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# Improving Quality of Mango Fruits in North Lombok, Indonesia Through the Improvement of Agribusiness System

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## ABSTRACT

**Background:** Mango is one of the most important horticultural crops in the world, and North Lombok. The quality of mango fruits appears to be one of determining factors in mango business worldwide, demanding mango producers and other related stakeholders to pay attention. This paper aims at describing agribusiness systems of mango in North Lombok, Indonesia and followed by recommending strategies for improving the quality of mango fruits along the way of all agribusiness sub systems from input, farm, processing, marketing and supporting service.

**Methods:** This study took place in North Lombok Regency, the Province of West Nusa Tenggara, Indonesia, during April 2017 to December 2018. Primary data were collected through interviewing respondents of mango growers, traders and key informants of mango agribusiness. These primary data were complemented with data from secondary sources. Data analysis was framed in agribusiness system.

**Result:** The study revealed that there were several weaknesses in each sub-system of agribusiness and weak connections amongst the subsystems. Therefore, there needs improvement in each subsystem of agribusiness to become strong and supports each other. The sub system of supporting services appears to have more determining role than other sub systems in improving the system of agribusiness, further in improving the quality of mango fruits, the performance of the mango business for benefits of the mango entrepreneurs and the economy of the region. Contributions of this study include in knowledge of agribusiness integration for successful program and in economy of the mango entrepreneurs and of the region.


**Key words:** Agribusiness, Mango production, North Lombok, Supply chain.

## INTRODUCTION

Mango is one of the most important horticultural crops in the world, Indonesia, West Nusa Tenggara and North Lombok. In the world, mangoes are important as more than 103 countries grow mangoes for gaining economic benefits (Jahurul *et al*., 2015). Global exports of mangoes together with guavas and mangosteens reached about 2.2 million tons in 2020, with some 90% comprised of mangoes (FAO, 2021). Indonesia is fourth largest mango producer country after China, India and Thailand, yet Indonesia was out of the top ten on the exporting countries (Evans *et al*., 2017). Indonesia exports only little of its mangoes, below 1% of its total production (Qanti *et al*., 2017; Reardon *et al*., 2015) for some reasons, such as lack of quality for meeting international market standard (Hanani *et al*., 2009; Pradipta and Firdaus, 2014). Accordingly, Indonesia should attempt to increase the quality of its mangoes for worldwide marketing. Increasing the quality of mangoes should be done in agribusiness system (Borsellino, 2020; Davis and Goldberg, 1957; Davis, 1956; McGregor, 1997; Ng and Siebertb, 2009). The attempts should start from the application of good inputs, good farming, good harvesting and good delivery to the consumers, as prescribed essence of 'good agricultural practices' (FAO, 2016; MoA of Indonesia, 2022; Zainuri *et al*., 2021).

Mango is important crop in West Nusa Tenggara Barat Province, as playing several roles or makes contributions in several ways. Mango production in this province is high, reached 140 thousand tons in 2020 (BPS NTB, 2022), abundant in the province (Pertanianku, 2019) and contribute as one of mango production centers in Indonesia (Febrinastri, 2019). Mangoes in West Nusa Tenggara took fourth position after East Java, Central Java and West Java (BPS, 2022).

Mango is the most important horticultural crop in North Lombok Regency, Indonesia, for several reasons, including high production, with the production of mangoes of 9.578 tons in 2020 (BPS Lombok Utara, 2021). In this regency mangoes are grown on orchards and house yards. Growing mango on orchards, are run by those who own quite large parcel of land. They are grown mono culturally or multi culturally.

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This paper aims at describing agribusiness systems of mango in North Lombok, Indonesia and followed by recommending strategies for improving the quality of mango fruits in all possible subsystem of mango agribusiness, started from the subsystem of input, then farm, processing, marketing and supporting service. The improved conditions of the agribusiness system of mangoes are expected to help improve the quality of mango fruits to be delivered to mango customers and from this quality improvement it is expected to increase the income of mango entrepreneurs in particular and the economy of the region in general.

## MATERIALS AND METHODS

This study took place in North Lombok Regency, the Province of West Nusa Tenggara, Indonesia. The whole process of study was started in April 2017 through to December 2018, conducted by the first author from the Faculty of Food Technology and Agroindustry and the co-author from the Faculty of Agriculture, the University of Mataram, Indonesia. The main locations for study were selected purposively on the ground of having the most mango trees (and most mango growers) in the regency. The results of this selection were the districts of Gangga and Kayangan. Within each selected district, one village were selected in the same basis of having the most mango trees or growers and led to the villages of Genggelang (in Gangga District) and Gumantar (in Kayangan District).

