The Integration of Corporate Social Responsibility for the Mine Rehabilitation with Sago Plants: A Case Study of PT Vale Indonesia Tbk (Vale)

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Abstract: Integrating a corporate social responsibility (CSR) for the mine rehabilitation with sago planting in the Vale' contract of work area requires a review of community development programs and reclamation projects. The data of the CSR programs are gathered from in-depth interviews, the annual reports, and managerial reports. Furthermore, we present a diagram of CSR for the program of mine rehabilitation with sago planting based on the frameworks of triple bottom lines (the economic concerns, the social concerns, and the environmental concerns). We then propose CSR stages for that programs towards the local livelihood in general and the post-mined area in particular. Based on these steps, the way to improve CSR program for sago planting in a participatory need assessment are discussed and recommended

Keywords: corporate social responsibility, sago planting, community development, reclamation projects, mining contract of work, triple bottom line, participatory need assessment

Introduction

The strategic issue in the Regency of Luwu Timur, the Province of South Sulawesi, is one of the regions with the largest nickel reserves in Indonesia. At this time, the nickel mining in Luwu Timur is conducted by PT. Vale Indonesia (Vale), but the potential for environmental damage and public poverty as a result of mining activities can happen in every time. Therefore, Vale as the leading of mining company has been implementing corporate social responsibility (CSR) for community development program. The aim of this research is to design CSR programs for the mine rehabilitation with sago plants and then describes how the implementation of CSR stages based on the participatory need assessment.

Methods

The research was conducted in October - November 2017, which is a case study of the Vale' contract of work area at the Regency of Luwu Timur, the Province of South Sulawesi, Indonesia. The methods of data collection were in descriptive and qualitative research with in-depth interviews, and conducted the field observation to the post-mined area. The obtained data is analysed by SWOT analysis (Humphrey, 2005) and the frameworks of the triple bottom line (Elkington, 1997)

Results and Discussions

1. In General, the interview result based on the local livelihood

In the beginning, the implementation of Vale' corporate social responsibility (CSR) was investigated seriously. It is very important to find a link between the implementation of CSR program and the sago planting. PT Vale Indonesia Tbk (Vale) began planting sago palm at the post-mined area in end year 2015s. There were a 2000 sago-seedlings ordered by the contractor. Running time, at least the mortality of sago seedling is high (fewer than 5% life). At this time, Vale still purchases at least 1000 sago-seedlings for mine reclamation project in early of the year of 2018 with different method and treatment

Based on the in-depth interview, The SWOT analysis is created as follow;

Strengths	Weakness
• Having a good policy in mining reclamation following Vale Environmental Management System (EMS) • Having a modern nursery for seedling and cultivating • It is easy to find the sago seedling in the local area • Having a regular inspection in sago planting	• Due to high mortality of sago seedling, the mine rehabilitation with sago plants can be stopped • Ineffective the significance of budget allocation for mining reclamation if the sago planting always meets the failure • Lack of experiences in sago planting • Lack of knowledge in sago planting • Lack of collaboration with other parties especially sago expert or academician • Marginal land after mining activities
Opportunity	**Threats**
• The supplier of sago seedling is from contractor, not local people • The area of sago seedling is outside of Luwu Timur regency • New technology in sago processing • Vale can be a pioneer to plant the sago in the post-mined area	• Maybe not or difficult to find the best practice for sago planting in the post-mined area • Less of reference or information about the sago research in the mining area • The sago crops are being economically less competitive with other commercial crops such as palm oil, pepper, and cocoa.

Figure 2: SWOT analysis for sago planting in the post-mined area

This is recommendation for future research, there are :
Research on the soil condition in the post-mined area, research on the quality of sago-seedling towards the need of mining reclamation projects. research on the method of sago planting and its fertilizing in the post mined area, research on the supply chain management on the sago seedling, specifically the delivery risk for sago logistic distribution and research on the participatory need assessment (CSR for community development) integrating the sago' planting projects and etc.

