

Challenges and opportunities for the development of national hybrid seed production in the agribusiness perspective in Indonesia

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Abstract. The development of national hybrid corn seed production is faced by two factors that interplay namely; challenges and opportunities. In an agribusiness perspective, overcoming challenges means creating opportunities. The more challenges that are overcome the more opportunities available. Many factors are challenges and obstacles, and many factors are opportunities that can motivate the development of national hybrid corn seeds. The research was conducted in four provinces; in South Sulawesi for 3 years, in Central Sulawesi for 4 years, in Southeast Sulawesi for 3 years, and NTB for 4 years. Five variables i.e. the cohesiveness of farmer groups applying SOP for seed production, institutional support, marketing support, government policy support, and farming profits were considered in the study. The results showed that the most serious challenge faced in developing hybrid corn seed production was marketing. In Central Sulawesi, which has better marketing institutions, breeding corn seeds is more developed than other regions. Profits range from 15 million to 17 million rupiah per hectare. Conversely in NTB and Southeast Sulawesi, marketing is not smooth so breeding does not develop. In NTB, from 2015 to 2017 marketing is carried out within groups and outside groups at a price of Rp.25,000/kg. Likewise in Southeast Sulawesi, the regional government did not provide marketing guarantees so farmers sought their own and had difficulty finding markets because of the emergence of assisted seeds in the region. Captive breeding area in NTB in 2015 was 1.0 ha increased to 3 ha in the second year, increased to 5 ha in the third year turned to 1 ha in the fourth year. Then the factor as the strong motivator was the establishment of a national corn seed use policy which provides a quota portion of 40% of the need for assisted seeds. This policy motivates all parties concerned to coordinate, both internally coordinating each agency, and externally so that the quota set by the government can be properly fulfilled.

1. Introduction

One item contained in President Jokowi-JK's Nawa Cita for the 2015-2019 period is to move the domestic economic sectors in which are listed national foods sovereignty [1]. The Ministry of Agriculture of the Republic of Indonesia responded to the food sovereignty program by establishing various programs including: a sustainable corn self-sufficiency program [2], a seed subsidy program that had an impact on area expansion and increased farmer income [3]. Sustainable corn self-sufficiency must be supported by a seed supply system that involves relevant parties, so that it can produce quality seeds and can be easily accessed by farmers [4,5].



Based on the facts in the field, several institutions related to the supply of national maize seed include: Provincial and District/City Agriculture Services as a determinant of Candidate Farmer and Candidate Location (CFCL). Regional Research Institute (IATA) as a source of technology and companion to the application of technology, a regional Agency as a companion to production technology and as bridge in formation from farmers to other farmers, Seed Distributors whose function is to bridge production from farmer groups to user farmers, and Farmer Groups as producers that are fostered to produce quality seeds. These functions have not been implemented as expected in the concept of the corn seed independent village program [6];[7];[8].

The supply of corn seeds in Indonesia is still dominated by multinational corn seed companies, including Monsanto, Syngenta, BISI, Pioneer [9], while national corn seed products receive less attention [6], even though the quality of national corn seeds if produced well, able to match multinational corn seeds, it's just lost in the marketing process. This is one of the challenges that is not easy in the effort to develop a national hybrid corn seed system [10, 7].

Recognizing this code of conduct, in the middle of 2017 the Ministry of Agriculture received pressure from the Central Parliament, to use national corn seed with a portion of 40% of the total seed-assisted amount distributed by the government. This is a great opportunity for R&D partners to work [11, 12]. The planting area of maize in Indonesia is around 3 million ha, some of which can be planted twice corn [13]. The planting area is still increasing with the proposed increase in planting area of 4 million ha of corn in 2018 with a trillion rupiah budget [9]. According to [13], the actual potential planting area is around 38.58 million ha, with details of existing 8.11 million ha, 11.3 million ha of land that can be integrated with plantation crops, 3.5 million ha of coconut stands, 11,68 million ha of untapped land, 2.19 million ha of grazing land, and 1.8 million ha of Perhutani land. It shows that, the demand for corn seeds is very large and this is a very big opportunity for the development of a national hybrid corn seed production system. This paper aims to determine the challenges, potential and opportunities for developing national hybrid corn seed production to expand the use of national hybrid corn seeds.