This study applied qualitative research method (Denzin and Lincoln, 2005; House, 2005; Merriam, 1998; Patton, 2002; Silverman, 2000; Trumbull, 2000), which focuses on understandings of investigated topics and evaluations can be carried to bring meanings for improvement (Patton, 1990, 2002) of the system, *i.e.* agribusiness system.

Samples consisted of 20 farmers, six traders, selected through snow balling method, based on information from one respondent to another. Data were also obtained from eight informants, consisted of two leaders of farmer group, two assemblers, two retailers, one agricultural officer and one academician from the University of Mataram.

The instrument for this study is a semi-structured questionnaire for interviewing respondents and list of topics for in-depth interviewing key informants (Babbie, 2004; Bryman, 2016; Cooper and Schindler, 2003; Zikmund, 2003). Data analysis is framed in agribusiness context (Beierlein *et al.*, 1986; Borsellino, 2020; Cramer *et al.*, 2001; Davis and Goldberg, 1957; Davis, 1956; Ng and Siebertb, 2009), in which in each sub system of mango agribusiness is described as they found. The results of this study are presented in the next section.

## RESULTS AND DISCUSSION

### The sub system of input

Inputs in general in agriculture consist of land, seeds, fertilizers, pesticides, work (Hill and Ray, 1987) and some authors add management (Casavant *et al.*, 1999; Cramer *et al.*, 2001; Sjah, 2010). For a good growth, the inputs such as fertilizers, seeds and water are needed in the right amount and quality. Applications less than the requirements will cause sub optimum growth of the plants (crops) (McArthur and McCord, 2017; Sadras *et al.*, 2016). It is important to pay attention to the quality of inputs for optimum growth of the crops and for improving quality of mango fruits, to be delivered to markets with high price.

Inputs in the production of mango, as in other crops, comprise particularly of seeds, land, workers, fertilizers (Hill and Ray, 1987; McArthur and McCord, 2017; Sadras *et al.*, 2016). After several years of growing mango trees, some growers apply growth regulator or hormone, called Pakclobutrazol (Kulkarni *et al.*, 2006; Purwanto, 2012; Sarker and Rahim, 2018). Some farmers have seen positive result of this application, in the form additional production in out of normal seasons. Some other farmers were reluctant to apply as they are not convinced with additional gains that will be more than the additional cost for the hormone applications.

In particular to the input of seed, mango seeds were obtained through aids of the government (the office of agriculture of North Lombok), or through purchase to commercial seed providers. In the past, the government distributed mango seeds to community, with the government dropped the seeds to the community or the community came to the government offices to pick the seeds up. As the seeds were given in such way, then community did not choose the seeds, rather the seeds were taken as in their availability, in the sense that there was no selection of varieties. The farmers did so, since they got facilitated that way (got the free seeds from the government) and this similar to finding in the adoption of *Moringa oleivera* in the Philippines (Velasco and Canada, 2022). In contrary, community who bought seeds from commercial seed providers, chosen the seeds as they wished, according to their preference and perception on the quality and market of the mango fruits. There was in the past, both ways of mango seeds obtaining, *i.e.* through government aid and individual buying by the individual growers.

The investigation revealed that there are more mango trees of particular variety (*i.e.* Madu) than other mango varieties, such as Harum Manis and Golek. Consequently the production of Madu variety is more than the other varieties. Further consequence of this is that the price of Madu mango becomes low, following price theory that price will be low when supply increases while demand remains constant (Cramer *et al.*, 2001; McIver, 2001; Penson *et al.*, 2015; Seitz *et al.*, 2002; Sjah, 2010). The growers do not get good prices from Madu mango fruits, despite they were still profiting. The varieties of Harum Manis and Golek, on the other hand, get good prices almost all the time. Apart from low production (or supply), the fruits of Harum Manis and Golek have better quality than other mango fruits and this better quality improves the product price (Cramer *et al.*, 2001; McIver, 2001; Penson *et al.*, 2015; Seitz *et al.*, 2002; Sjah, 2010).

The particular quality of the fruits of Harum Manis and Golek are that they are big (so have much meat), in oval form, tasty or sweet (Femina, 2021; Sendari, 2019). Learning from this, there should be selection of varieties, in particular to markets, whom are willing to pay for good price in return for their satisfactions to the products (Fotiadis *et al*., 2022; Kotler *et al*., 2020; Nijssen, 2022; Vanslembrouck *et al*., 2002; Womack and Jones, 2003). The selection of variety is one of determinants of quality of products for the chance of gaining good price of the products and high income for the entrepreneurs of the products. The importance of variety in mango production is similar to the importance of crop selection in Bangladesh (Islam *et al*., 2021), East Lombok, Indonesia (Sjah, 2000a; Sjah *et al*., 2006c), North Lombok, Indonesia (Zainuri *et al*., 2017b), Sudan (Briggs, 1985) and Altiplano (Gladwin, 1980; 1983; 1989).