Conclusions

1. Based on both the in-depth interview and the field observation, the planting of sago have so far not been optimally identified. We identified that most of the sago stakeholders are still lack of understanding on the importance of sago benefits for food security, disaster mitigation and biodiversity.
2. For Vale policy, CSR for community development programs can be integrated in the mining rehabilitation project. It is very important to gain benefit for local people in their sustainable livelihood and land conservation as well.
3. In the post-mined area, the research on sago planting are facing some significant problems which need to be solved immediately by comprehensive research.
4. CSR for sago planting in the post-mined area is suggested following the model of participatory need assessment.

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Durability of Sago Thatch on Beach Huts of the VSU Resort, Leyte (Advance report)

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Abstract: The durability of sago (*Metroxylon sagu* Rottb.) thatch on the beach hut was observed in the field condition of Leyte, Philippines, with comparing those of nipa (*Nypa fruticans*) and footstool palm (*Livistona rotundifolia*, anahaw in Filipino) for 5 years. The sago and nipa palm thatch were sustained with small parts of destruction of the edge of eaves, although the footstool palm leaf thatch have already been broken from the sewn parts. It is suggested that the sago and nipa palm shingle roofs were stronger than footstool palm leaf roof in hot and high moisture condition.

Keywords: beach hut, footstool palm, durability, nipa palm, sago palm

Introduction

Leaf and leaflets of the footstool, nipa and sago palm can be used for thatching. To make thatch, the leaflets are taken off the rachis and are folded over a wooden or bamboo lathe and sewn together. It is important that the midribs do not break but bend. The folded and lathed leaflets then are put on top of a house, partially covering each other. Such a thatched roof may last for several years (Flach, 1977). On the other hand, a thatched roof from footstool palm (*Livistona rotundifolia*) leaves was made by connecting leaves together on large roof beams. The thatch production from nipa palm (*Nypa fruticans*) in Bohol, Philippines, was reported by Carandang et al. (2009). Nipa palm could produce the mean value of 51,148 shingles per year. The front side epidermis of nipa palm leaflet is thick and cell groups immediately below the epidermis support the leaflet structure (Abe, 1994). After three years under drying condition two or three layers of cells below the epidermis would make the cured epidermis to combine the original epidermis. The large vascular bundle of nipa palm leaflet makes the connection with front and back side epidermis by vascular bundle sheath, which give rise to bocks structure. Local producers in western Leyte easily made a shingle from the thorn-less leaves of nipa palm by hand, one of the reason of thorn-less leaves.

Meanwhile, Celiz et al. (2002) revealed that sago palm (*Metroxylon sagu* Rottb.) leaf production. Okazaki et al. (2013) determined the breaking resistance of nipa and sago palm leaflets and concluded that sago leaflets showed lower breaking resistance than nipa leaflets after air-drying. However, there is no report on comparable study on the durability of thatch in the field condition. The mesophyll cells of sago palm leaflet enrich between the epidermises and has small amount of the cavity cells in the front epidermis. However, the structure of sago

leaflet will not be broken, because of the uniformly arranged cells (Abe, 1994). Large vesicular bundles of sago palm may contribute the hard strength. The thatch in tropical areas requires the shade and way of the wind.

We tried to elucidate the durability of sago thatch in the field condition. This is an advance report.

Materials and Methods

The durability experiment of three palm thatches on the beach huts was carried out in the campus of Visayas State University, Leyte, Philippines from 2011. Leaves and leaflets; footstool, nipa and sago palm were used for thatch to compare the durability in the field. The footstool palm leaves collected from the neighborhood of Visayas and sewn together on large roof beams. The nipa and sago thatches were made by hand in the local village and transported to the beach huts of VSU Resort. The field observation of thatches on the beach huts of VSU Resort has been done with naked eyes since 2011yearly.

Results

1. Footstool palm thatch

The footstool palm leaves are characterized by the broad fun. Footstool palm thatch is tied close together with the adjacent leaf. On the beach huts they gave comfortable atmosphere and temperature on the beach in Baybay, Leyte. However, the durability of footstool palm was relatively weak in the field condition of VSU campus. Drying period from December to May in this area strongly affected the enation structure of footstool palm. Prevailing and strong wind attacked the swing parts and destroyed the connection during study period. The hut of footstool palm roofed with Galvanized iron sheets.

