Analysis and design of crowdfunding investment system as financing alternative for patchouli production in Aceh

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Abstract. Aceh patchouli is the best patchouli which contains patchouli alcohol above 30%. The demand for Aceh patchouli is quite high and it has been exported to many countries such as United States, India, Singapore, France, and Spain. However, despite its high demand, the high capital required to cultivate the patchouli causes the farmers to have less enthusiasm about cultivating the patchouli. Recently, there is an alternative way to get the fund more efficiently compared to traditional funds like banking loans, called crowdfunding. This article aims to uncover the potential of crowdfunding as an alternative to financing patchouli production in Aceh and to describe the business process model of the crowdfunding investment system. A literature study shows that crowdfunding can be used as an alternative financing patchouli production in Aceh. System analysis using BPMN is able to illustrate the business process in a crowdfunding investment system for patchouli products. The interaction between stakeholders involved is briefly described in BPMN.

1. Introduction

In the global usage, patchouli oil is commonly used as fixative aromatic oil because its character can resist the evaporation so the scent can be more durable. Swamy and Sinniah [1] reported that the most abundant component is Patchouli Alcohol, which is an important ingredient in many fragrance products like perfumes, soaps, detergents, body lotions, and cosmetic products. Other benefits of patchouli oil are also used as anti-insecticidal, anti-fungal, and bacteriostatic properties [2]. For centuries, people from China, India, Japan, and Malaysia have relied on patchouli for medicinal purposes and insect repellent [3]. Patchouli is also used to help address skin and hair problems, such as psoriasis, eczema, acne, dry, chapped skin, and dandruff [4]. It also has wound-healing and scar-reducing properties [5]. Patchouli, as an anti-depressant and mood lifter, is used to balance the body and stimulate a weakened immune system [6]. Moreover, the typical scent of patchouli becomes an indicator of authentic oriental fabric [7].

Its abundance of usefulness makes patchouli considered as the most commercial plant compared to other essential oil. Patchouli oil from Indonesia has the highest percentage of essential oil export commodities, which supplies around 90% of global market share [8]. Lisma [9] stated that the quality of patchouli oil in Indonesia is ranked third after China and France. The leading export destination of Indonesian patchouli oil is The United States, Singapore, France, German, and Spain [10]. Aceh Patchouli (Pogostemon cablin Benth) has a unique aroma that encourages people to put patchouli as their fragrance base. Aceh Patchouli can produce patchouli crude with Patchouli Alcohol (PA) content

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above 30%, which makes the world's best patchouli [11]. Almost all regions in Aceh can be a potential area to cultivate patchouli, where the four biggest productions are in Aceh Jaya, West Aceh, South Aceh, and Southeast Aceh.

This high demand of patchouli should be accompanied by the development of patchouli cultivation and industry in the country. Meanwhile, Aceh farmers have less enthusiasm about cultivating patchouli because the capital they have does not seem enough to begin cultivation [11]. Based on Aceh Bureau of Statistics, the total production of Aceh patchouli decreased almost half from 758 tons in 2016 to 484 tons in 2017 [12]. It might be helpful and effective for farmers if they have sufficient funds for cultivation in the patchouli industry [13]. During this period, many fund sources are available for farmers, such as banking loans, creditors, and intermediaries. However, farmers tend to use the non-formal institution from intermediaries because of less procedure administration, no asset guarantee, yet simple to access.

Intermediaries as their fund sources have become part of the social networks chain in the agricultural system. Intermediaries and farmers cannot be separated from each other. Nonetheless, some arguments assess that the presence of intermediaries can be detrimental to farmers. Quartey [14] explained that the existence of pre-harvest contracts submitted by middlemen to farmers is aimed at lowering prices and the farmers who are bound by capital loans could not freely sell their product to the market. Farmers will be more profitable if they sell their agricultural products directly to consumers or market traders rather than selling them to intermediaries. This statement is supported by Russel [15], who said that the presence of intermediaries in the agricultural system makes farmers dependent on them.

