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Load Cell Technology In The Rice Holding Capacity Monitoring System At MKP Rice Milling In The Malind District

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LoadCell,
Prototyping,
Milling.

ABSTRACT
Region District Malind, Merauke has a total amount resident as much ± 20,125soul. The majority of the population makes a living as farmers. The rice farmers' post-harvest food is supported by rice milling technology in the area. There are 14 rice mills, 1 of which is registered as a Rice Procurement Working Partner (MKP) with Perum Bulog. The system of absorbing farmers' rice by MKP mills is carried out only if Perum Bulog requires a supply of rice for Civil Servant (ASN) rations, social assistance, and supply rice to another region (move regional). System absorption like This felt impact to para farmer, that is to its height lost results postharvest farmer. Besides That current MKP milling This Also Not yet supported with use monitoring technology facilitate para farmer For obtain information related condition warehouse milling updated. Obstacles the can resolved with utilise technology LoadCell or A device hard on technology digital scales. Planning this monitoring system done use prototyping methods, ie build A design digital scales as well website application as a media for presenting data and information to user like farmer And party milling. As for results obtained on study This ie A innovation new in the transaction process on milling, like message service grinding, condition monitoring room accommodate grain And rice on warehouse milling for para farmer as well as report results absorb between party milling And Corporation Logistics Bureau as effort maximize handling results postharvest on area the.

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INTRODUCTION

Post-harvest handling is the action taken and prepared so that agricultural products are ready and safe for consumption. Post-harvest handling of rice includes cutting, threshing, transportation, care, drying, storage, milling and processing. Rice milling technology plays an important role in post-harvest handling activities in determining the quality and quantity of rice produced [1] . The rice milling system is a series of machines that have the function of converting ground dry grain into rice ready for consumption [2] . The milling system known to the Indonesian people is Rice Milling. In Indonesia, especially in Merauke Regency, specifically Malind District, with a total population of people ± 20.125, the majority of the population makes their living as farmers, where Each farmer in the area is able to produce

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110 to 130 bags of grain or the equivalent of 2.7 tons of rice per harvest time. The high post-harvest yields of farmers in the area are also supported by the large number of rice milling sectors in the area. There are 14 recorded rice mills spread across the Malind District area, and one of them is listed as a Domestic Rice Procurement Working Partner (MKP) with Perum Bulog Merauke. 13 other rice mills were established as non-partner rice milling businesses. Absorption rice farmer by both of them there is difference. Chain process absorption for MKP milling ie started with farmer sell rice to Milling MKP rice, then Perum Bulog buys farmers' rice through these partners. The absorption was carried out by Perum Bulog to supply rice rations for the State Civil Service (ASN), social assistance, as well as supplying rice to other regions or what is usually called *Move Regional.* So that the Rice Mill can buy farmers' rice if Perum Bulog needs rice stock for this supply.

The rice absorption system, especially that carried out by the MKP Rice Mill, has several impacts on farmers, one of which is the high post-harvest loss of farmers who because rice absorption is carried out only if the Bulog Perum requires a supply of rice and if the storage capacity in the warehouse is sufficient to accommodate farmers' rice. Apart from that, this is also because the rice mills in the Malind District area are not yet supported by a *monitoring system* for the amount of rice capacity in their milling warehouses, but to get information regarding the amount of rice capacity, farmers must visit the rice mill and ask the rice mill directly. If the mill's warehouse is full, the mill will delay taking the farmer's grain until there is less rice in the warehouse. The checking process by the farmer is carried out repeatedly until the farmer obtains certainty regarding the time for harvesting the farmer's grain. Meanwhile, checking the rice storage capacity by the mill itself is carried out every working day, to ensure the availability of rice storage space for other farmers who will grind their rice. So that It is felt that monitoring the rice holding capacity of milling warehouses like this can have an impact on providing information on rice holding capacity from the rice mills to farmers. This is because information cannot be accessed directly without the process of visiting the rice mill.