2. Nipa and sago palm thatches

Nipa and sago palm thatches are strong and durable for at least 5 years on the beach of Leyte. The price of sago is 3,000 Ps per 100 shingles in Dulag, Leyte in June of 2018.

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The Current Situation of Sago Production and Market Linkages in South Sulawesi, Indonesia

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A number of studies have been conducted to study on sago palm in Indonesia. Our previous research in 2016 identified several actors involved in sago business in South Sulawesi. The objectives of this study are to understand the nature of traditional sago production in South Sulawesi and identify market linkages of sago starch in South Sulawesi.

Materials and Methods. The survey was conducted from February to April 2018 in Luwu Utara region and Makassar city. A total of 27 respondents (sago processors, *dange* (roasted sago) maker, dried sago producer, sago-based cookies industry, middlemen and retailers) were interviewed about their current situations and their market linkages.

Results and Discussion. For small and medium sago businesses, understanding the marketing of the product is the important way to maximize their profit. According to our investigation in the field, the market linkages of sago production in South Sulawesi can be classified into the following categories: (1) Producer to domestic trader, which is showed in the distribution of wet sago by sago processor and *dange* maker, (2) Producer to retailer in dried starch market, and (3) Producer to consumer in sago-based cookie industry. However, linkages between producers and cooperatives, and exporter were not found. Moreover, Fluctuations in the output price is one of the most important problems because there is a big gap between producer prices and consumer prices. The current state of sago market in South Sulawesi is still ineffective because of many steps with too little value addition. For example, the price of dried sago in Makassar hikes over 89.5% - 96% until it reaches the consumers without any extra value addition. Based on our interview, the important criteria for setting market price are demand, quality, season based and availability of sago (Fig. 1).

Factors constraining sago starch development

As in this study, it shows that every actor has their specific constraints (Fig. 2). The main constraining factors for sago producer are machinery and equipment, low price, availability of sago palm, less support from government and market respectively. For *dange* maker, the

constraining factors are quality (color), price, climate, equipment, and market. Meanwhile, constraining factors for dried sago producer are financial, market, availability and quality of sago starch, equipment and storage and transportation and shipping to market outside South Sulawesi. Moreover, for sago-based cookies producer, factors constraining production are the durability of product, packaging, human resources, and price.