2. Methodology

2.1 Determination of Research Location and Time

The study was conducted in four provinces, namely: 1. South Sulawesi which began in 2016, 2. Central Sulawesi started in 2015, 3. Southeast Sulawesi began in 2015, and West Nusa Tenggara began in 2015. The determination of the location is based on the location of the development of a corn seed independent village by the Agricultural Research and Development Agency [8].

2.2 Variables and Observations

To determine the challenges and opportunities for developing national hybrid corn seed production by fostered growers, 5 variables were observed, namely: (1) cohesiveness of fostered farmer groups in applying hybrid corn seed production technology based on Standard Operating Procedures (SOP), (2) institutional support, (3) marketing support, (4) government policy support, and (5) captive farming income. Observations were carried out through the assistance activities of the application of hybrid corn seed production technology using question keys. Variables scored by 1-5, score 1 means very incompatible and 5 is very appropriate.

2.2.1 Stickiness of Farmer Groups Variable. The stickiness of farmer groups in implementing SOP is assessed in 5 activities that determine the quality of seeds, namely: (1) togetherness of planting, (2) accuracy of roguing, (3) accuracy of detachment, (4) accuracy of harvesting and processing, and (5) together in marketing.

i. Planting togetherness is given a score as follows:

score= 1 if planting is carried out on time by 20% of members,

score= 2 if timely planting is carried out by 40% of members,
 score= 3 if planting is carried out by 60% of members,
 score= 4 if planting is on time by 80% of members,
 score= 5 if planting is carried out on time by 100% of members;

ii. The accuracy of the selection (roguing), given a score as follows:

score= 1 if roguing is done on time by 20% of members
 score= 2 if roguing is done on time by 40% of members
 score= 3 if roguing is done on time by 60% of members
 score= 4 if roguing is done on time by 80% of members
 score= 5 if roguing is done on time by 100% of members.

iii. The accuracy of detachment is scored as follows:

score= 1 if the detelling is done on time by 20% of members
 score= 2 if the detelling is done on time by 40% of the members
 score= 3 if 60% of the detachments are made on time
 a score= 4 if the detelling is done on time by 80% of the members
 a score = 5 if 100% of the detachments are made on time.

iv. The accuracy of harvesting and processing is given a score as follows:

score= 1 if roguing is done on time by 20% of members
 score= 2 if roguing is done on time by 40% of members
 score= 3 if roguing is done on time by 60% of members
 score= 4 if roguing is done on time by 80% of members
 score= 5 if roguing is done on time by 100% of members.

v. Togetherness in marketing is scored as follows:

score= 1 if 20% of members sell through groups
 score= 2 if 40% of members sell through groups
 score= 3 if 60% of members sell through groups
 score= 4 if 80% of members sell through groups
 score = 5 if 100% of members sell through the group.

2.2.2 Institutional Variable. The role of the institutional variable is assessed by observing the activities of institutions related to seed production, namely; farmer groups, Institute for Agricultural Technology Assessment (IATA), Agricultural Extension Center, Agriculture Office, and village/urban/sub-district governments.

i. Farmers Group. The activeness of farmer groups supporting the breeding activities of corn seeds is assessed by observing activities in caring for member who produce seeds and given a score of 1-5 with the following criteria

score = 1 if the group does not take care of its members
 score = 2 if the group only takes care of the source seed
 score = 3 if the group takes care of seeds, fertilizer and other facilities
 score= 4 if the group manages the facilities, post-harvest
 score = 5 if the group manages the facilities, post-harvest, and seeks a market.

ii. Institute for Agricultural Technology Assessment (IATA). IATA activities related to the seed independent program are assessed and scored as follows:

score = 1 if researchers and extension workers are involved in production planning.
 score= 2 if researchers and instructors conduct production and post-harvest technology training
 score= 3 if the researcher and the counselor provide assistance in the field

score = 4 if the researcher and instructor coordinates the marketing of seeds
 score = 5 if researchers and extension assist in the development of production and marketing

iii. Extension Center. The Agricultural Extension Center (BPP) or the Agricultural Extension Center for Animal Husbandry and Forestry (BP3K) is a counseling agency domiciled in each district. Its sactivity in seed breeding is assessed by observing it sactivities related to seed production and is given a score as follows:

score = 1 if the instructor does not know the existence of captivity
 score= 2 if the extension agent knows where it is but does not accompany
 score= 3 if the counselor provides assistance in the production aspect
 score = 4 if the counselor gives a hint of production and post-harvest technology
 score = 5 if conducts production, post-harvest assistance, and coordinates marketing.

