Sweet potato agribusiness development strategy to improve farmers’ income

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Abstract. Sustainable agricultural commodity production is determined by the conducive policy implemented by both central and local governments as well as the stakeholders. To meet domestic and export demands it is necessary to conduct agribusiness development strategy for farmers’ income improvement, i.e. investment climate upgrading. Enhancing export opportunity of sweet potato products has large opportunity, but domestic production is still limited. This paper aims to analyze agribusiness strategy for export purpose. Specific purposes of this paper are: (i) to analyze sweet potato domestic production, (ii) to evaluate sweet potato processing and marketing, and (iii) to assess partnership between sweet potato farmers and processors. The study was conducted in East Java. The research results show that sweet potato production expansion is due to export-oriented partnership resulting in farmers’ income enhancement. It is urgent to increase sweet potato production based on good agricultural practices (GAP) to meet export market demand in terms of quantity and quality.

1. Introduction

Sweet potato (Ipomoea batatas L.) is one of substitutes of rice as the main staple directly consumed or as the raw material for the processing industry such as flour, chip, starch, etc. [1,2]. Some farmers do not grow sweet potato anymore due to its unstable selling price and they continue growing rice [3]. The sweet potato export market is potentially promising and Indonesia has to take this opportunity optimally. Sweet potato export potential is indicated by its growth rate of 13.49% per year. During the period of 2015-2019 total export of sweet potato was on average was 629,505 tons per year. There are 118 sweet potato exporting countries during the said period and Indonesia was ranked 11th with its average volume of 9,571 tons per year or its share of 1.52% with a negative growth rate of 10.98% per year. US as the first exporting country with its share of 40.43% (254,520 tons per year) experienced a growth rate of 8.65% per year. It indicates that US is able to take advantage of world’s sweet potato consumption despite its export growth rate is below that of the world (13.49% per year).

Indonesia’s sweet potato’s export is still limited to some countries such as Japan, Malaysia, Singapore, and South Korea with total share of 93% [4]. Most of Indonesia’s sweet potato production, i.e. 2,158,656 ton on average during the period of 2014-2018 was consumed for domestic demand [5] and only 0.4% of the production was exported [4]. National sweet potato production grows by -5.05% per year in most regions in the country such as West Java (-11.12 % per year) and East Java (-2.46 % per year), other provinces (-7.18 % per year), except Papua Province (2.10 % per year) [5].
It is still possible to expand Indonesia’s export as the world’s sweet potato export grow positively. Sweet potato agribusiness development is important to boost farmers export especially the production and processing aspects as well as marketing through export. This paper aims to analyze sweet potato agribusiness strategy for export purpose. Specifically, this paper aims: (a) to analyze sweet potato domestic production, (b) to evaluate sweet potato processing and marketing, and (c) to assess partnership between sweet potato farmers and processors.

2. Conceptual framework
In general, sweet-potato farmers deal with conventional marketing channel, namely they sell fresh harvested product to collecting traders. Farmers’ bargaining position is low and they are lack market information leading to relatively low farm-gate price [6]. To improve farmers’ income through higher farm-gate price, it is important to conduct partnership with both medium and large scale sweet potato processors. In the future, the farmers have to be able to manage their own business for better performance [7]. Farm business management consists of planning, marketing, and investment. The farmers will get profit if they able to improve farm revenue, to lower production cost, as well as other cost components related with investment return [8].

Figure 1 shows that linkage between farm business and agribusiness depends on the supporting institutions such as bank, cooperative, educational institution, transportation, market, and post-harvest. These supporting institutions stimulate agribusiness in terms of distribution, storage, processing, as well as small, medium, large scale farm business of various commodities including agricultural inputs supply and distribution.

![Figure 1. Linkages among farm business, agribusiness, and supporting institutions](image)

3. Data and analysis
The study was conducted from January to August 2020. Primary data were collected from sample farmers in Pacet Sub-District, Mojokerto Regency, East Java. Out of 30 sweet potato farmers in the village, 15 persons of them were selected randomly as the respondents. Secondary data were collected from Ministry of Agriculture (MoA) and other Ministries and regional offices in East Java. Farm business analysis consists of: (i) cost and income analysis, and (ii) benefit to cost ratio [9].

The equations to estimate those approaches using formulas are as follow:

\[ \text{Net income} = \pi = TR - TC \]  
\[ \text{Total revenue} = TR = P \cdot Q \]  
\[ \text{Total cost} = TC = TFC + TVC \]

**Benefit to cost ratio** analysis uses the following approach:

\[ \frac{B}{C} \text{ Ratio} = \frac{\pi}{TC} \]  
If B/C ≥ 1, the business is feasible to develop, but if if B/C ≤ 1 then the business is not feasible [10].
Return on investment (ROI) or called as “Return on Total Assets” is measurement of total business actors’ assets available in the company [11]. The greater the ROI value, the better the business performance will be. ROI equivalent is expressed as follow:

\[
ROI = \frac{\text{Net profit after tax}}{(\text{Total assets})*100}\]

(5)