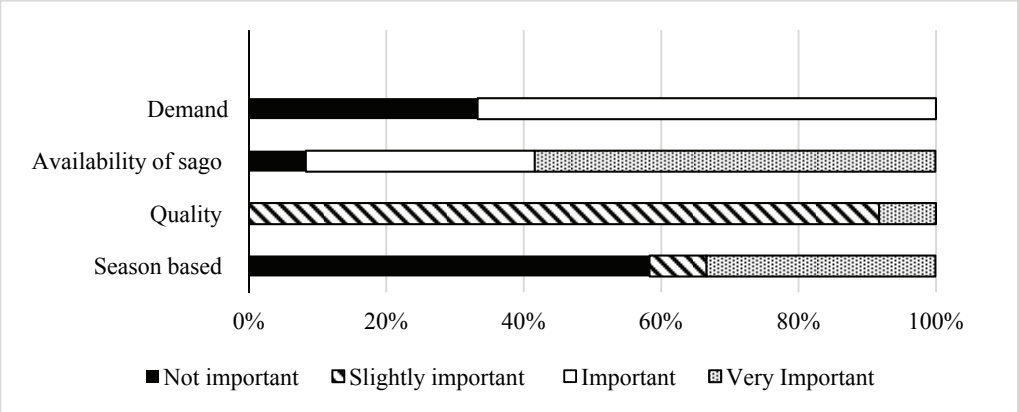

Fig 1. Criteria for setting market price

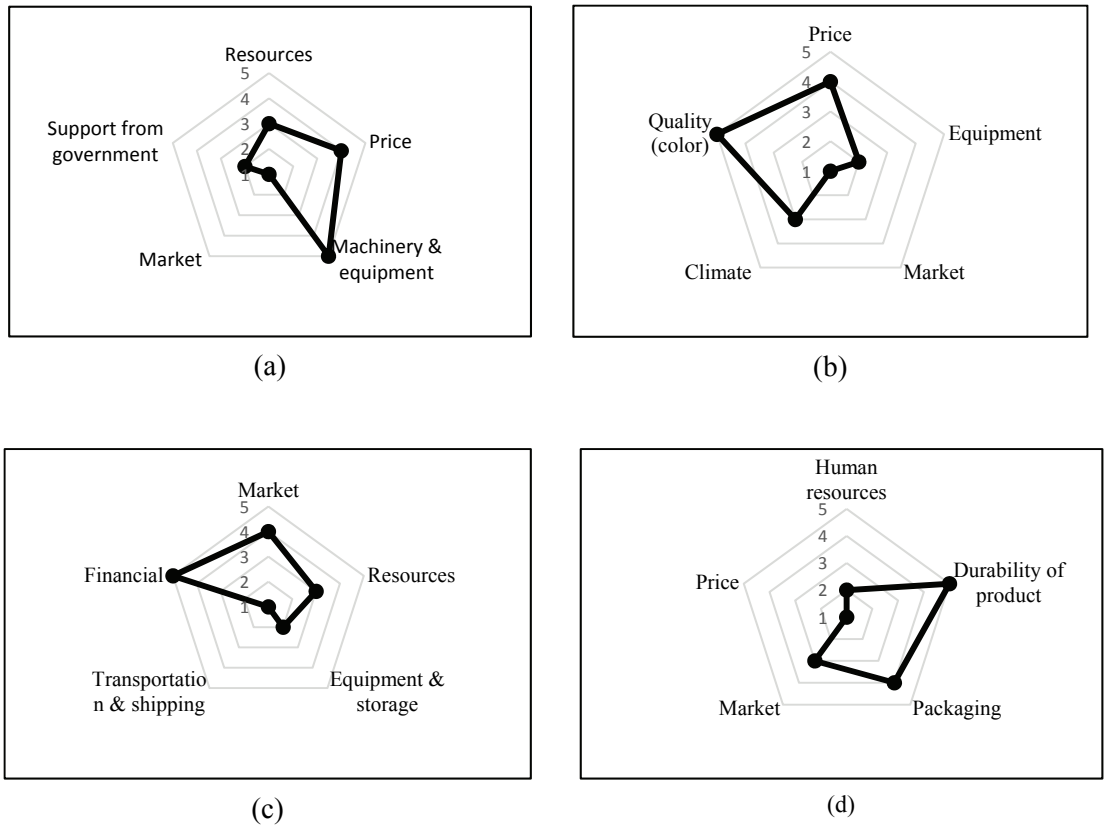

Fig 2. (a) Constraining factors of sago processor, (b) Constraining factors of *dange* maker, (c) Constraining factors of dried sago producer and (d) Constraining factors of sago-based cookies producer (Ranking 1= low, 5= high)

Floral Morphology of *Metroxylon* Palms: Sago Palm and Solomons' Sago Palm

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The genus *Metroxylon* is distributed from Southeast Asia to Micronesia, Melanesia and Polynesia. It is divided into two sections: *Metroxylon* and *Coelococcus*. *Metroxylon sagu* Rottb. (called the true sago palm: hereafter "sago palm") is the only species in the section *Metroxylon*. The other species are recognized within the section *Coelococcus*, representing the eastern half of the *Metroxylon* distributing area. In Papua New Guinea and Solomon Islands, both sago palm and Solomons' sago palm (*M. salomonense* (Warb.) Becc.) of section *Coelococcus* are distributed. The Solomons' sago palm is found in Vanuatu as well. The original habitats of these two species are comparatively close together in some areas.