iv. District/Provincial Agriculture Service. The Department of Agriculture, both at the district and provincial level, will determine the sustainability of corn seed breeding. They regulate the procurement of corn seeds every year, both funds sourced from the State Budget (APBN) and Local Budget (APBD). Its role in developing hybrid corn seed production is scored as follows:

score= 1 if distributing national corn seeds 10% of the quota
 score= 2 if distributing national corn seeds 40% of the quota
 score= 3 if distributing national corn seeds 60% of the quota
 score= 4 if distributing national corn seeds 80% of the quota
 score= 5 if distributing national corn seeds 100% of the quota.

v. Village/District Government

The village /sub-district government has an important role in motivating the community to carry out economic activities. Hybrid corn seed production activities are potential economic activities to develop in rural areas, because seeds are needed in large quantities and are sustainable. The attention of the village government is assessed and scored as follows:

score= 1 if the village government is not aware of corn seed production activities
 score= 2 if the village government knows but does not motivate breeders to breed properly
 score= 3 if the village government monitors the procurement of in puts needed
 score= 4 if the village government fights for the marketing of seeds produced by breeders
 score= 5 if the village government tries to develop a large scale breeding.

2.2.3 Marketing Variable. Marketing guarantees are marked by the presence of parties who can guarantee their marketing, the price of an agreement that benefits both parties, and the existence of a safeshelter. All these elements were observed and scored as follows:

i. Distributor Availability. The role of the distributor as price guarantor is observed for its existence and is given a score as follows

score= 1 if the distributor is located outside the province
 score= 2 if the distributor is located inside the province
 score= 3 if the distributor is inside the province but does not have adequate processing facilities
 score= 4 if the distributor is in the province and has processing facilities
 score= 5 if the distributor is inside the province and has processing and quality control personnel

ii. There is an agreement price. One factor motivates choosing a business is the selling price.

score= 1 if there is no price guarantee
 score= 2 if there is a guarantee but the farmers are not satisfied
 score= 3 if there is a guarantee and the farmer is satisfied
 score= 4 if there is a guarantee, the farmer is satisfied, and the payment is paid in installments
 score= 5 if there is a guarantee, the farmer is satisfied, and the payment is in cash

iii. Transaction Location. The location of the transaction is also often considered by the farmers.

Transaction locations are scored as follows:

- score= 1 if the location is uncertain
- score= 2 if the location is uncertain and farther
- score= 3 if the location is uncertain, rather close (5 km)
- score= 4 if the location is uncertain and close (<5 km)
- score= 5 if the location is uncertain and is in the village

iv. Time of Payment. The time of payment also determines the motivation of farmers, the faster the payment the more favored by farmers. When payment is scored as follows:

- score= 1 if paid > 4 months later
- score= 2 if paid 3 to 4 months later
- score= 3 if paid 2 to <3 months later
- score= 4 if paid 1 to <2 months later
- score= 5 if paid <1 month

2.2.4 Policy Variable. Policy variables are assessed by observing the existence of policies related to the development of hybrid corn seed production. Three indicators are observed and scored, namely: Desire to use national seeds, Verifying distributors, and facilitating infrastructure

1. The desire to use national seeds

- score= 1 if complaining and rejecting the national VUB cycle
- score= 2 if complaining and giving suggestions for improvement
- score= 3 if interested in using
- score= 4 if you have tried to find a national product
- score= 5 if prioritizing national products

2. Manage and select distributors

- score= 1 if you don't know distribution
- score= 2 if there is no internal coordination regarding distributor selection
- score= 3 if there is an internal agreement eligible to become a partner
- score= 4 if selecting distributor capabilities
- score= 5 if evaluating distributor performance.

3. Facilitating facilities and infrastructure

- score = 1 if there is no seeding assistance plan
- score= 2 if there is no aid for seeding infrastructure
- score = 3 if there is seedling infrastructure help
- score= 4 if there is assistance in infrastructure
- score = 5 if there is help in infrastructure and processing

2.2.5 Revenue Variable. To calculate income, observations are made of the use of production facilities and the prices paid by farmers, the use of labor and wages paid by farmers, and the production obtained, both those that qualify for seeds according to the agreed price, and those that do not qualify for seeds are valued according to the price of corn.

