

The Analysis of Inovation Technology Implementation of Hybrid Corn in Alebo Southeast Sulawesi

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ABSTRACT. Corn (*Zea mays*) is the second commodity in Southeast Sulawesi after rice. Corn is the matter for food and feed. Corn productivity in Southeast Sulawesi is 3,6 t/ha. Low productivity is caused by technology application in farmer level not optimally yet, and farmer still used the local variety or old variety. Hybrid corn variety has been tried by several farmers but the progress is still slow. Based the conditions in 2009 held the assessment of hybrid corn variety. The assessment conduct in Alebo Southeast Sulawesi on planting season I (August-November 2009) continued on plant season II (Januari-April 2010). The assessment objectives is to know the adoption of hybrid corn to member of farmer group. Assessment implemented by technology expose, farmer filed days and using information media as leaflets.

Key words: hybrid corn, technology, adoption.

Introduction

Corn is one of the leading commodity in Southeast Sulawesi has a significant economic value in agriculture. Demand for corn for animal feed requirements continue to increase, while the production capacity is limited. Widespread planting of corn in Southeast Sulawesi in 2012 reached 47.624 ha with productivity 3.6 t/ha. (Distan Sultra 2012). One cause of low productivity in maize farming is the application of technology that is not optimal and most farmers still use local varieties and lack of technology (Distan Sultra 2011).

Corn is a staple in several districts in Southeast Sulawesi as Muna and Buton regency. Varieties grown in these two districts are generally local sticky rice, and farmers generally plant for consumption purposes. Hybrid corn varieties from year to year continue to evolve with technological developments. In the market has been outstanding hybrid maize varieties such as Bisi 2, Bisi 16, Bisi 816, NK 22, NK 33, Pioneers, etc. Semar. Hybrid maize varieties have high yield potential advantage that, for example, the Milky-5 production potential estimated at 14.4 t/acre dry shelled. While the results of multilocation trials in some areas showed an average yield of 11.3 t/ha of dry shelled. Besides, varieties of corn cob Milky-5 has a large double with equal size, cob length 18.2 cm, the number of lines 12-14 rows seeds, plant height 204 cm and physiologically ripe at the age of 103 days (Balitsereal 2007). However, farmers in some villages have used hybrid varieties such as Bisi 2, Bisi 16.

The enthusiasm of farmers to plant corn hybrids are still low. This is presumably due to the communication between the technology provider and the farmers are not optimal. The communication process is the result of research and study, and farmer adoption is still slow. This condition is caused by the use of communication and information dissemination technology limited, lack of promotion and dissemination of agricultural technology packages that touch the needs of farmers. This is in line with the opinion Mardikanto (1993) that the success of agricultural development is influenced by the availability of matter is extension support materials.

Accuracy of information and technology in the operation of the farm is one of the factors that determine the admissibility of technology or information promoted. Information and technology needs of farmers must comply with the principle of the right materials, timely, effective and appropriate channels/media used. Sumardjo (1997) stated that in order to introduce agricultural technologies that have been proven both technically, economically and socially, and deserves to be disseminated through various forms of media, whether print, sound and projected. Furthermore, the Agency for Agricultural Research (2003) states that technology should be disseminated to farmers technology required and has commercial value and provide added value. An innovation can be adopted and rejected by farmers, this phenomenon could be a reference in developing innovations for farmers. Various factors which may be identified as the cause is 1) the economic viability and social acceptability of the innovations introduced, 2) the degree of importance on the production system, 3)

ease of access to inputs due to the innovation, 4) the availability of facilities, time and energy, as well as the degree of difference before and after use innovation from the demand side (Soedjana and Kristjanson 2001).

This study aims to obtain data and information on the application of technological innovation at the farm level to the use of high yielding varieties of hybrid maize in South Konawe, The expected output is the availability of data and information technology innovation adoption of hybrid maize varieties in the South Konawe.

