Barrier to entry and feasibility of community based corn seed agribusiness: study case in Sigi Regency Central Sulawesi

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Abstract. The availability of corn seed at the farm level with reachable price plays an important role in the productivity of corn farming. However the sustainability of this agribusiness mostly depends on how its marketing exists. This paper investigates barriers to entry and feasibility in based community seed corn agribusiness to get sustainable business. The study used a survey to 20 member of based community corn seed breeder and the evaluation of other breeder groups under the supervision of the Field School Seed Independent Program hat have been carried out in the period of 2015 to 2018. The study also has survey in market structure of seed corn in Central Sulawesi especially Sigi District. The data were descriptively analysed. The result shows that corn seed agribusiness was feasible with Benefit Cost Ratio 1.06 in partnership system. While an assessment identifies some activities with negligible entry barriers, a notable cost of entry is associated with most activities including promotion cost. Other concern barriers are economies of scale, distribution network, high competitive market with incumbent producer based on quality product, differentiation product, and promotion systems. Based on direct superior seed distribution or BLBU procurement policy, market opportunities especially for Research and Development hybrid corn varieties are still promising considering there is 26% gap between corn seed production and demand in Sigi Regency and wider in Central Sulawesi.

1. Introduction

Corn have an important role as the main ingredient for food and animal feed industry. Demand for corn until today continues to increase as directly proportional to population growth thus a result of increased food needs and consumption of animal protein. One significant factor to raise corn production and food security was the availability of corn seed especially hybrid corn seed [1,2,3]. However, the price of hybrid corn seeds tended to increase over time due to the relatively oligopolistic nature of the market at the producers’ level [4,5].

Generally, Indonesia is considered a competitive seed production hub. The government encourages sharing knowledge about the latest seed technology through partnerships, while encouraging trade agreements to cover transfer of technology in agriculture through business practices [6]. However, in the global market, the government could not intervene in the industry because it does not provide subsidy to the multinational companies. The hybrid corn seed industry tends to become oligopolistic due to the ability of the multinational firms to control the technology and massive marketing which deterring the entry of new firms. Leading firms can adjust their respective behavior, creating an informal control over the market [7,8,9]. Furthermore, [10] stated that measurement of industry
concentration in innovation and product market could help monitor changes in market concentration and detect anti-competitives practices. It affects to the price of corn seed in the market.

The availability of corn seed at the farm level with reachable price plays an important role in the productivity of corn farming. Initially, the government supported based community corn seed agribusiness was to provide quality seed with reachable price at the farm level. These small-scale industries have potency to be developed in order to improved farmer income. However, the sustainability of this agribusiness mostly depends on how its marketing exists. Market opportunities, especially for hybrid corn varieties, are still promising considering that there is a wide gap between corn seed production and demand especially in domestic market of Central Sulawesi. Information of barrier to entry and feasibility would be very useful in identifying the challenges of based community corn seed agribusiness in corn seed industry in Central Sulawesi. However it still faces many challenges as barrier to entry in wider market and due to highly market competition. Information of barrier to entry and its feasibility would be very useful in identifying the challenges of based community corn seed agribusiness in corn seed industry in Central Sulawesi.

2. Methodology

Primary data were gathered from the corn seed based community agribusiness and corn seed distributors through interview in Sigi District Central Sulawesi, Year 2019. Data gathered from the based community corn seed agribusiness groups included the following information: capital investment, volume of corn seed production by variety and season, technology used in corn seed production, area planted to corn for seed production purposes, production practices, and brand names of seeds sold, input output of seed production, and marketing chains. Primary data were also gathered from farmers as corn seed consumer while secondary data were taken from the related institutions and publications. Data were descriptively analysed using BC ratio, graph, and tabulation. The study is part of Field School of Seed Independent and National Agriculture Region Program; programs in Assessment Institute of Agricultural Technology Central Sulawesi in year 2019.

3. Results and Discussion

3.1. Market Knowledge

The corn seed market knowledge was assessed. Market information included the types and varieties of corn seeds preferred by corn farmers and potential seed requirement by region. Their sources of market information were also identified in this study and accessing market information was determined. The study found out that R and D varieties such as Nasa 29, HJ 21 still not widely distributed in market. It was distributed by government programs. Farmers were still not familiar yet in market. These showed that the based community producer may face a stiff competition in the market.