2.3. Data Analysis

This study uses two analysis techniques namely: qualitative and quantitative analysis. Qualitative analysis is carried out on qualitative data relating to the development of hybrid corn seed production which is directed to provide qualitative answers, ranging from assessing strongly disagree and disagreeing to development, to strongly agreeing and hoping to be developed widely. The observed

variables are given a score/scorebased on a LikertScale [14], namely: 1 to 5 with the meaning of answers of each variable.

According to [15], the Likert scale is a scale that can show responses to a new innovation that was introduced. The answer to each variable in question has a gradation from very negative to very positive and can be in the form of words. Concentration of the mean value (mean) is calculated using the Sturges formula [16] as follows:

$$Z = \frac{X - Y}{K}; \text{ Note: } Z = \text{class interval}$$

$X = \text{Highest value}$
 $Y = \text{Lowest value}$
 $K = \text{Number of classes.}$

Based on the formula, the average value (Z) = 0.8 is obtained and then used as an interval in classifying respondents' assessments into five levels as follows:

- 1,00 - 1,80 = Strongly disagree/very dislike.
- 1.81 - 2.60 = Disagree/dislike
- 2.61 - 3.40 = Neutral, enough, somewhat agree/neutral, enough, rather like
- 3.41 - 4.20 = Agree/Like
- 4,21 - 5,00 = Strongly agree/Really like

The basis of the assessment is the variable in dominant varieties (current superior varieties). The greater the score, the better the score means that it has an opportunity to be basically developed.

Then to find out the economic superiority, an analysis of farming income is done by collecting input and output data. Inputs in the form of production facilities used are valued based on prices prevailing at the study site, out pouring of labor in managing the hybrid corn seed production farm, paid based on work paid at local applicable rates. Then the yield value is calculated based on the selling price received by farmers in place. The collected data is tabulated and calculated with an analysis of costs and revenues using the formula [17]. Economic has beneficial if the R/C ratio is greater than 1 [18].

$$1. \text{ Profit } (\pi) \pi = \sum_{i=1}^n Y * PY - VC \qquad 2. \text{ R/C ratio} = \frac{(Y \times PY)}{VC}$$

Note:

- π = Profit
- Y = Yield
- PY = Price Yield
- VC = Variable Cost
- R/C = Return Cost Ratio (Acceptance of total costs)

3. Results and Discussion

3.1 Grower Identity

Cultivators established since 2015 by the Indonesian Agency for Agricultural Research and Development are located in 7 provinces, but only 4 provinces produce hybrid corn seeds; namely: South Sulawesi, Central Sulawesi, Southeast Sulawesi and NTB. The identities of breeders and the development of breeding areas in 4 provinces are listed in Table 1.

Table 1. Identity of fostered growers in 4 provisions in Indonesia, 2019

Description	Provinces ¹⁾			
	A	B	C	D
District	Bantaeng	Sigi	Konsel	Sumbawa
Sub District	Gatarengkeke	Palolo	Lainea	Utan
Name of Farmer Group	Maju Bersama	Mekar Bersatu	Citra Sari	Muka Baru
Fostered Period	2016-2018	2015-2018	2015-2017	2015-2018
Number of members (Farmer)	20	20	25	10
Planting Area				
2015 (ha)	0	1,0	1,0	1,0
2016 (ha)	1,0	3,0	3,0	3,0
2017 (ha)	3,0	50,0	5,0	3,0
2018 (ha)	10,0	100,0	0	5,0

Source: [6]; [7]

*) A = South Sulawesi

B = Central Sulawesi

C = Southeast Sulawesi

D = West Nusa Tenggara

The observations of the five main variables carried out during the captive breeding activities taking place in 4 provinces are described as follows:

3.2 Stickiness of Breeder Farmer Groups

Assisted farmer groups as the main perpetrators of captivity are trained, accompanied and helped coordinate with various related parties. The most important thing is expected to be done by the guided farmer groups is to apply the Standard Operating Operational Procedure (SOP) for seed production, so that high quality seeds can be produced, so they are able to compete in the market [19].

The cohesiveness of the farmer groups in all provinces is quite good, which is marked by relatively simultaneous planting time (a score of about 3 to 4) which mean srathercon currently until the same time. The same understanding is that if farmers plant with in the agreed time of 2 weeks.