Material and Methods

Assessment activities carried out in farmers' fields in Alebo, Southeast Sulawesi. Activities carried out in two phases, where the first stage in the growing season I is in August-November, a title/demonstration farm technology involves determining varieties of hybrid corn, tillage, planting, fertilizing, weed control, pest / disease, harvest and post-harvest handling. Technology demonstration held on land farmer cooperators 8 people each measuring 1,250 m, farmer cooperators selected farmers who experienced in planting corn at least twice, used hybrid corn seed varieties, fertilizer urea, KCL, SP36, herbicides, insecticides, and raffia. While the tools used include: scales, meter, hoes, sickles, machetes, hand sprayer, and a corn sheller. While phase II, growing season II the month from January to April by 40 members of farmer group, where the second phase of activity is directed to evaluate the viability of the technology after technology innovation transfer activities on the growing season before. Primary data collected includes:

1. The experience of farmers in farming maize, age, education,
2. The use of inputs include seeds, production matter.
3. Production by farmers in dry shelled farmer cooperators
4. Applied technology adopter farmers
5. Varieties used adopter farmers
6. Factors driving adoption of technological innovation.

Primary data on the level of adoption of hybrid maize technology innovations by farmers, conducted through interviews and direct observation of the 40 members of the group Sido Makmur farm demonstration results of hybrid corn. The data have been collected contained in tabular form and analyzed descriptively.

Results and Discussion

Overview Research Areas

The experiment was conducted in the village of Alebo, Southeast Sulawesi. The village is about 23 km from the town of Kendari. Spacious village Alebo ie 338 ha with a population of 993 people, made up of 249 households (Village Alebo, Monograf 2008). Most of the farms in the village Alebo done in the cultivated land area of 150 ha, 80 ha of gardens and grounds. Village Alebo a transmigration village in 1973 and in 1978 became the definitive village. Alebo village topography quite flat, with altitude of about 60 m above sea level. The dominant soil type is Red Yellow Podzolic, with 30 cm topsoil and soil fertility were. Average rainfall for the past 5 years Alebo village, is 691 mm with 45.6 mm of rain day. Preview Alebo village land use is presented in Table 1.

The table above shows that the vast moor/garden of 150 ha. Of the total moor land for planting corn about 50 ha, and the rest to plant vegetables and fruits. Varieties of maize grown corn growers are mostly local (70%) composite maize (20%), as well as hybrid sweet corn (10%), with the orientation of the corn market, with a planting calendar from November to August.

Varieties of Hybrid Corn Technology Degree

Technology degree was conducted on farmers' lands 8 people each 1,250 m² so that the overall area of 10,000 m². Implementation of corn planting was conducted in August 2009 during which planting until harvest only 4 days of rain with low rainfall, so the conditions are less than optimal plant growth. However, with the efforts of farmers on soil covering a relatively wet soil conditions so that the corn crop continues to grow and bear fruit as it should. Identity farmer cooperators of this study are presented in Table 2.

Table 2 shows that the age of farmers participating in (6 people) an average of 30 years and no two people over the age of 60 years. The level of experience in farming corn

Table 1. Land utilization in Alebo Southeast Sulawesi, 2008.

Land utilizations	Total area (ha)	%
Upland	150	45,73
Garden	20	6,10
Forest	1,5	0,45
Forage	8,5	25,91
Housing	60	18,29
Road and general facility	11,5	3,52

Tabel 2. Farmer identity of corn assessment cooperators in Alebo, Southeast Sulawesi.

Name	Sex	Age (th)	Education	Expiience in corn farming (th)	Land owner (ha)
Tohir	M	73	SR	26	2
Ngatimu	F	61	SR	16	1
Suprayitno	M	34	SMP	10	1
Suerminatun	F	30	SMP	8	0,75
Sampun	M	35	SLTA	12	1
Titik Mukliswati	F	33	D 2	9	0,75
Sukamto	M	34	SMP	7	1,5
Heni Astuti	F	29	SMP	5	0,5

Note: M: male, F: female

farmer participants ranged from 5-26 years, while the vast landholding corn ranged from 0.5 to 2 acres.