Since intermediaries are no longer effective, the use of innovation such as financial technology and the digital marketplace can overcome the problem. Recently, innovative use of technology can be an alternative way of obtaining financial access. The alternative funding is known as crowdfunding and can be alternative financial options with the potential to be disruptive. In crowdfunding, money is gathered by the crowd using the internet [16]. The amount of money collected is relatively small, but with massive participants, it can get a significant amount of funds [17]. Crowdfunding, as a phenomenon in the digital media era, has various developments from year to year. The United States, as an internet and technology giant, debuted in 2008 with the establishment of the world's largest crowdfunding site, Kickstarer and Indiegogo in 2008. The existence of these two crowdfunding sites has become a catalyst for the development of the crowdfunding industry in the world, especially in America. In 2013, several crowdfunding sites in Indonesia began to appear, such as Patungcan.com, Ayopeduli.com, GandengTangan.com, and Kitabisa.com, which facilitated many non-profit projects such as arts, education, culture, and health. The crowdfunding platform that has sprung up in Indonesia is more in the form of reward-based crowdfunding and based on donations where fundraisers will get rewards in the form of services and goods from their donation.

Aside from reward and donation-based crowdfunding, there are also two other kinds of crowdfunding, namely lending-based and equity-based crowdfunding. Each type of crowdfunding has a different aim. For this research, equity crowdfunding will be the main focus because it suits small businesses or farmers, which are still growing. Equity crowdfunding can be a method for connecting entrepreneurs and investors through an internet-based intermediary entity [18]. Crowdfunding provides benefits for the community through local and global means. Kitchens and Torrence stated that crowdfunding would be a tool for people to invest in their communities, and this will help to sustainably create a healthy economy [19]. Crowdfunding also creates opportunities for talented people with limited resources and for investors who want to retain that talent in their communities. Nowadays, modern technology makes it possible to overcome geographical barriers and access money globally. The research findings revealed that most entrepreneurs focus on projects in their geographical communities but try to raise funds globally [20].

This paper examines the characteristics of crowdfunding that distinguishes it from traditional funding sources, in which technology enters financial services. Besides, with all the benefits of the internet, crowdfunding can raise funds from the public at large and get a significant amount of funds.
Based on these backgrounds, this article aims to uncover the potential of crowdfunding as an alternative to financing patchouli production in Aceh and to describe the business process model of the crowdfunding investment system.

2. Methodology

2.1 Literature review

This research uses a literature review to uncover the potential of an alternative financing patchouli production in Aceh that might be financed through crowdfunding. This study reveals these opportunities from the standpoint of existing literature, namely through scientific articles as supporting theoretical evidence and mass media articles as empirical evidence.

A literature study or literature review is a summary of subject areas that support identification in the formulation of specific research problems. A literature review evaluates various sources such as books, academic or professional scientific articles, or web-based sources.

2.2 System requirement analysis and modeling

The crowdfunding investment system is analyzed using the System Development Life Cycle (SDLC) as a phased approach by using a specific cycle of analyst and user activities [21]. An analyzing system using SDLC symbolically present a system as a simple diagram shown in figure 1. In general, input is used as stimuli and cues and fed into a system to process the inputs, so it produces an output [22]. Four main parties will become stakeholders, namely farmers, developers or crowdfunding platforms, investors, and banking. The key stakeholders have their respective roles and interests. The first flow starts from farmers submitting their project, requesting funding through crowdfunding platforms then promises returns to investors. Investors will see investment opportunities offered by farmers and give their commitment to fund. The crowdfunding platform as an intermediary institution that brings together investors and farmers, while banking acts as a financial institution to receive and sent the money.

