The design of financial recording system in industrial bio-briquette of Ramie (Boehmeria nivea) decortication waste with design thinking approach

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Abstract. The production process of ramie (boehmeria nivea) fibers generates waste which contents 5.95 to 7.83% ash; 1.88 to 2.87% silicate; 30.67 to 31.08% lignin; 33.81 to 35.99% alpha cellulose; 62.95 to 63.78% holoselulosa; 17.43 to 18.14% pentosan, which can be used as raw material of bio-briquette. Those potential can be used to generate a business opportunity, such as industrial bio-briquette of ramie decortication waste. The purpose of this research is to create accounting information which could present an income statement that is easily applied on industrial bio-briquette of ramie decortication waste. This research use descriptive analysis method with design with design thinking approach to gather the information through depth observation on human being as the object to achieve the purpose. The result in this research is financial recording system of industrial bio-briquette of ramie decortication waste in a desktop application. The system is integrated with production activities according to the needs of accounting information particularly at managerial production. The existing applications creates information in the form of financial operations which can be used as a factor in decision-making.

1. Introduction

Nowadays, businesses agribusiness ramie plant (Boehmeria nivea) utilize its fiber as the raw substitute material for cotton. On production process generates decortication waste which data is based on Saroso et al. [1] has ash content 5.95-7.83%; silicate 1.88 to 2.87%; lignin from 30.67 to 31.08%; alpha cellulose from 33.81 to 35.99%; holoselulosa 62.95 to 63.78%; pentosan 17.43 to 18.14% in which based on Prawirohatmojo [2] can be used as a raw material for bio-briquette because it contains high lignin and cellulose to produce carbon. The potential use of such waste can be used as ramie bio-briquette industry and to integrate the business of ramie into ramie industry center.
To develop ramie bio-briquette industry, one of the pillars that can be built for business fundamental is by fixing the financial management and systems that is used in these industries. The basic problem in management on a small and medium enterprises (SMEs) is about the owner which is not using the proper financial recording system in their industry [3]. Financial recording when conducted with carefulness and discipline, will help the industry in terms of financial management so that the industry will run according to its business model development.

The process of designing activities according to financial records in Ervillia [4] should include: characteristics of the raw materials used; company's assets; as well as the characteristics of the users of financial reports. These things should be known in depth so that financial recording system can be designed properly using design thinking approach. Design thinking is a mindset based on the designer glasses when solving the problem focused on human oriented approach [5]. The principle of design thinking by Glinski in Purnomo [5], Collaborate in the processes of systematic human-centered as a user through a planned process that produces behavioral changes and conditions in line with expectations. Stages of the design process with design thinking is described as follows.

![Figure 1. The Design Thinking Process](image)

Source: Purnomo [5]

2. Method
The method used is descriptive analysis with design thinking approach to collect data by performing in-depth observation on the characteristics of SMEs in conducting financial records. Design thinking approach to collaborate intuitive data and analytics data to design the appropriate financial recording system for ramie bio-briquette industry.

![Figure 2. Procedure of Research using Design Thinking Approach](image)
3. Results and Discussion

3.1. Discovery
Discovery stage is done by identifying the overall ramie business activities ranging from the treatment, ramie fiber decortication process to produce decortication waste and utilization to become ramie bio-briquette. Discovery stage requires an approach to build empathy so the result is in the following:

![Diagram](image.png)

Figure 3. The Result Empathy Build of Utilization of Plant Operations Ramie to Bio-briquette

In the result of empathy building is known that what is felt and dreamt from the ramie businesses, resulting in its big efforts as well as the learning process. It covers the process technology, tools and machinery, product quality and governance to marketing products based on ramie.

On discovery process also found analytics and intuitive facts which can be used as a reference to find solution by collaborating these facts.

![Diagram](image.png)

Figure 4. Facts Found of Ramie Bio-briquette industry

3.2. Interpretation
On the discovery process is obtained the characteristics of ramie bio-briquette industry which caused on the recording activities, including: 1) Business management utilization of ramie is not structured
yet which made the businesses spend a lot of time in seeking ramie bio-briquette industry so it is not motivated to do a proper financial record activities; 2) Tools are needed for recording that is able to become a trigger to awareness for the businesses in recording business activities. 3) The needed tools should be able to meet the variable of success in design thinking.

3.3. Ideation
The development of ideas is done by considering the variable of success in design thinking which explained in this figure.

![Image](image_url)

**Figure 5.** Ideation stage using the variable of success in design thinking

At the stage of ideation also make the process of prototyping is to visualize the ideas that have been built next to the workings of the tools that is understandable.

![Image](image_url)

**Figure 6.** Prototyping for Financial Recording Tools

3.4. Experimentation
Experimentation stages is realizing the result of prototyping in the ideation stage. Prototyping is built with Microsoft visual studio as the document flow mechanism and Microsoft SQL Server as the access in relational data management system. Prototyping is built into the system in the financial records to production and sales, and culminate in the presentation of income statement.
3.5. Implementation

The systems have been built and then are implemented on ramie bio-briquette industry to determine appropriate parameters that suitable to variable of success in design thinking. The system was implemented in record business activities in the second quarter period of June 2016 and produce variables that have been classified in the following table.

![Figure 7. The Result of Experimentation from Prototyping System: (a) Recording on production, (b) The result of recording sales (c) income statement on specified period.](image)
Table 1. The Parameter of success in implementation of financial recording system

| Change                                                                 | Deficiency                                                                 |
|------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 1. There has been a tools as a means to financial recording activities. | 1. In overall the system is not making many positive impacts on economic because the system is unable to show the financial position of the business. |
| 2. The emergence of collaboration in recording activities with employee.| 2. The absence of significant changes in behavior because it has not lead to positive economic impact. |
| 3. The existence of a bottom-up process that groove recording in conjunction with the production flow. | 3. The reward system is not running because there is no balance sheet features that present financial information business. |
| 4. Development of awareness in knowing the information income statement operating. | 4. The revealed hidden pattern is the businesses need a financial recording system that is capable to show information about financial position (balance sheet). |
|                                                                         | 5. The financial recording system has not been pleasant because of its hidden pattern requirement’s is not met. |

4. Conclusion
The financial recording system in industrial bio-briquette of ramie decortication waste that is built based on the characteristic of the user using design thinking approach have produced a system such as desktop application. The financial recording system is integrated with the ramie bio-briquette production activities and generate information of income statement. In the system implementation, it is not able to change the behavior in awareness to do financial recording. This happened because some of the variable of success in design thinking are not fulfilled yet, such as not showing the overall positive impact on economic; reward system is not ongoing; and the financial recording system that have not been fun because of the hidden pattern that has been revealed is not right. Such as the businesses of ramie bio-briquette industry need a financial recording system that is capable of presenting information of financial position (balance sheet).

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