In his hybrid maize cultivation technology was introduced several technological components have been assembled together between local researchers and extension workers. The components of the technology are:

- The perfect tillage and harrow plow 2 times 2 times, made drainage ditches across the direction of flow of the land.
- Hybrid Maize Varieties with the amount of 15 kg per ha.cb. Planting distance Introduced spacing of 75 x 40 cm with seeds 2 seeds per hole and spacing of 75 x 20 cm with seed 1 seed per hole.
- Planting method is being introduced that way 5-7 cm deep drill with a hoe or digging beds according to soil conditions.
- Fertilizers used are:
 - Manure that has been ready to use as much as 800 kg/ha
 - Chalk Farm as much as 200 kg/ha
 - Urea fertilizer as much as 200 kg/ha
 - 200 kg NPK/ha Phonska
- Control of stem borer using Furadan is mixed with the seed before planting, pest control mice using poisoned bait and intensive weeding, pests control while using pig fence.

Agronomist Performance

High variability of maize hybrids in the study sites are presented in Table 3. Corn planting was held on August 7, 2009, which was classified as a plantation in the Dry Season (MK). The number of rainy days during the cropping recorded 4 days of rain with a low intensity rainfall (drizzle). Variability corn crop looks pretty good show.

Table 3. Hybrid maize cropping agronomist variability exhibited in the village Alebo, Southeast Sulawesi.

Variety	Planting distance 75 x 40 cm (2 seed/hole)	Planting distance 75 x 20 cm (1 seed/hole)
Plant population (plant per hill)	32	26
Plant hieght 30 days (cm)	47,22	50,45
Production (dry mill) (t/ha)	6,87	5,07

Table 3 shows that the plant population for corn hybrid varieties of maize to 2 seeds per hole are 32 plants and about 40,960 stems per hectare. As for the 1 seed per hole, totaling 26 plants and about 33,280 stems per hectare. Growth achieved hybrid varieties at 30 days to 2 seeds per hole is 47.2 cm, while for the 1 seed per hole, reaching 50.5 cm. Production of hybrid corn seeds per hole 2 shows the results of 6.87 t/ha, while for the 1 seed per hole shows the results of 5.072 t/ha. Thus, the average production of hybrid maize is 5.98 t/ha.

Farming Analysis

To determine the magnitude of the benefits of hybrid corn farming is carried out analysis farming corn hybrids with a complete package of technology, especially the use of new hybrid maize varieties. Results of analysis of hybrid maize farming farmer cooperators in growing season I (August-November 2009) is presented in Table 4.

From Table 4 shows that the production of hybrid maize varieties for 5975 kg of dry shelled with a selling price of Rp 1,750/kg of the obtained result value of Rp 10,456,250, while the total cost of cultivation of Rp 5,015 million, it earned revenues of Rp 5,441,250 with R/C Ratio 2.08. The results show the technology is economically feasible.

Applied of Hybrid corn Technology Innovation

During hybrid maize activities conducted survey through interviews with the implementation of technological innovations by members of farmer groups. Data collected include matters relating to the adoption of the technology applied by farmers implementing. Observations were made through direct interviews with 40 people of farmer group members Sido Makmur, Alebo village, who follow the learning space and through focus group discussions as well as observations on the application of technology in the field. By Fawzia (1995) to

determine the application of technological innovation at the farm level is necessary to direct observations at the farmer's farm implement activities in the field. Variability members of farmer groups who follow the teaching field technological innovations are presented in Table 5.

The above table shows that farmers adopter of hybrid corn technology innovation consists of 36 people men, women 4 people, aged between 21-73 years old farmer, education SR-S1, corn farming experience between 3-26 years old and widespread ownership between 0.5 to 2 ha. The maize varieties were planted, with 40 members of farmer

Tabel 4. Farming analysis of hybrid corn in Alebo, Southeast Sulawesi, 2009.