Farmers can access rice capacity information on rice mills in *real time if they utilize Load Cell technology.* A piece of hardware in this digital weighing system is capable of detecting the pressure or weight of a load. So *it is compatible* when used to measure the amount of rice stored in a rice mill warehouse. Therefore, the author is interested in conducting research on the use of load technology Cell in the Rice Storage Capacity Monitoring System at the MKP Rice Mill in the Malind District Area. Load Cell technology is used as a reading system for the rice quota quantity in the Rice Mill warehouse, then the reading data is sent to the web server to be processed into information on the rice capacity of the Rice Mill, which can then be accessed directly by farmers via the Rice Mill *website page.*

Objective Study

The aims desired by the author in completing this research are: designing a *monitoring system* the total capacity of rice storage space at the MKP Rice Mill in the Malind District Area using *Load Cell technology.* It is hoped that the system will be able to become a new technology for farmers and rice mills in monitoring the availability of rice storage space in

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the rice mill warehouse before the mill makes a decision on further action. Apart from meeting the need for information on rice storage capacity, the system is also designed to display information on the productivity of the MKP Rice Mill in carrying out post-harvest handling in the Malind District area.

Theoretical Basis

Understanding Monitoring System

a. A group of organized elements interacting with each other to achieve an organizational goal is called a system. These elements are explained in a general system characteristic, namely as follows [3] .
b. Understanding Information
   Data is a fact or reality that describes an event that occurred at a certain time. So that the collection of data or facts is processed into a form that is more useful for the recipient, which is then called information [4] .
c. Understanding Productivity
   In the Big Indonesian Dictionary or KBBI, productivity has the meaning of the ability to produce something, production power, or productiveness. The term productivity is often used to measure the efficiency or accuracy of the way the effort or work of a machine, factory, system, or person converts *input* into *output.* This is confirmed by the National Production Council which states that productivity is a comparison between the results achieved and the overall resources used [5] .
d. Load Cell Sensors
   A sensor that is used to measure the weight or load of a large object is called a *load cell sensor.* Principle *The load cell* works as an energy conversion device, namely converting the weight of an object into electrical energy.
e. This sensor has a conductance value that is directly proportional to the force or load received and is resistive or purely resistance. If *it loads The cell* does not have a large load, so the resistance value will be the same on each side. Conversely, if *load* If *the cell* has a large load, the resistance value will be unbalanced. So this is used to measure the weight of an object [6] .
f. CodeIgniter Framework
   Codeigniter is a *framework* or collection of *PHP* (Hypertext *) classes* and *functions Preprocessor*) with MVC model (*Model, View* and *Controller*) which is used to build a dynamic web application using the PHP programming language [7] .
g. NodeMCU ESP8266
   The ESP8266 NodeMCU is used as a data communication medium *using wireless* technology as a substitute for cable media. The advantages of this device include that it has *IP capabilities networking* which allows devices to access or control the internet, has *deep features sleep* which causes the ESP8266 to be more power efficient, and can be used as *a client* or *server* in the data communication process [8].

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METHOD

Analysis Required system

The flowchart of the proposed system can be seen in Figure 1 below.

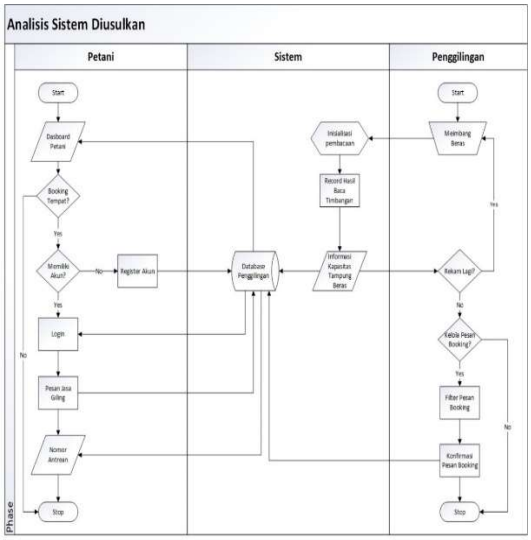

Figure 1. Flowchart of the Proposed System

Design System

1. Hardware Design or Device Hard
   The hardware design stage is carried out to design a *prototype system,* which is carried out using the *Rich method Picture Diagrams. Rich's* depiction *Picture The diagram* can be seen in Figure 2 below.