Togetherness data shows that, in all provinces the group is classified as compact. The averages core of togetherness of group members in all provinces is considered quite adequate. In South Sulawesi the planting togetherness score improved from year to year, while in Central Sulawesi it was stable at 4.2, in South Sulawesi it was originally expected to increase 3.9 in the second year to 4.2, and in Central Sulawesi it was better with a greater score of 4 which meant around 80% of the members planted with in a predetermined period (Table 2).

Then another factor that stands out is togetherness in marketing. All breeder members in four provinces market their results through a marketing network, namely through farmer groups. Thus the price can be controlled in accordance with the initial agreement, it's just that not all breeders easily get the market. In Southeast Sulawesi it was only the first year that was sold through distributors, and the following year was marketed to its members [20]. Likewise in NTB the first and second years are able to market to members, but after the region has received aid seeds, captive breeding results are difficult to market [21]. In Central Sulawesi and North Sulawesi a detachment team was formed consisting of members, in groups conducting detachment [7]. Thus it is ensured that detachment is carried out properly. While in South Sulawesi and NTB it is done individually, but it is still controlled by the group leader to ensure that detachment has been carried out properly [22].

Table 2. Compactness scores of farmer groups in national hybrid corn seed production, 2019

Year	Farmes Group Compact	Provinces ¹⁾				X ²⁾
		A	B	C	D	
2015	Togetherness planting time		4,2	3,4	4,3	4,0
	Togetherness in Roguing / selection		4,1	4,3	4,7	4,4
	Togetherness in Detelling		4,2	4,2	3,1	3,8
	Togetherness in harvesting/processing		4,2	4,2	3,9	4,1
	Togetherness in marketing		4,5	4,5	3,7	4,2
2016	Togetherness planting time	4,2	4,2	4,2	4,3	4,2
	Togetherness in Roguing / selection	4,3	3,5	4,6	4,3	4,2
	Togetherness in Detelling	3,7	4,0	4,1	3,7	3,9
	Togetherness in harvesting/processing	4,8	4,2	4,0	3,4	4,1
	Togetherness in marketing	4,9	4,5	3,9	4,9	4,6
2017	Togetherness planting time	4,2	4,2	3,9	4,2	4,1
	Togetherness in Roguing / selection	4,4	4,2	4,2	4,4	4,3
	Togetherness in Detelling	4,0	4,5	4,3	4,5	4,3
	Togetherness in harvesting/processing	4,8	4,5	4,4	4,5	4,6
	Togetherness in marketing	4,9	4,9	3,9	4,5	4,6
2018	Togetherness planting time	4,5	4,2		3,1	3,9
	Togetherness in Roguing / selection	4,5	4,3		2,9	3,9
	Togetherness in Detelling	4,0	4,7		2,9	3,9
	Togetherness in harvesting/processing	4,8	4,7		3,2	4,2
	Togetherness in marketing	4,9	4,9		3,7	4,5

¹⁾ A = South Sulawesi B = Central Sulawesi
C = Southeast Sulawesi D = West Nusa Tenggara

²⁾ X = Average

3.3 Local Institutional Support

In Indonesia social institutions in rural communities have a very important role both in terms of regulating life security, social activities, mutual cooperation activities, celebratory activities [23];[24];[25]. Based on the investigation, it is known that the existing social institutions that still have a strong influence on agricultural business are the extension group, the research group, the Agriculture Service, and the village government [7]. The role of farmer groups, counseling and research institutions is more prominent than other institutions. This is due to the activity of fostering seed production is one of the main tasks of researchers and extension workers in disseminating the results of their research, while other institutions such as the Department of Agriculture and village government are only beneficiaries of the results of the coaching. The score of farmer groups as captive businessmen and researchers from research institutions shows an average high above 4. Then the instructor's role is more stable in numbers 3 to 4, which means that the extension agent has been assisting in production and post-harvest technology in the field (Table 3).