Residual Income (RI) analysis indicates that the company creates asset (positive) or reveals capital loss (negative). In the long term, the sustaining companies are those create assets. RI is residual profit to measure performance by estimating difference between profit before tax and capital cost of investment. Economic added value is achieved if the business actors get residual as profit before tax decreased by capital cost. RI equation is as follow [11]:

\[
RI = \frac{\text{Net operating profit after tax}}{\text{Capital cost jr}}
\]

\[
= \frac{\text{EBIT} (1 – T)}{(\text{WACC} x \text{Total Assets})}
\]

(6)

where

\[
\text{NOPAT} = \text{Net operating profit after tax}
\]

\[
\text{EBIT} = \text{Profit before interest and tax}
\]

\[
T (\text{Taxes}) = \text{Tax}
\]

\[
\text{WACC} = \text{Weighted average capital cost}
\]

4. Results and discussion

4.1. Sweet potato domestic production

Farmers grow sweet potato on dry land or rain fed during wet season and on irrigated land on dry season. However, different land cultivations are necessary in both seasons in order to get optimal yield [12]. Practically, farmers grow sweet potato as monoculture crop adopting varieties easily accessed. The farmers mainly deal with sweet potato weevils (Cylas formicarius) that may reduce yield up to 80%. The farmers have to apply land sanitation and adopt healthy seed (shoot cuttings) to overcome this pest [13].

Farmers’ fresh sweet potato quality is relatively low or around 40% only accepted by the processors. Good sweet potato quality is achieved through better farm management consisting improved variety adoption, quality seed, good crop rotation, right mounds, accurate sex pheromone application, natural predator use, bio pesticides practice, and chemical control [14].

Lack of sweet potato farm management leads to lower yield resulting in production decrease. MoA data showed national production decrease during period of 2017-2018 was 19.91% due to yield decline of -15.95% [15]. In Mojokerto Regency the harvested area expanded from 1,724 hectares in 2017 to 2,280 hectares in 2018 [16]. Sweet potato produced in Mojokerto is the raw material for the processors both domestic investment (PMDN) and foreign investment (PMA) in East Java Province. There are seven PMAs (Korea and Japan) and one PMDN found in some regencies and city in East Java, namely Pasuruan, Mojokerto, Gresik, and Lamongan Regencies and Surabaya City.

To supply raw material to the processing companies, the partnership between farmers and processing companies ensure sweet potato improved varieties, continuity, quantity, and quality. It indicates that farmers could not participate directly in international trade despite sweet potato has already its Indonesian National Standard (SNI), i.e. 01-2293-1998 [17,18]. Sweet potato tuber central parenchyma or inner part of the tuber color is the consumers’ preference. Its orange color rich with beta carotene and purple color rich with anthocyanin are preferred more by consumers due their benefits to health [19,20]. The processors have to encourage the farmers more to adopt those preferred varieties for meeting the consumers’ demand.

Sweet potato processing companies and farm business are still profitable such as indicated by B/C ratio > 1. Technically, the farmers are efficient through optimizing agricultural inputs [21,22]. The processing companies’ ROI value on average during the last five years was 30% to 32%. The ROI value was affected by capital cash flow for business operation during one period. Cash flows in the early years were relatively good especially in the sweet potato producing area and the companies’ ROI distribution are relatively stable each year.
Table 1. Cost and income analysis at farm level and processing companies, estimates of Return of Investment (ROI) and Residual Income (RI), 2020

| Item | Value |
|------|-------|
| **A. Farmer’s level (Cost & Income Analysis)** | |
| • Production cost (Rp) | 4,935,144 |
| • Income (Rp) | 10,295,000 |
| • Profit (Rp) | 5,359,856 |
| • B/C Ratio | 1.09 |
| **B. Processors’ level (Cost & Income Analysis)** | |
| • Gross profit (Rp) | 249,744,000 |
| • Operating cost (Rp) | 82,856,000 |
| • Profit before tax (Rp) | 166,888,000 |
| • Tax (Rp) | 20,026,560 |
| • Net profit | 146,861,440 |
| **C. Processors’ level (Balance Analysis)** | |
| • Current asset (Rp) | 120,000,000 |
| • Fixed asset (Rp) | 684,000,000 |
| • Total assets (Rp) | 804,000,000 |
| • Liquid liability (Rp) | 250,000,000 |
| • Capital (Rp) | 515,000,000 |
| • Current year profit (Rp) | 39,000,000 |
| • Total liability (Rp) | 804,000,000 |
| **D. Processors’ level (Range of ROI and RI Analysis); 5 years** | |
| • Profit (Rp) | 166,888,000-202,853,407 |
| • Accumulated Investment (Rp) | 515,000,000-671,000,000 |
| • ROI (%) | 30.23-32.41 |
| • RI (Rp) | 162,715,800-197,782,072 |

Source: primary data

Business profit is the main factor affecting investment. Return level in term of profit in the long run will expand companies’ assets. Improved assets will enhance production capacity, create labor employment, and gear regional economic growth. Product sale improvement is carried through market enhancement and raw material supply escalation from farmers.