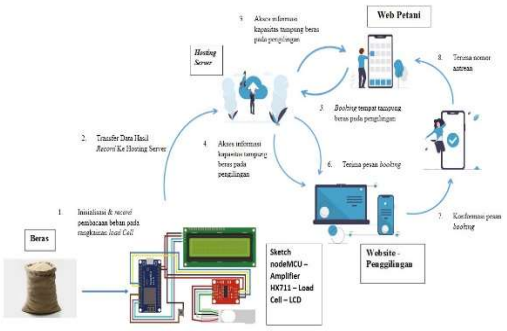

Figure 2. *Rich Picture* Diagram of Proposed System

2. Software Design or Device Soft
   Software design is carried out using Unified Modeling Language (UML) visual modeling.

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a. Farmer Use Case

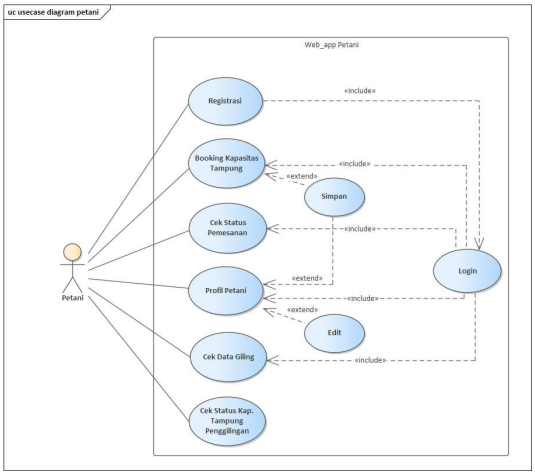

Figure 3. Farmer Use Case

b. Milling Use Cases

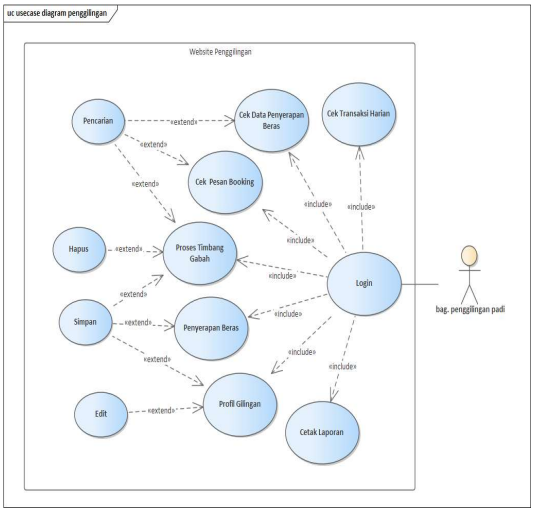

Figure 4. Milling Use Case

RESULTS AND DISCUSSION

Between Advance Application

1. Farmer Login Form

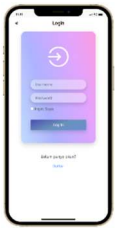

Figure 5. Login page Farmer

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2. Farmer Dashboard Page Form