**The sub system of farm**

Mango trees are mostly grown on people house yards and are on orchards; with both places have their own justifications. Growing mango trees in house yards are done for easy maintenances, *e.g.* easy watering, such as by channeling waste water to the mango trees. Additional reason is for having shades in the house, similar to the reason in the case of perennial crop selection in East Lombok (Sjah, 2000a,b,c; Sjah *et al*., 2002).

Reasons for growing mangoes on orchards are related to the ease of management implementation. For example, plantation on orchards tends to be in mono cropping system. This system makes easy to do maintenance to the crops, such as watering, fertilizer applications, spraying pesticides, pruning and harvesting.

**The sub system of processing**

Nearly all of harvested mango fruits are sold in fresh, without further processing. Without processing, then mango fruits lost its chances to gain better values; they lost their added values. The additional values obtained from processing sourced from the higher values of products caused by the products new form, place and time, for matching with consumer wants (Fotiadis *et al*., 2022; Kotler and Armstrong, 2011; Kotler *et al*., 2020; Nijssen, 2022; Stanton *et al*., 2000).

**The sub system of marketing**

The products are sold immediately fresh at the farm gates (orchards or house yards). This selling is purposively done for better quality and lack of producer capital. The finding of immediate capital need was similar to the findings in other farmers of food crops in Lombok that farmers seek help from credit providers to run their farming business (Sjah *et al*., 2006a, b; Sjah *et al*., 2006d). However, credit provision should be implemented in accurate way both in its delivery and in repayment (Sjah *et al*., 2006b).

**The sub system of supporting service**

The system of agribusiness requires all sub systems to work in integrated way for gaining high impact of the system. One of the important sub systems in agribusiness to make the system work better is the sub system of supporting service. This sub system supports other sub systems of input, farm, processing and marketing (AHRDB, 2001; Borsellino, 2020; Davis and Goldberg, 1957; McGregor, 1997; Ng and Siebertb, 2009).

In the sub system of input, there needs support in finding quality seeds of mango and seeds of more demanded mango fruits. This is followed by handling the sub system of farm, to practice better farming than the current practices, include fertilizer application in particular and maintenances of crop, such as watering and pruning the mango trees. The applications are believed to increase production in quantity as well as in quality (Liliane and Charles, 2020; Nuno and Baker, 2021; Sadras *et al*., 2016).

In the sub system of processing is clearly about doing the processing itself, given that there were no processing activities. The most necessary part of mango fruits to be processed into valuable products, such as mango fruit sweet, juice, crisp and others (Zainuri *et al*., 2017a; Zainuri and Sjah, 2020). Finally, support need to be allocated to the sub system of marketing, in the kinds of provision of market information several points to increase marketing values.

**Contributions of the study**

Contributions of this study include contributions in body of knowledge, economics of mango entrepreneurs and economic of the region. The knowledge contribution is in profit seeking that must be in integrative way and be led by the quality of product, as proven successful in mango for export in Pakistan (Mmemon *et al*., 2015) and in milk in India (Rapankum *et al*., 2022).

Since the parties involved in the agribusiness of mangoes get profits, some portions of these benefits are transferred to the regional government. The region benefits financially from tax payment and Company Social Responsibility (CSR) funds (Križanová and Gajanová, 2016; Qothrunnada, 2022; Sheehy, 2015), with further positive impacts of government spending to the people and the region. In brief, successful mango agribusinesses contribute to the region and its people. The benefit received by the government is still added by the fact that the agribusiness of mangoes absorb workforce and as a result agribusiness of mango helps the government in reducing unemployment in the region.

## CONCLUSION

There were several weaknesses in each sub system of agribusiness and weak connections amongst the agribusiness subsystems of input, farm, processing, marketing and supporting service. To improve the conditions of agribusiness and to have its high positive impact for the business itself and for the external of the business, the weaknesses should be overcome, such that each subsystem of agribusiness becomes strong and supports each other. The subsystem of supporting services appears to have more determining role than other subsystems in improving the

system of agribusiness, further in improving the quality of mango fruits, the performance of the mango business for benefits of the mango entrepreneurs and the economy of the region. Contributions of this study include in knowledge of agribusiness integration for successful program and in economy of the mango entrepreneurs and of the region.

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