A research need to be done to know the preference the consumer opinion about product. Producer should providing information about consumers’ opinions or complaints on their product lines, based on informal reports from the traders or consumers. To some extent, this information was one-sided as they only described the farmers’ views on the corn seed products sold in the market. A bigger company employed various information campaign strategies in order to reach a greater number of consumers, which include field demonstration and trials for their corn seeds. This function was performed by the field extension workers who coordinate with the agricultural service offices at the regency and provincial levels to put up demonstration plots. Assessment Institute of Agricultural Technology (BPTP) facilitated a demonstration plot that could be as one market strategies of R and D varieties. On the other hand, the representatives of based community groups should regularly attended meetings sponsored by government and non-government organizations, to participate in strategy or to discuss recent developments in corn production.
Producer were expected to be proactive and to attend meeting on developments in the domestic corn agribusiness sector. The producer also connected with officials who could influence the government’s procurement of corn seeds besides of farmers’ preference. Most of the corn seeds produced by the community based seed corn producer are sold to government projects. Thus, the producer does not have field extension workers or salespersons to gather consumers’ preference on its products then farmers could not complain directly to the seed producer. Similarly, other producers used their contracts with government.

Market research was likewise conducted to assess consumers’ preferences on corn seed products. It gathered information on specific characteristics of corn seed preferred by consumers and the weaknesses of the product. Figure 1 shown the preference of farmer to R and D varieties.

![Figure 1](scatterplot.png)

**Figure 1. Scatterplot Importance and Preference to R and D hybrid varieties, 2019**

Noted: (1) productivity, (2) Plant diseases resistance, (3) seed vigority, (4) harvesting age (5) size of corn cob (6) number of cob, (7) size of seed (8) color of seed (9) plant’s height (10) Seed availability (11) Price of seed

Quadrant I shown the availability seed in the market need to be improved. Other characteristic that getting less preference is the size of cob which smaller than the competitor product. In Quadrant II, consumer have preference on the resistance of varieties in some important diseases and high number of cob which resulting in production. Quadrant III shown that the plant height was proportional plus marketable of colour seed, while Quadrant IV shown that consumer like the age of harvesting which around 100 days.

There is a policy direct program for superior seed that 60 percent should be R and D varieties. It could be fulfilled by based community corn seed agribusiness. The potential seed requirement in Sigi District were shown in Picture 2. From these graph we can concluded that based on direct superior seed distribution or BLBU procurement policy, market opportunities especially for Research and Development hybrid corn varieties are still promising considering there is 26% gap between corn seed production and demand in Sigi Regency and wider in Central Sulawesi. Information on the market demand was acquired by lobbying with the Agricultural Service officials either at the provincial or regency levels. Producers were proactive in pursuing purchase orders either directly from the buyers or indirectly through brokers or middleman.
Local producers used the previous season’s sale to estimate their sales volume for the next season. For example, government projects for the planting of corn on irrigated farmlands were usually implemented during the dry season and the same projects for dry land are carried out on wet seasons. Seed producers maintained good relationships with corn seed distributors as an important way to distribute their production. All corn seed traders tried to sell corn varieties based on the level of demand they deduced from the market.

Several factors that affected demand were used as bases for demand assessment by retailers. The traders also observed the corn varieties that are extensively grown in the corn growing areas. Another method employed was gathering information from other corn seed traders and from the seed companies. As a matter of policy, the seed companies do not provide information directly to the traders but through their sales people or middle-man. It was observed that no single variety could perform well in all regencies or sub regencies due to differences in agro-ecosystem. Thus, a popular variety in a particular area might not be as favourably accepted in the other areas. Information from government institutions like the Agricultural Services, was rarely available except to the traders who directly supplied them the corn seed for government projects. The farmers had the freedom to choose the variety of corn that they desired. Recommendations from government agencies did not specifically endorse any particular brand of corn seed. However, government projects to promote seed industry and delivery innovation (Spielman and Kennedy, 2016) such as new variety to farmer and extension services.