The sago palm can propagate in two ways: vegetative propagation by adventitious buds arising from lower leaf axils or subterranean stems or suckers (tillers), and sexual propagation by seeds. For cultivation purposes, it is more common to transplant suckers, as seedlings take about 1 year to grow to a suitable size for transplantation. The use of seedlings is slowly increasing, however, because it is not easy to secure large sufficient numbers of suckers for transplanting in large-scale plantation projects. Although sago palm seeds (fruits) are known to show low germination, the authors reported that the removal of seed husk tissues could lead to germination rate over 90% when the clean-mature seeds were soaked in water. The removal of the exocarp, mesocarp and sarcotest is considered effective as physical treatment prior to seeding (Ehara et al. 2001). However, the former results were given from the well-developed fruits. On the other hand, the section *Coelococcus* species can be propagated by seeds alone as they do not produce suckers. Their seeds generally show high germination rates and some of *Coelococcus* species even produce viviparous seeds (Ehara et al. 2003).

The authors reported the morphology of pollen grains with the structure of hermaphrodite and staminate flowers of sago palm in the previous report (Ehara et al. 2006). In this study, the floral morphology of sago palm and Solomon's sago palm was observed and compared to investigate the development of seed/fruit that will show germinability.

Materials and Methods Some fruits at various development stage were sampled for morphological observation from a spiny sago palm that was transferred from Papua, Indonesia to Aberisawah, Southeast Sulawesi and grown there. First-, second- and third-order branches of inflorescence were taken from a spiny sago palm (vernacular name: *Yierevi*, Ehara and Naito WWK3) grown in Wewak, East Sepik, Papua New Guinea (Moem village, 3°34.743'S; 143°41.470'E) and a Solomon's sago palm (vernacular name: *Takur dun,* Ehara and Naito GA1-1) grown on Gaua Island in Vanuatu (14°15.907'S; 167°36.098'E). Flowers at the pre-anthesis stage were obtained from some of representative branches of each palm. Cross section of gynoecium (i.e. pistil) in the hermaphrodite flower was prepared using a plant microtome and observed under a stereoscopic microscope.

Results and Discussion There were three different types of fruits, (1) with one seed having horseshoe-shaped endosperm, (2) seedless including endosperm-like inner part divided into two cloves,

and (3) seedless including the inner part divided into three cloves (Fig.1). Tomlinson (1990) described that the gynoecium is trilocular, but two ovules abort in *M. vitiense* (H. Wendl.) H. Wendle. ex Benth. & Hook. F. (Fijian sago palm).

Thus, internal structure of the gynoecium (Fig.2) of the sago palm and Solomons' sago palm was observed. In both of the two species, base part of gynoecium was trilocular (Fig.3). The Solomons' sago palm is solitary: it does not sucker from the base of palm. There was no difference in the internal structure of gynoecium between sago palm and Solomons' sago palm that is propagated by only seed. From this result, it is considered that Solomons' sago palm also has three ovules at the early stage of flower development and two of them will abort to lead enough development of a vigorous seed that will show higher germinability. The anatomical observation at the following development stage of flower is further subject to make clear when and how the number of ovules diminishes and an embryo develops with the progression in *Metroxylon* palms. The process of flower development is not clear even in Fijian sago palm. In case of sago palm, the reason why seedless fruits including two or three cloves of endosperm-like part are also produced and their proportion among the produced fruits should be studied.

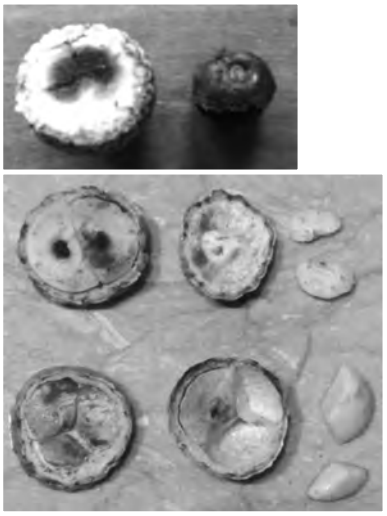


Fig.1. Sago palm fruits.