Item	Value (Rp)
I Cost	
A. Production matter	
Hybrid corn seed 15 kg a Rp 40.000	600
Organic fertilizer 800 kg a Rp 500	400
Dolomit 200 kg a Rp 1000	200
Urea 4 zak a Rp 60.000	360
NPK pHonska 2 zak a Rp 125.000	250
Sock 50 lembar a Rp 2.000	100
Furadan 10 kg a Rp 12.500	125
Pestisida	150
Herbisida	250
Total production matter cost	2.435.000
B. Wages	
Land clearing	600
Land preparation	600
Plot making	160
Canal	160
Seed hole	160
Fertilizing and Dolomit Applied	900
Harvesting Cost	120
Post Harvest Handling	240
Total Wages	2.580.000
Total Cost	5.015.000
II Production (in dry mill)	
Production: 5.975 kg dry mill a Rp 1.750	10.456.250
Rvenue	5.441.250
BEP	839,33
R/C Ratio	2,08

Table 5. Performance of farmers innovation technology adopter hybrid corn in Alebo, Southeast Sulawesi.

Discription	Information
Farmer Age	21-73 years
Sex	Man 36 Woman 4
Experience in cultivation	3-26 years
Education	SR – Bachelor Degree
Corn area	0,5-2 ha
Corn variety	hybrid corn (28 farmer) sweet corn (12 farmer)

groups (100%) to plant hybrid varieties, which consists of 28 people to plant yellow corn hybrid varieties and 12 varieties planted sweet corn hybrids. The spread of information technology begins with a discussion of hybrid corn technology between teams BPTP with agricultural extension field. Together trainers conducted technology demonstrations conducted by the farmer cooperators (8 people) in growing season I. During the technology demonstration was invited members of farmer groups at each event technology innovation backed by spreading leaflets. At the end of the open-field demonstration of the technology conducted between research-extension-farmer-cooperators from farmer group members. In January-April 2010 (growing season II) conducted interviews and observations of 40 members of farmer group. Innovation distribution of Researcher AIAT Southeast-Extension Worker-Cooperator Farmer-Farmer Group show in Figure 1.

Based on interviews with 40 members farmer group and direct observation of the application of technological innovation hybrid corn planting on December 2009-April 2010 indicated that over a field of learning supported by technology innovation demonstration by farmers have been able to accelerate the adoption of innovations, especially the use of hybrid maize varieties, the use of organic and inorganic fertilizers, the use of herbicides, integrated pest management. This is according opinion Madonna (2010) that technological innovation will be quickly adopted by farmers if conducted participatory learning and farmers are directly involved in technological innovation in the field events, the field school approach.

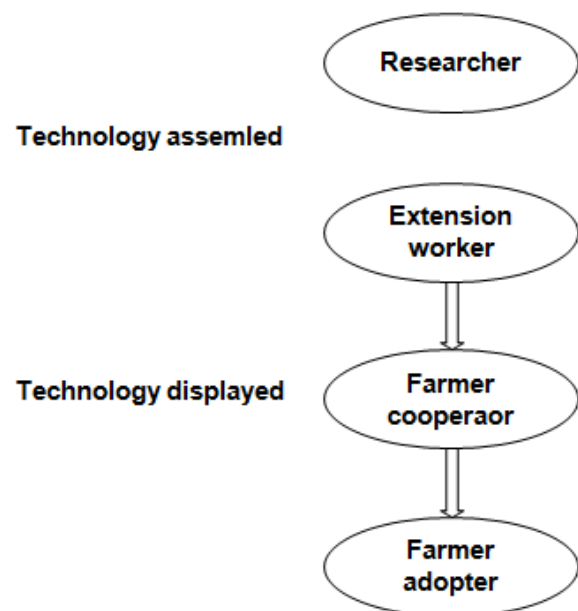


Figure 1.

Table 6. Variability adoption of hybrid corn technology innovation in Alebo, Southeast Sulawesi, April 2010.