Table 3. Scores of institutional support in corn seed production activities in 4 provinces in Indonesia,

Year	Local institutional support	Provinces ¹⁾				X ²⁾
		A	B	C	D	
2015	Farmer groups	0	4,3	4,2	4,3	4,27
	Research Institute	0	4,5	4,5	4,6	4,53
	Counseling	0	3,4	2,7	3,1	3,07
	Agriculture Agency	0	3,2	2,9	2,9	3,00
	Village/Sub-district government	0	2,7	2,9	2,7	2,77
16	Farmer groups	4,4	4,4	4,3	4,7	4,45
	Research Institute	4,7	4,7	4,7	4,9	4,75
	Counseling	3,1	3,5	2,9	3,7	3,3
	Agriculture Agency	2,7	3,5	2,9	3,5	3,15
	Village/Sub-district government	2,7	2,9	2,7	3,4	2,93
2017	Farmer groups	4,7	4,5	4,1	4,7	4,50
	Research Institute	4,7	4,7	4,7	4,9	4,75
	Counseling	3,2	3,7	3,4	3,9	3,55
	Agriculture Agency	3,1	4,2	2,9	3,9	3,53
	Village/Sub-district government	2,5	3,1	2,9	3,1	2,90
2018	Farmer groups	4,8	4,7	0	4,8	4,77
	Research Institute	4,8	4,7	0	4,9	4,80
	Counseling	3,4	3,9	0	3,7	3,67
	Agriculture Agency	3,2	4,3	0	3,5	3,67
	Village/Sub-district government	2,9	3,3	0	2,9	3,03

Another case with the Department of Agriculture, a variety of responses in each region. In South Sulawesi, there has been no monitoring of activities and planning to absorb the results of the trained breeders. The Dinas coordinates more with the producers of the seeds than by cultivating the breeders to produce seeds according to their needs. Unlike in Central Sulawesi, the agriculture of rice is gradually involved in the development of breeders, even the captive breeding model is replicated to other districts to meet the required national seed requirements [26]. This has also been a major factor in the development of large-scale breeding in Central Sulawesi.

3.4 Marketing Institutional Support

Based on the four determinants of marketing support it is known that, the existence of distributors who: provide price guarantees, have representatives in the area that can communicate and coordinate farmers well, determine the time of payment for the agreement, all become motivators for farmers to develop seedlings. The scores of the four indicators in areas with sustained seed production are 4 or more which means they are supportive (Table 4).

Table 4. Scores of marketing support for hybrid corn seed production activities in 4 provinces

Year	Institutional marketing	Provinces ¹⁾				X ²⁾
		A	B	C	D	
2015	Existence of Distributors	0	3,5	2,5	4,5	3,5
	Existence of agreement prices	0	3,2	3,2	4,5	3,6
	Transaction location certainty	0	3,1	3	4,5	3,5
	Payment period	0	3,1	2,5	4,6	3,4
2016	Existence of Distributors	4,2	4,2	2,5	4,2	3,8
	Existence of agreement prices	4,3	4,3	2,7	4,5	4,0
	Transaction location certainty	4,3	4,3	2,8	4,7	4,0
	Payment period	4,5	3,9	2,5	4,5	3,9
2017	Existence of Distributors	4,2	4,7	2,5	4,3	3,9
	Existence of agreement prices	4,3	4,7	2,5	4,4	4,0
	Transaction location certainty	4,3	4,7	2,5	4,5	4,0
	Payment period	4,2	4,5	1,5	4,2	3,6
2018	Existence of Distributors	4,5	4,7	0	2,5	3,9
	Existence of agreement prices	4,3	4,7	0	3,5	4,2
	Transaction location certainty	4,7	4,8	0	2,3	3,9
	Payment period	4,2	4,1	0	2,5	3,6

Marketing of agricultural products will determine the sustainability of seed breeding farms. Some experts say that the price of agricultural products is a very effective extension to encourage farmers to implement technology [27]; strong seed marketing institutions will motivate seed producers to develop captive breeding business scale [28]. According to Dirjentan, a certain price that benefits farmers will attract farmers to produce seeds [13].

3.5 Government Policy Support

Government policies related to the development of corn in Indonesia are recorded a lot, but directly related to corn seed is the issuance of the national corn seed policy. In 2017, the use of national corn seeds was 40% of the total seed assisted [11, 12]. Prior to the policy, the use of national corn seeds was very low because the producers were not able to compete with seed producers from MNC, even though the productivity in the national corn seed productivity demonstration plot was not inferior to MNC corn seed productivity [10, 6]. In the case of developing national corn producers, three things illustrate the government's attention and support for the sustainability of the national corn seed production business, namely: the desire to use national seeds, strict determination of distributors, and help provide seed infrastructure. In Central Sulawesi the increase in its attention rises from year to year, while in Southeast Sulawesi, initially gives adequate attention but in subsequent years decreases, so that seed producers in the region do not develop, and even end in 2018 (Table 5).