3.2. Barriers to Entry

Market structure of the corn seed industry has some main elements, namely: (1) degree of buyer and seller concentration; (2) degree of product differentiation; (3) barriers to entry; and (4) market knowledge. Market structure determines the behavior of a firm in the industry [11]. Except the role government in providing corn seed in its programs, the availability corn seed in the market are dominated by four big enterprises namely: Bisi, Dupont Pioneer, Sygenta. Those products where distributed by wholesalers which spread in corn production centre in Central Sulawesi.

One of market structure is barrier to entry market. Market entry is the addition of one or more new sellers to a market while barriers against entry are situations that make entry difficult. There are two sources of barriers, i.e., exogenous and endogenous sources. Exogenous resources are found in the underlying market, such as capital requirements, economies of scale, product differentiation, sunk
costs, vertical integration, and formal official barriers set by government agencies. Endogenous sources are conditions and strategies implemented by the dominant firms and may be voluntarily done, which consist of retaliation and pre-emptive actions, excess capacity, marketing expenses, market segmentation, legal barriers such as patents, controls over strategic resources, and secrecy [11, 12]. Barriers to entry at the seed companies and the distributors or traders level were examined in this study. Barriers to entry in the corn seed industry covered the following aspects: (1) economies of scale; (2) marketing cost, (3) infrastructural aspect, (4) technology. The small-scale industries still face many barriers as shown in figure of barrier to entry in Figure 3.

**Figure 3.** Barrier to entry community based corn seed agribusiness in Central Sulawesi, 2019

There were many factors that affected their economies of scale. Among these were the volume of sales, total marketing cost, volume of production. Multinational firms produced mainly their own hybrid varieties, while the based community products who produced the R and D hybrid and composite varieties. Average production costs of multinational companies were greater than the based community producer. However the average yield obtained by based community producer is lower that make higher average cost higher. The hybrid corn seed varieties sold by the multinational firms commanded a higher selling price due to its better quality particularly in terms of crop yields.

Economies of scale occur when increased output leads to lower average costs. Therefore new firms, with relatively low output, will find it difficult to compete because theirs average costs will be higher than the incumbent firms benefiting from economies of scale. A firm producing at Q1 has lower average costs. If a new firm enters and produces Q2, its average costs will make it uncompetitive. It shows in Figure 4.
3.3. Product differentiation technology

The degree of product differentiation would determine if the buyers differentiate, distinguish, or have specific preferences among the competing outputs of the various sellers established in an industry. In the corn seed industry, corn seeds can be differentiated in terms of varying characteristics of different corn varieties, brands, and packaging. Technology such as biotechnology as one of way to longer the lifecycle of products [13]. Product differentiation as a barrier can be observed in advertising and other seller activities which aim at intensifying the difference between a firm’s product and the products of the competitors. At the seed growers’/seed companies’ level, product differentiation was assessed in terms of variety and genetic technology used (e.g., hybrid or composite) [11, 14].

Based community seed producer differentiated corn seed through differences in varieties. On the other hand, the consumers differentiated corn seeds the through labels and packaging. Modern facilities owned by the multinational company, such as laboratories, differentiate their corn seed varieties not only physically but also genetically. On the other hand, the consumers usually distinguished corn seed through seed label and packaging. Furthermore, the farmers differentiated corn seed through the actual performance based on its productivity and resistance to pest and disease. Consumers distinguish corn seed using visible characteristics like the length of grain, labels and packaging. The producers had capability to distinguish corn seed by type of variety and the genetic technology used because of his long experience in producing corn seed. In general, wholesaler-retailers differentiated corn seed products based on their varieties through various indicators. The prominent indicators included the seed type, product packaging, label, and seed weight. The retailers distinguished corn seeds based on the packaging, seed type, and label. The based community corn seed producer work in partnership who has responsibility for the technology in product packaging.