Figure 6. Dashboard page Farmer

3. Message Registration Customer

Figure 7. Farmer Resentment Message

4. Page Booking Farmer

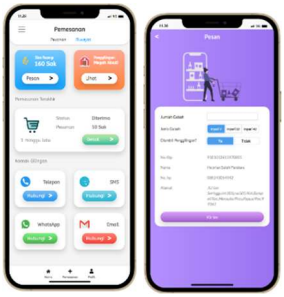

Figure 8. Page Booking Farmer

5. Milling Login Form

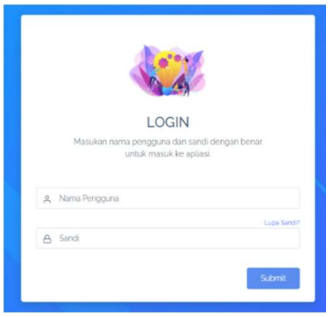

Figure 9. Customer Data List Page

6. Milling Dashboard

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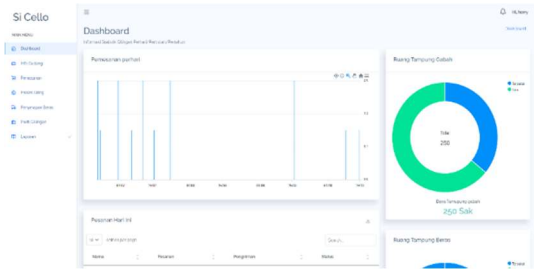

Figure 10. Drilling Dashboard.

7. Order Menu Page

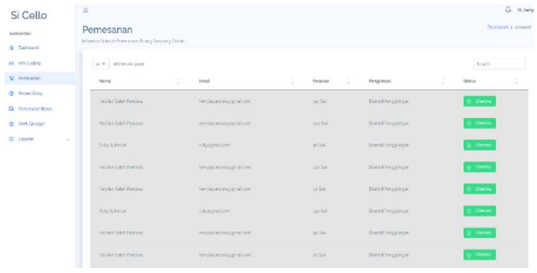

Figure 11. Order Menu Page

8. Milling Process Menu Page

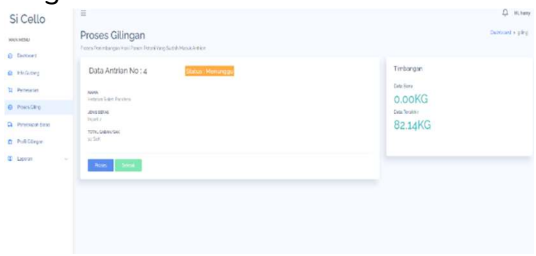

Figure 12. Milling Process Menu Page

9. Ingestion Menu Page Rice

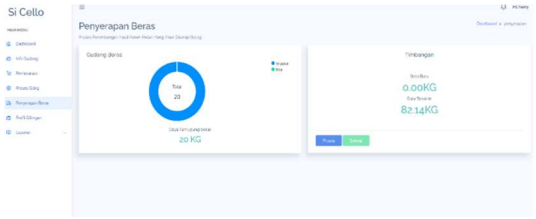

Figure 13. Ingestion Menu Page Rice

10. Page Report Milling

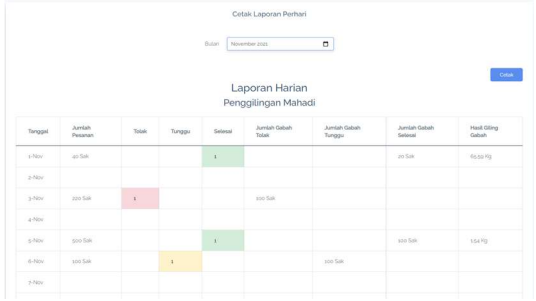

Figure 14. Page Report Milling

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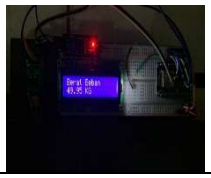
Prototype Test Method

Testing of the microcontroller device was carried out using the prototyping method. Tests are carried out when the device is in normal condition and after weighing. The appearance of the scales in normal conditions can be seen in Figure 15 below.

Figure 15. Display Normal Condition of Digital Scales

Next, testing during weighing is carried out by testing the calibration of the tool against weighing parameters, namely rice in units weighing 50 kg/sack. The test results can be seen as shown in Table 1 below.