![Figure 1. System analysis of patchouli production crowdfunding investment.](image-url)
The core business process of crowdfunding investment system modeling was modeled using Business Process Modelling Notation (BPMN) for process identification, discovery, and analysis [23]. BPMN uses a standard for business process modeling as the graphical process modeling language [24]. Also, to make every stakeholder understand, BPMN uses a valid instrument for modeling the processes and communicating the various roles and tasks involved [25]. Sybase Power Designer 16.5 software was used to construct the BPMN of the crowdfunding investment system. The detail of the method and framework of this paper is briefly depicted in Figure 2.

Figure 2. Research framework.

3. Result and discussion

3.1 The potential use of crowdfunding in agriculture to be alternative financing
Fintech has now expanded to the agricultural sector, which is used for business financing at the farm level. Farmers who have limited capital and find it difficult to access credit to financial institutions have the opportunity to be able to utilize digital technology with the concept of crowdfunding as an alternative access to capital, while capital is one of the critical internal factors in implementing farming [26]. The crowdfunding platform has been regulated by the Republic of Indonesia Financial Services Authority through OJK Regulation No. 77/POJK.01/2016 Concerning Information Technology-Based Money Lending and Borrowing Services. This regulation guarantees security for crowdfunding users because it requires crowdfunding managers to have a limited liability company or cooperative. The existence of this regulation shows that there is support from regulators for crowdfunding in the form of oversight mechanisms so that it can guarantee security for users.
Crowde or PT. Crowde Building the Nation (Crowde) is one of the crowdfunding platforms in Indonesia that specializes in agriculture [26]. The number of farmers who have collaborated with Crowde has reached more than 5,071 farmers in 276 villages in Indonesia. The form of funded agricultural projects also varies, such as crop cultivation, commodity trading, seed purchasing, sending commodity supply requests, and food processing industries.

The response of the Crowde partner farmers showed a positive response to the crowdfunding scheme as access to capital. Almost all partner farmers say the process or procedure of the capital scheme is straightforward to follow. Most farmers consider that this crowdfunding model is beneficial and suitable for farmer capital access. In addition, the reason most farmers partner with Crowde is that the submission process for the crowdfunding scheme is reasonably straightforward.

Another crowdfunding platform for agriculture is AgroPay. The platform acts as an intermediary to connect all actors that are farmers, investors, wholesalers, and customer. Focusing on a niche market through mobile services makes AgroPay accessible to all parties from anywhere and at any time. Farmers will get funding from investors quickly. The investor can be anyone interested to invest in agriculture. AgroPay, as a crowdfunding platform, will provide the investor with the ability to track their investment from their smartphone. The investor will be given choices whether they want to invest in short term cycle commodities such as peanut and vegetables or long term cycles like a fruit tree. Customers as the final destination of the product will increase price competition among suppliers and improve agricultural sustainability in the future [27].

3.2 Business process modeling on crowdfunding investment system

As a business model, crowdfunding has multiple advantages compared to more conventional models. Some apply more to creators, others more to donors. Some apply to both. The lack of patchouli production and farmer less enthusiasm are the main focus in providing a better solution.

This life cycle of a crowdfunding investment system was initially model as a process using BPMN. BPMN represent the relationships, processes, workflows, formulations, and stakeholders in the system with a real-life business situation. The farmers submitting their project, requesting funding through crowdfunding platforms, then promises returns to investors. Investors will see investment opportunities offered by farmers and give their commitment to fund — the crowdfunding platform as an intermediary institution that brings together investors and farmers. Banking acts as a financial institution to receive and sent money. The stakeholders involved in the system are farmers, developers, investors, and banking. Investors act to see investment opportunities offered by farmers and give their commitment to fund — the BPMN of crowdfunding investment system depicted in Figure 3.
4. Conclusion
A literature study shows that crowdfunding can be used as an alternative financing patchouli production in Aceh. With the regulation of the crowdfunding platform, this makes users feel safe in accessing it. System analysis using BPMN is able to illustrate the business process in a crowdfunding investment system for patchouli products. The system limitation is described by inputs, stakeholders, objectives, controls, resources, threats, and outputs. The interaction between stakeholders involved is briefly described in BPMN.

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