4.2. Sweet potato processing and marketing

Farmers’ sale value is calculated through volume of production in their farm land areas multiplied by its farm-gate price. Thus, farmers have to take account marketing aspect in addition to their farm business [23]. Collecting traders purchase sweet potato harvested by farmers and process it into snacks distributed though wholesalers and retailers in some regencies and outside the East Java Province. Some processed products are sold in the tourism areas in East Java. Exported products are those processed and marketed by the companies.

There are three types of marketing conducted by farmers, i.e. (i) the farmers sell directly to the collecting traders who process the sweet potato; (ii) the farmers sell the sweet potato before harvest to collecting traders and processors through tebasan or sold in the field, and (iii) the farmers sell sweet potato to the collecting traders who are also sweet potato processors based on partnership with agricultural inputs credit provided by the traders to the farmers. The partnership is not formally established but it is carried out through good will of both parties. The farmers are willing to establish partnership with the collecting traders in order to deal with unstable selling price.
4.3. Sweet potato partnership

Partnership between farmers and processors is an important part of sweet potato development. Two types of partnerships in Pacet Sub district, Mojokerto Regency, are: (i) partnership between farmers and processors with agricultural input credit provided by processors for farmers’ sweet potato with farm-gate price determined before planting the crop, and (ii) partnership between processors and exporters to adopt export quality standard contrary to the products locally marketed below which are export quality. Thus, processors is the main agent for sweet potato development [24-29] as they play important role in farm business such that they get good quality raw material for enhanced promotion activities of international standard products [30,31] such as depicted in Table 2.

Some issues to take account for improving partnership are: (i) many farmers have not adopted improved varieties for better raw material of the processing companies, (ii) less interest of investors to support farmers to grow sweet potato, and (iii) lack of information on sweet potato as one of healthy foods.

Export opportunity for processed sweet potato is still promising such as shown by one of processor in East Java. The processors is able to export purple sweet potato chip as many as 20 tons and orange chip as many as 5 tons monthly. The raw material required for export is purple and sweet potatoes each of 150 tons and 20 tons monthly. The exporter sells sweet potato to Japan, among others. Those processors in East Java Province are those from South Korea, i.e. PT Korenesia, PT Shinwon International, PT Seed Origin International, and those domestic investors, i.e. PT Gresik Mustika Timur, PT Antaboga Manunggal Karsa, PT Siantar Top Tbk, and Japan’s investor PT Masuya Distra Sentosa.

Table 2. Partnership between farmers, processors, and exporters in East Java Province, 2020

| Actors               | Issue                                                                 | Partnership follow-up                                                                 |
|----------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Local processors     | Farmers’ partnership (Pacet Sub district, Mojokerto Regency)          | • Agreement based on sweet potato variety, continuity, quantity, quality, and price.  |
|                      | Partnership with processors                                          | • Determining planting schedule, harvest schedule, preferred sweet potato variety, farm-gate price, and low-interest rate credit for farmers. |
| Exporters            | Partnership with collecting traders                                   | • Agricultural input credit is intended for better farm practice, e.g. improved variety adoption, balanced fertilizer, pest/disease control, and post-harvest technology. |
|                      |                                                                       | • Equal sharing of marketing, i.e. 50% sold through partners (export to South Korea and retailer partners in Surabaya, Batu, Malang, Mojokerto, and Sidoarjo) and 50% sold by processors themselves. |
|                      |                                                                       | • Improving snack quality from local to international standards such as those sold in Middle East and East Asia. |
|                      |                                                                       | • Establishment of the nucleus and plasm companies selling products of small and medium business. |
|                      |                                                                       | • More access to get raw material supply from the sweet potato producing centres, e.g. Mojokerto, Ngawi, Banyuwangi, Kuningan, and Bogor |

Source: primary data

The exporters deal with a specific issue, i.e. lack of supply of purple sweet potato (Murasaki variety). Farmers are reluctant to grow this variety due to low selling price, i.e. Rp 800/kg, and low yield. The exporters try to establish a growing contract with farmers based on predetermined farm-gate price which is profitable to farmers. In addition, the exporters purchase local varieties and process them to meet export market. Furthermore, investors need easy and quick business permit. Guidance and extension to farmers for applying better farm practice is urgent.
5. Conclusions and policy implications

5.1. Conclusions
Sweet potato agribusiness is promising and the processors’ role is significant for this commodity development at farm level. Main issues for improving sweet potato agribusiness are: (i) expanding sweet potato production with improved varieties preferred by export market and quality, (ii) the farmers are suggested to grow high-yielding varieties, the varieties preferred by consumers, and profitable selling price. Partnership between farmers and processors depends on partnership between processors and exporters. Those partnerships are strategic for farmers’ income improvement.

5.2. Policy implications
Some institutions are essential for developing sweet potato agribusiness. Some actions to take are: (i) Indonesian Agency for Agricultural Research and Development (IAARD) is encouraged to invent sweet potato varieties in accordance with both domestic and international markets; (ii) farmers are supported to grow improved varieties and apply good agricultural practice; (iii) processing companies have to encourage farmers to grow improved varieties using quality seed; (iv) expanding export market to improve farm-gate price and national production during and after Covid-19 pandemic; and (v) Agricultural Service Office at regency and city level pays more attention to secondary crops such as sweet potato.

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