3.6 Farm Income

The main determinant of the sustainability of a farm is profitable income [29]; [18]; [30]. The theoretical hybrid corn seed production and experience on a relatively small scale shows that the technological capability of seed production is very profitable because it can produce 1-2t/ha, even more [6]; [31]; [21]; [20]. Based on observation at the level of breeders trained by seed producers, it is known that, the income of grower in South Sulawesi during the three growing seasons is always profitable, namely: in 2016 reached 9.5 million rupiah per hectare, increased to 19.2 million rupiah per hectare in 2017, and a little decreased to 13.5 million rupiah per hectare in 2018. Likewise, the

income of growers in Central Sulawesi during the 4 growing seasons is always profitable even though profits fluctuate (Table 6).

Table 5. Scores of government policy support for hybrid corns seed production in 4 provinces

Year	Government Policy Support	Provinces ¹⁾				X ²⁾
		A	B	C	D	
2015	Desires to use national Seed	0	4,1	3,3	4,2	3,9
	Manage and select distributors	0	3,5	2,3	4,1	3,3
	Infrastructural building	0	4,2	4,2	4,1	4,2
2016	Desires to use national Seed	3,5	4,3	3,3	4,1	3,8
	Manage and select distributors	3,5	4,3	2,5	3,9	3,6
	Infrastructural building	4,2	4,5	4,2	3,6	4,1
2017	Desires to use national Seed	3,5	4,5	2,5	3,7	3,6
	Manage and select distributors	3,4	4,7	2,4	3,5	3,5
	Infrastructural building	4,2	4,2	4,2	3,5	4,0
2018	Desires to use national Seed	3,5	4,7	0	3,2	3,8
	Manage and select distributors	3,5	4,2	0	3,7	3,8
	Infrastructural building	4,2	4,5	0	3,5	4,1

Table 6. Cost and income analysis of hybrid corn seed production activities in 4 provinces

Year	Description	Provinces ¹⁾				X ²⁾
		A	B	c	D	
2015	Production seed area (ha)	0	1,0	1,0	1,0	1,0
	Varieties produced	0	Bima-20	Bima-20	Bima-20	
	Production achieved (t/ha)	0	1,37	1,95	1,30	1,54
	Revenue (Rp,000 /ha)	0	12.035	11.597	13.473	12.368
	R/C ratio	0	1,89	2,12	2,06	2,02
2016	Production seed area (ha)	1,0	3,0	3,0	3,0	3,0
	Varieties produced	Bima-19	Bima-20	Bima-20	Bima-20	
	Production achieved (t/ha)	1,52	1,93	2,12	1,57	1,79
	Revenue (Rp,000 /ha)	9.495	19.215	9.320	19.137	14.292
	R/C ratio	1,62	2,02	2,08	2,53	2,06
2017	Production seed area (ha)	3,0	50,0	5,0	3	14,75
	Varieties produced	Bima-20	HJ-21	Nasa-29	Bima-20	
	Production achieved (t/ha)	2,11	2,01	0,51	1,55	1,54
	Revenue (Rp,000 /ha)	19.211	10.791	(4.551)	18.368	10.954
	R/C ratio	2,27	1,62	0,56	2,44	1,72
2018	Production seed area (ha)	10	100	0	5	38,33
	Varieties produced	Bima-20	HJ-21	0	HJ-21	
	Production achieved (t/ha)	1,77	2,05	0	0,52	1,45
	Revenue (Rp,000 /ha)	13.506	21.975	0	5.725	13.735
	R/C ratio	1,89	1,65	0,00	0,68	1,40

4. Conclusion

Based on the description of the five variables relating to the sustainability of national hybrid corn seed production above it is known that: the variable that most determines the sustainability of national hybrid corn seed production is the marketing variable. If the national corn seed use policy continues to be encouraged and improved as the main lever for the emergence of the market, the other supporting variables will also get better. Farmers' commitment apply seed production technology is increasingly compact, because it has felt greater profits, the participation of relevant local institutions and accompanying and directing the better, as well as producers and distributors of corn seeds are also increasingly developing their role by providing guaranteed seed prices to breeders.

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