3.4. Capital and marketing cost

The capital requirement was a major barrier to entry to the corn seed business. Higher capital was needed to purchase more volume of sales and lower their average marketing cost per kg. Some of the retailers were selling corn seed commodities along with other agricultural inputs. Some retailers marketed their corn seeds and agricultural inputs to government projects by lobbying with its officials. This method of sales was less profitable than selling directly to common buyers due to relatively higher transaction costs and delayed payments. Other barriers in small-scale business included the ability of the firm to conduct market research, to recruit capable technician for breeding, and capable manager who handle the business [15].
3.5. **Loyalty to established brand**
As in most markets, barriers existed for new investors intending to sell commercial corn seed. The biggest being the high amount of capital required to start the business. Start-up business needs investment for the marketing costs and seed purchase. While the growing demand for commercial corn seed will attract many new entrants, the stiff competition in the market and the additional number of sellers would decline profits over time. The incoming entrants could less competitive from some established traders. Due to the high cost including number of sellers who would change for the loyalty of consumers, it would not be easy for new traders to convince consumers to shift their preferences brand. Positioning brand in hybrid varieties would take time therefore based community corn seed producer prefer to market their product based on the government projects. The new brand may faster connected by seed networking of farmer and extension [16].

3.6. **Infrastructural aspects**
The large capital investment becomes the main barrier in the corn seed industry. Investments included experiment stations, seed processing plants, and marketing cost. Based community corn seed producer get parent seed from Indonesian Cereal Research Institute (ICERI) Maros. These mean that experiment stations no more covered the experiment stations. The main constraint encountered enter the corn seed business are the cash for the purchase of variable inputs or for its fixed assets such as vehicles, warehouses and processing facilities. Technology and experience in seed processing were other constraints. Knowledge is acquired over time from its experiences which included trials and errors. The powers of the central government to local government and fragmented the solid market for government purchases of seed corn as the projects had to be financed by the local governments. Unfortunately sometimes, the financial capabilities of the local governments were relatively weaker compared to that of central government and caused the delayed of payment. The continuing demand for corn seed serves as the main barrier to exit from this industry and indicated that the producer was still able to earn profits from producing corn seed.

3.7. **Feasibility of based community corn seed agribusiness**
The feasibility of community based corn seed production need to be known as one of considerations for joining this agribusiness. It will be a consideration whether the business will be economically feasible or give profit to farmers. By [16] formula, the result showed that corn seed production was feasible or profitable to do.

| Table 1. The feasibility of corn seed agribusiness in Sigi Central Sulawesi, 2019 |
|-----------------------------|-------------------|
| **Items**               | **Total (IDR)**   |
| Fixed Cost               | 2.000.000         |
| Seed                    | 3.000.000         |
| Fertilizer              | 1.213.000         |
| Herbicide               | 1.280.000         |
| Pesticide               | 480.000           |
| Fungicide               | 150.000           |
| Labour                  | 6.900.000         |
| Total Cost              | 12.023.000        |
| Revenue                 | 24.750.000        |
| Benefit                 | 12.727.000        |
| Benefit Cost Ratio      | 1,06              |
| Revenue Cost Ratio      | 2,06              |
From Table 1, we can conclude that corn seed agribusiness is feasible or profitable in case partnership system. Some items such as seed were covered by the partner. Seed is the second highest cost where one hectare the need Rp. 3,000,000. The highest cost was for labor where in seed production they includes roughing and detasseling, plus post-harvest for seed. However the based community will need a higher cost in non-partnership system but will increase the share due to the shorter marketing chain. Here the roles of government are needed to give access in capital investment. These similar to [18] that the lack of access to credit constitutes a significant barrier to entry. Until governments and development partners make credit available to seed entrepreneurs directly or through risk sharing arrangements with commercial banks, national seed companies will not grow leaving the seed sector monopolized by the regional and multinational seed companies

4. Conclusion
Based community corn seed agribusiness was feasible with Benefit Cost Ratio 1.06 in partnership system. However, it concern barriers namely economies of scale, marketing cost including distribution network and promotion systems, highly competitive market with incumbent producer based on brand loyalty and quality product or technology, and infrastructural aspects. Based on BLBU procurement policy, market opportunities especially for Research and Development hybrid corn varieties are still promising considering there is 26% gap between corn seed production and demand in Sigi Regency and wider in Central Sulawesi. The local companies cannot cope up with the competition from the multinational companies due to lack of budget, innovations especially in research and development, and marketing systems. The government has to encourage these community based corn seed to be independent and sustainable by giving policy to reduce the barrier to entry. It also improved varieties of corn more affordable to the farmers. Thus, it will encourage the farmers to adopt improved varieties of corn.

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