanding of an application's potential users. This includes identifying user needs, preferences, and context of use that may influence application design. UCD encourages iterative prototype development that involves regular user feedback. Developers can present early versions of the product to users, receive feedback, and make iterative improvements to ensure that the app's design and functionality meet user expectations. UCD helps identify potential user errors in using the application. By adjusting the design and user interface based on user feedback, developers can reduce the likelihood of errors and improve the user experience [11-13].

The weather monitoring application development is a good example of the application of User Centered Design (UCD) principles. The following are several stages and aspects of UCD that can be applied in application development. Applying UCD principles in developing weathers monitoring applications can increase adoption rates, user satisfaction, and the effectiveness of these applications in providing useful and relevant weather information. This study examines the development of a weather monitoring system with temperature, humidity, gas and light intensity sensors. The monitoring model was built based on a responsive web and is used to assist the Indonesian cash culinary business process called Angkringan.

## II. METHODS AND MATERIAL

In this study, a weather monitoring model was built using a physical computing and mobile application approach. The weather monitoring model will be used to assist business processes in the typical Indonesian culinary business, namely Angkringan. Research methods are clearly shown in Figure 1 below.

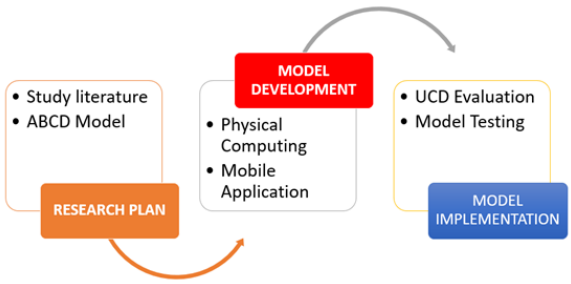


**Figure 1.** Research Stages

As a first step in this research were studying literature related to culinary business, physical computing, asset based community development and user centered design. By studying the literature, the research position and stage of the art of this study can be known. The next step was to implement the asset based community development (ABCD) method to obtain information on the modalities of a culinary business. In this study, the test case was partnered with Angkringan Gentong, Semarang district, Central Java Province, Indonesia. The asset based community development (ABCD) method is a development

method used in this study including: inculturation, discovery, design, define and reflection. The results of the ABCD method showed an overview of the application that will be created according to the modality of Angkringan gentong as the research object.

This application development used a prototyping model approach. Physical computing is a model that combines software with a hardware system. One of these models that is quite popular is the internet of things (IoT). The Internet of Think (IoT) application in Angkringan 5.0 was equipped with sensors including humidity sensors, temperature sensors, and wind speed sensors to monitor the weather. Apart from that, current and voltage sensors are also used to control electrical devices. This application is useful for helping SMEs, especially Angkringan traders. This application is useful for monitoring the weather when selling angkringan, whether it is sunny, cloudy or rainy, so that angkringan traders anticipate these conditions.

The development model used a physical computing approach and application deployment with mobile applications. The physical computing model approach used several sensors. The rain sensor on the hardware is able to read the conditions around the hardware, whether the weather is sunny, drizzling or raining, and sends the data to the system. The sensor is able to provide precise information about weather conditions around the hardware in real time. The DHT11 sensor on the hardware is able to read air humidity and ambient temperature and send this data to the system. Data can be read and sent in real time in the system and has a small difference with comparable online data. The LDR sensor in the hardware is able to read the intensity of ambient light both when it is dim and bright and sends this data to the system. Data can be read and sent in real time in the system and can be read both indoors and outdoors. The system is able to provide information if gas is detected around the hardware in the form of icons for both detected gas and undetected gas.

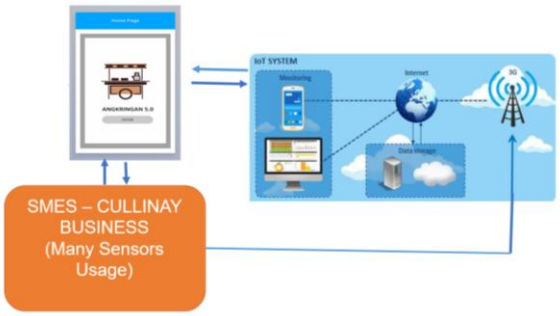


**Figure 2.** Architecture Model of Weather Monitoring

The mobile application is used to access the sensor system results. This data can be used for further processes and further decisions. The initial appearance of the car application is as shown in Figure 3 below.


**Figure 3.** Mobile Application

This mobile application consists of a dashboard and recap. The dashboard consists of temperature (0C), humidity (%), wind speed (km/h), electric current (A), voltage (V) and solar irradiance (w/m2). The recap page contains a summary of the data on the dashboard every day.

The user centered design (UCD) is an iterative interface design process approach (iterative) which focuses on usability goals, user characteristics, environment, tasks and workflow in its design. Another definition according to ISO (1999), user-centered design which is also referred to as human-centered design is an approach to developing a focused interactive system on creating useful systems. UCD can be interpreted as an iterative interface design method which focuses on the needs of the end user (end-user)

so that the final design formed is influenced by user. The four stages of UCD are determining the context of use, determining usage and organizational requirements (specify user and organizational requirements), create solution designs (produce design solutions), and evaluate designs against user needs (evaluate designs against user requirements). In the UCD approach, the principles that must be considered are user focus, integrated design, continuous process of user testing, and interactive design. This research uses a UCD approach with an online survey method via questionnaires. From The survey results obtained can determine user needs as a basis for system improvements.