Table 1. Results Test Calibration

Measurement Results (kg)		Error (kg)
Weigh Parameters (sac)	Load Cell Sensors	
Rice = 50 Kg	Test Results:	0.05
		
Rice =100 Kg	Test Results:	1.79
		
Rice = 1 50 Kg	Test Results:	0.11
		
Rice = 200 Kg	Test Results:	0.9
		

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Then testing continued with test calibration Load Cell device on each side scales to parameters weigh, that is rice with unit weight 15 kg. Results test can seen on Table 2 follows.

Table 2. Results Test Every Point Loadcell

Measurement Results (kg)		Error (kg)
Weigh Parameters (sac)	Load Cell Sensors	
 Side right lower	 Test Results:	4.87
 Bottom Left Side	 Test Results:	1.26
 Upper Left Side	 Test Results:	2.75
 Top right side	 Test Results:	3.77

Discussion

Parameters are carried out by weighing rice in 50 kg bags. Maximizing the results of the scale is only able to hold the weight≤ 200 Kg. The weighing results with these parameters are shown in Table 4.3 with details of the test results as follows.

a. Rice weight condition = 50 Kg, system test results are able to read a total weight of ± 49,95 Kg, error 0.05 Kg
b. Condition of rice weight = 100 Kg, system test results are able to read a weight amount of± 101,79 Kg, error 1,79 Kg
c. Condition of rice weight = 150 Kg, system test results are able to read a weight amount of± 149,89 Kg, error 0,11 Kg
d. Condition of rice weight = 200 Kg, system test results are able to read a weight amount of± 199,10 Kg, error 0,9 Kg

Based on the results of the calibration test, the total error difference from the standard parameters (sak) is ± 2,85 Kg4 tests (n) or the average error for each test is ± 0.713 Kg. Next, a calibration test is carried out on each side of the scale. This test is intended to test the accuracy of the reading results for each *Load device Cell* to the given load. The test results can be seen in Table 2 with details of the test results as follows.

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a. Rice weight condition = 15 Kg, test results on the Bottom Right side show results $\pm$ 10,13 Kg, error 4.87 Kg
b. Rice weight condition = 15 Kg, test results on the bottom left side show the results$\pm$ 13,74 Kg, error 1,26 Kg
c. Rice weight condition = 15 Kg, test results on the Upper Left side show the results$\pm$ 12,25 Kg, error 2,75 Kg
d. Rice weight condition = 15 Kg, test results on the Upper Right side show the results$\pm$ 11,23 Kg, error 3,77 Kg

From the results of testing the accuracy of each side of the scale, results were obtained with a total reading $\pm$ 12,65 Kg*error of.*

CONCLUSION

After conducting research and testing a series of systems, the author concluded that functionally the system for monitoring the capacity of the rice storage space at the MKP mill in Malind District, using Load Cell technology, was able to read rice and grain weight data well. The *real-time* reading results can be displayed on the mill's website application. Where this data is accumulated together with previous weight data to provide the latest information on the condition of the rice and grain storage space at the MKP mill in the Malind district. This information serves as a reference for farmers before ordering milling services and for millers before accepting orders for milling services. Apart from its function of monitoring the condition of the rice and grain storage space in the mill for farmers, this system is also able to produce mill productivity reports during the post-harvest handling period in the Malind District area. The report can be in the form of information on the entry and exit of grain and rice per date or month desired by the mill itself. Suggestion: *monitoring* system for rice storage space at the MKP mill in Malind District still has many shortcomings in its implementation. Both in terms of information systems and *microcontroller devices.* The shortcomings are that in the *booking system* or ordering space for storing rice and grain, there is a need to add a scheduling feature for picking up farmers' grain by the mill. Then the disadvantage of *the microcontroller* device side is that the reading at one point on the scale has a low level of accuracy. So there needs to be a flat or even surface so that readings can be done well. From the shortcomings above, it is hoped that in further development a method for scheduling grain collection can be added, accompanied by the implementation of a *tracking system* and the application of a Geographic Information System (GIS), as well as the use of *Load technology. Cells* with different utilization methods such as using *S-Beam / LSB type* Load *Cells* so that the tool reading results can run well.

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