Adopter	Adopter		Non Adopter	
	Farmer	%	Farmer	%
Hybrid variety utilization	40	100	-	-
Land preparation	28	70	12	30
Plant hole making	2	5	38	95
Organic fertilizer utilization	40	100	-	-
Anorganic fertilizer utilization	40	100	-	-
Dolomit utilization	20	50	20	50
Herbicide utilization	40	100	-	-
Integrated crop management	40	100	-	-
Soil covering	25	62,5	15	37,5
On time harvest	20	50	20	50
Average	29,5	73,75	10,50	26,25

Number of technological innovation adopter of hybrid maize in the Alebo village in 2010 are presented in Table 6

The above table shows that through technology demonstrations conducted by eight farmers who held on growing season I (August-November 2009) has been able to provide technological innovations to 40 members of farmer groups on growing season II (January-April 2010). Technological innovation is adopted by members farmer groups involves the use of hybrid maize varieties (100%), tillage perfect (70%), the use of organic fertilizers (100%), the use of inorganic fertilizers (100%), soil covering (62.5%), the use of agricultural lime (50%), harvest time (50%) with an average participation of members of farmer groups to the application of hybrid maize technology innovation by 73.75%. Technological innovations that have not been applied by the farmer group members is 26.25%, of which the largest is the manufacture of drill holes (95%) in which farmers choose seed planting corn herons, because plants grow faster than the way digger shows that the application of innovation new is not always socially acceptable in practice, which it requires in-depth knowledge and skills to the environmental interaction (farmers, land, culture, society) and technology. The implication is that the implementation of an innovation must be location specific (Francis and Hildebrand, in Noman and Doglas). Description of the dominant factors affecting the adoption of hybrid corn technology are presented in Table 7.

From the above table shows that there are factors driving the implementation of technological innovations in farming corn hybrids namely Corn Hybrid Modeling Technology, Materials and Media Information Hybrid Corn, corn hybrid seed availability appropriate, availability of organic fertilizer. Inorganic fertilizer availability, dolomit availability, Buyer Assurance, certainty the right selling

Table 7. Dominant factors affecting the adoption of hybrid corn technology innovation in Alebo, Southeast Sulawesi 2009.

Accelerator	Farmer opinion			
	Agree		Disagree	
	Total	%	Total	%
Technology exposition	40	100	-	-
Material of hybrid corn	40	100	-	-
Seed availability	40	100	-	-
Organic fertilizer availability	40	100	-	-
Anorganic fertilizer availability	40	100	-	-
Dolomit availability	40	100	-	-
Herbicide availability	30	75	10	50
Pesticide availability	10	25	30	75
Bayer assurance	40	100	-	-
Price certainly	40	100	-	-

price. From the picture above, the acceleration of innovation for hybrid maize required the existence of several things:

1. Available aquaculture technology specific hybrids corn suitable biophysical and social conditions of the local community, in the form of demonstrations and the presence of media technologies appropriate local information technology.
2. There are seeds of hybrid corn right variety.
3. Availability of inputs such as organic fertilizers, inorganic, agricultural lime.
4. The certainty of the buyer and the right price certainty.

Conclusions

The results indicate the presence of hybrid corn farming income of Rp 5,4 million/season/ha, with the R/C ratio of 2.08. Achievement farming corn hybrids is feasible (2.08) is strongly influenced by the choice of suitable varieties planted in the dry season. The majority (72.8%) of hybrid corn technology innovations adopted by farmers and there are some hybrid corn technology package that has not been fully implemented by farmers. Dominant factor affecting the interest of farmers to farm corn hybrids namely: (a) Available hybrid maize cultivation technology suitable location specific biophysical and socio-economic conditions of local communities; (b) Available hybrid corn seed right on location and season; (c) Availability of inputs such as organic fertilizers, inorganic, agricultural lime; (d) The certainty of the buyer and the corresponding price certainty.

To accelerate new varieties of hybrid corn, its need the increasing coordination among several institution which service to farmer.

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