The system usability scale (SUS) is a questionnaire to measure system usability based on the user's point of view. The system usability scale (SUS) framework consists of 10 statements and 5 response options in the form of a Likert scale. Respondents are then asked to select the most appropriate response based on their condition, the statement given is in the form of points ranging from 1-5 with point 1 being the meaning strongly disagree to point 5 which means strongly agree [12]. Table 1 is a test instrument with the SUS framework. strongly disagree to point 5 which means strongly agree. Table 1 is a test instrument with the SUS framework.

TABLE I

LIST OF TEST INSTRUMENTS

| No | Questions | Score |
|---|---|---|
| 1 | I would like to use this system more often | 1 - 5 |
| 2 | I found that this system doesn't have to be this complicated | 1 - 5 |
| 3 | I think this system is easy to use | 1 - 5 |
| 4 | I think that I will need help from a technical person to be able to use this system | 1 - 5 |
| 5 | I found some of the functions in this system to be well integrated. | 1 - 5 |
| 6 | I think there is too much inconsistency in this system | 1 - 5 |
| 7 | I imagine that most people would find it easy to learn this system very quickly | 1 - 5 |
| 8 | I found this system very complicated to use | 1 - 5 |
| 9 | I feel confident to use this system | 1 - 5 |
| 10 | I need to study before I use the app | 1 - 5 |

The usability scale (SUS) system in determining the assessment calculation results has three points of view, namely acceptability, grade scale, and adjective rating. There are three levels of acceptability consisting of not acceptable, marginal (low and high), and acceptable. Meanwhile, the grade scale consists of A, B, C, D and F. For adjective ratings there are more levels, namely worst imaginable, poor, ok, good, excellent and best imaginable. Of the three system usability scale (SUS) assessments as shown in Figure 5, acceptability is used to see the level of user acceptance of the software, grade scale to see the level (grade) of the software, and adjective rating to see the rating of the software produced. Apart from these three methods, the usability scale (SUS) system has another way of determining assessment results, namely by using the SUS score percentile rank. Determination of assessment results based on the SUS score percentile rank is generally carried out based on the results of user assessment calculations. SUS score percentile rank has differences with acceptability, grade scale, adjective rating which are grouped into three categories. The following are the provisions for determining the assessment of the SUS score percentile rank [12].

a) Grade A: with score >= 90
b) Grade B: with score >= 80 and < 90
c) Grade C: with score >= 70 and < 80
d) Grade D: with score >= 60 and < 70
e) Grade F: with score < 60

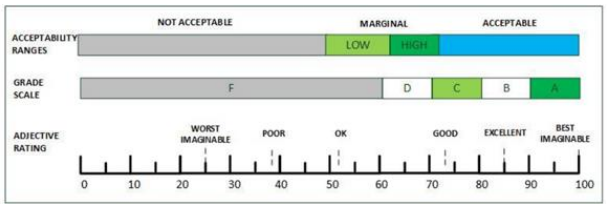


**Figure 3.** Mobile Application

## III.RESULTS AND DISCUSSION

The results of the research in the second year are a continuation of the research achievements in the first year. This stage includes developing the angkringan 5.0 model with UCD (user centered design) and internal testing of the prototype model. UCD testing is used to determine that the Angkringan 5.0 prototype meets the partners' needs. Apart from involving partners in model development, UCD research also uses a System Usability Scale (SUS) testing instrument which is filled in by partners. This test involved 10 Angkringan Gentong employees and 1 owner. The SUS test results are as in table 2.

TABLE 2
THE SUS EVALUATION AVERAGE SCALE

| No | Questions | Average Score |
|---|---|---|
| 1 | I would like to use this system more often | 4,2 |
| 2 | I found that this system doesn't have to be this complicated | 3,8 |
| 3 | I think this system is easy to use | 4,0 |
| 4 | I think that I will need help from a technical person to be able to use this system | 2,1 |
| 5 | I found some of the functions in this system to be well integrated. | 2,9 |
| 6 | I think there is too much inconsistency in this system | 3,0 |
| 7 | I imagine that most people would find it easy to learn this system very quickly | 3,0 |
| 8 | I found this system very complicated to use | 4,0 |
| 9 | I feel confident to use this system | 3,2 |
| 10 | I need to study before I use the app | 2,8 |
| | Score = Σ(odd - 1) + Σ(5 - even) | 82,5 |

From the results of the SUS test calculation, a value of 82.5 was obtained, so it can be said that the system built meets the SUS. In detail as in table 3.

TABLE II
THE SUS EVALUATION RESULT

| Parameters | System Criteria |
|---|---|
| *Acceptability Range* | *Acceptable* |
| *Grade Scale* | B |
| *Adjective Rating* | *Good* |

Acceptability is a measure to see the level of user acceptance of software, the grade scale is used as a measure of the level (grade) of a software, and the adjective rating is a measure to see the value (rating) of softwaraddress or URL fully in Regular font.

## IV.CONCLUSION

The weather monitoring is useful for culinary business processes. The development of the internet of things (ioT) can be used for weather monitoring. This study aims to evaluate the use of weather monitoring with IoT applications and mobile applications in the culinary business. The method used begins with asset based community development (ABCD) analysis and continues with model development based on user centered design (UCD). Model implementation testing uses the system usability scale (SUS). Testing with SUS involved employees and owners of the culinary business, Angkringan Gentong, totaling 10

respondents. The test results with SUS were grade B, which is acceptable.

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