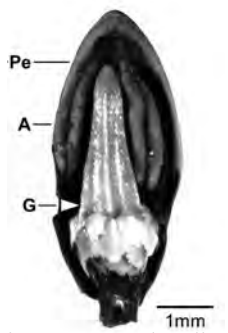
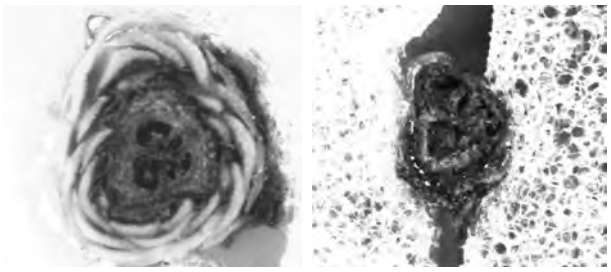


Fig.2. Hermaphrodite flower of sago palm. Pe, petal; A, anther; G, gynoecium. (from Ehara et al. 2006)



Sago palm Solomons' sago palm

Fig.3. Cross section of gynoecium (i.e. pistil).

Table 1. Number of branches of inflorescence and flowers.

Item	Sago palm	Solomons' sago palm
1st-order branch	13.0	28.0
2nd-order branch	13.3 ± 1.7	14.0 ± 1.9
3rd-order branch	10.6 ± 1.1	7.0
Flowers/3rd-order branch	270.0 ± 8.7	334.9 ± 20.3
Flowers/palm	495474	918848

Mean ± SD.

Although the flower density on 3rd-order branch of an inflorescence tended to be high by 30% in sago palm (3.1/cm^2) rather than in Solomons' sago palm (2.5/cm^2), the number of flowers was apparently large in Solomons' sago palm reflecting its larger number of 1st-order branches in the inflorescence (Table 1). It is still unknown what percentage of flowers will produce fruits in both the two species, which is also an important next subject.

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Can Sago Starch-Based Cookies Replace Wheat Flour-based Cookies in the Food Industry? The Challenge, Marketing Strategy, and Market Prospect of SMEs in South Sulawesi

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Abstract: The popularity of cookies as a favorable snack is widely known by people with wheat flour as a main raw material. On the other hand, sago starch-based cookies are getting more attention in Indonesia. This study investigates whether sago starch-based cookies can replace wheat flour-based cookies, and identifies the challenges, marketing strategies and its market prospects in South Sulawesi. A case study of sago starch-based cookies namely BASO was conducted through in-depth interview and observation. The obtained data then were analyzed by fishbone analysis and SWOT analysis. The results showed that within 10 months, the number of cookies production and sales of BASO has increased significantly by over 330%. The result indicated that sago starch-based cookies are accepted by the urban community and has the high prospect to be developed.
Keywords: Indigenous starch, local economies, sago starch, SMEs, South Sulawesi, wheat flour

Introduction

Cookies are small size flour-based snack made from soft dough, high fat and sugar (Davidson, 2016). Based on the statistic of food consumption, the average of cookies consumption in Indonesia in 2017 is 0.1 kg/ capita/ week and the growth average of cookies consumption within 2013-2017 is 1.8 kg/ capita/ year (Ministry of Agriculture, 2017). In the urban community, wheat flour-based cookies (WFBC) has a popularity, especially to celebrate events or ceremonies in Indonesia. Almost 70% of the imported wheat flour is used by food industry sector and the rest are absorbed for fodder sector. In fact, consumption of wheat flour makes Indonesia as the second largest wheat importer in the world. Moreover, a report from United States Development of Agriculture (USDA) predicted that Indonesia will become the biggest importer in the world. Consequently, the wheat flour eating habit should be anticipated by promoting local starch resources such as sago starch.

An initiative to make sago starch-based cookies (SSBC) originated from Dua Permata Luwu (DPW), a small and medium-sized enterprise (SMEs) in Makassar with their renowned brand called "BASO". BASO is abbreviated of BAgea Sagu Organik/ organic sago *bagea*. DPW successfully created a special *bagea* that has unique taste and texture that was broadly accepted by urban consumer. In this study, we investigated whether SSBC has a possibility to replace WFBC in the food industry including the challenges, marketing strategies and its market prospects.

Methods

This study was conducted in Makassar, the capital city of South Sulawesi, Indonesia from March to April 2018. The case study is DPW, a SMEs owned by two married women, Mrs. Mulyana Mulkin (42 years old) and Mrs. Yusni Khadija (44 years old) that was established in 2015. In-depth interview, and observation were carried out and then the obtained data were analyzed by fishbone analysis and SWOT analysis.

Results and Discussion

DPW is identified as a pioneer of innovated SSBC producer. At the first, BASO was launched

only in 3 multiple flavors (cinnamon, cheese and chocolate) and then added into 7 flavors (strawberry, cappuccino, good time and chocolate stick) in April 2016. In April 2017, DPW added more varieties to the product which are *nastar* and *putri salju*. Based on interview, the reasons why they chose sago business was because they wanted to utilize sago starch as a special souvenir from Regency of Luwu Timur which a legacy of Luwu people. On progress, DPW got support from Luwu Timur government on certificate of food production for home industry (P-IRT) and halal label. Furthermore, the government also promoted BASO through SMEs exhibitions and a main souvenir to the guest of Luwu Timur Government. The result of our study showed that the trend of a number of production (Figure 1) and sales (Figure 2) of BASO during 10 months (July 2017 to April 2018) has increased by 334%. The result indicated that sago starch-based cookies are accepted by the urban community and has the high prospect to be developed. Currently, the product is mostly sold online through Facebook and other media social application. Certain amount are sold in a cooperative belong to a mining company, PT Vale, in Luwu Timur and cooperative owned by Government of Luwu Timur.

To improve the production and sales performance, it is important to understand the production problems as it can be considered as the challenge and then formulate the suitable marketing strategy. The fishbone analysis was applied to identify the problems and SWOT analysis was used to determine available opportunities for BASO.

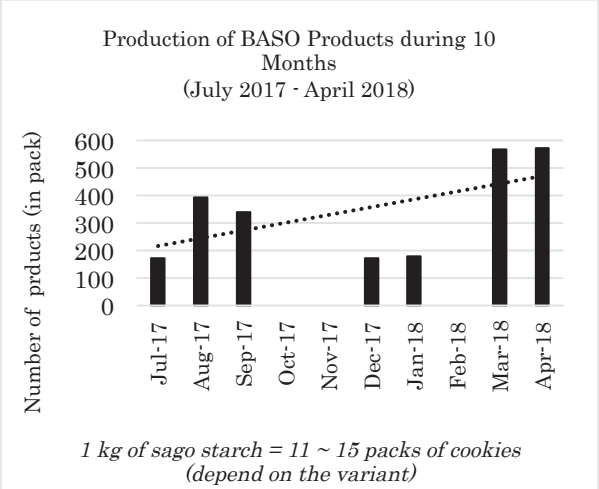

Figure 1. Production of BASO during 10 Months (July 2017 - April 2018)

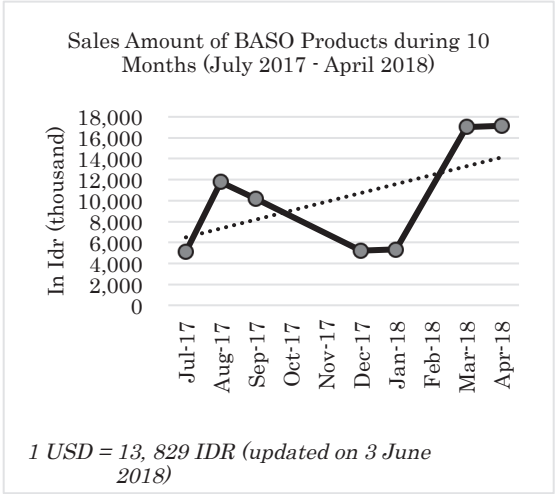

Figure 2. Sales of BASO during 10 Months (July 2017 - April 2018)

Conclusion

Through examining the case study, it can be concluded that the existence of wheat flour based-cookies can be replaced by sago starch-based cookies. SSBC can be accepted by the urban community who live in non-producing sago areas such as Makassar city, and has the possibility to expand the market to other cities in Indonesia. Promotion through online media application becomes a good alternative to get more customers and to avoid a high cost promotion. DPW as a pioneer for innovated SSBC can inspire other SMEs to grow and create a new eating habit of sago in the urban area which eventually will encourage sago farmers to engage more in sago production.

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