ISSN: 0369-8963

# The Role of Pentahelix in Developing Sugar Cane Production in East Java Indonesia

**M Samsul Arifien**
Agribusiness Doctoral Study Program, University of Pembangunan Nasional Veteran Jawa Timur, Jl Raya Rungkut Madya, Surabaya 60294, East Java, Indonesia
msamsularifien12@gmail.com

**Teguh Soedarto**
Department of Agribusiness, Faculty of Agriculture, University of Pembangunan Nasional Veteran Jawa Timur, Jl Raya Rungkut Madya, Surabaya 60294, East Java, Indonesia
teguhsoedarto@upnjatim.ac.id

**Hamidah Hendrarini**
Department of Agribusiness, Faculty of Agriculture, University of Pembangunan Nasional Veteran Jawa Timur, Jl Raya Rungkut Madya, Surabaya 60294, East Java, Indonesia
hamidah_h@upnjatim.ac.id

**Eko Nurhadi**
Department of Agribusiness, Faculty of Agriculture, University of Pembangunan Nasional Veteran Jawa Timur, Jl Raya Rungkut Madya, Surabaya 60294, East Java, Indonesia
ekonurhadi@upnjatim.ac.id

## Abstract

*Pentahelix is a model that integrates five sectors: government, industry, academia, community and mass media. Pentahelix, in its sugar cane production development activities, is a synergy of 5 actors, namely the Government, Sugar Factory, Academics, Farmer Groups, Mass Media. This research aims to analyze how big the role of each actor is in the synergy of developing sugar cane farmers. Qualitative descriptive research method, with the main informants/resources being farmers and key sources consisting of service officers, extension workers, community leaders. The research results concluded that the role of developing government actors/stakeholders was 32%, sugar factories 23.5%, academics 6.5%, farmer groups 37.5%, and mass media 0.5%.*

***Keyword:*** *Pentahelix, Construction, Sugarcane Production*

## Introduction

The Pentahelix concept is a collaborative model that links development with the environment. Development can be implemented well if it can be integrated with the environment, namely between stakeholders or across institutions. Pentahelix is a synergy model consisting of five sectors, namely academics, industry, media, community and government. Pentahelix synergy is expected to be able to provide innovation solutions, develop knowledge and technology, increase

 https://doi.org/10.5281/zenodo.14597773

economic added value, welfare of business actors, provide energy to develop, and be able to solve all problems in an integrated manner.

According to Soemaryani (2016), the pentahelix model is a reference in developing synergy between agencies to achieve goals. The role of pentahelix collaboration has the aim of innovation and contributing to regional socio-economic progress. According to Carayannis and Campbell (2012) the pentahelix describes what sustainable development, "eco-innovation" and "eco-entrepreneurship" mean in the current and future situations. Development cannot be done sectorally, but requires the synergy of several sectors in harmony together towards the desired ideals. The presence of synergy as a reinforcement of the chain of dependency between helixes which economically must be mutually beneficial. The main benefit is strengthening society as a subject of sustainable development. Pentahelix emphasizes the socio-ecological transition that society and the economy require. Within the framework of the pentahelix model of innovation, the natural environment of society and the economy is seen as a driver for the production of knowledge and innovation, thereby determining opportunities for the knowledge economy.

Furthermore, Aribowo (2018) said that in creating synergy, facilities, services, experiences provide advantages and benefits to the community and surrounding environment. So it is necessary to drive the system through optimizing the roles of business (business), government (government), community (community), academic (academics) and media (media publications). In this research, we explored the meaning of pentahelix in sugar cane production development activities. There were actors from the Government, Sugar Factory, Academics, Farmers' Groups, Mass Media, with their respective roles as follows:

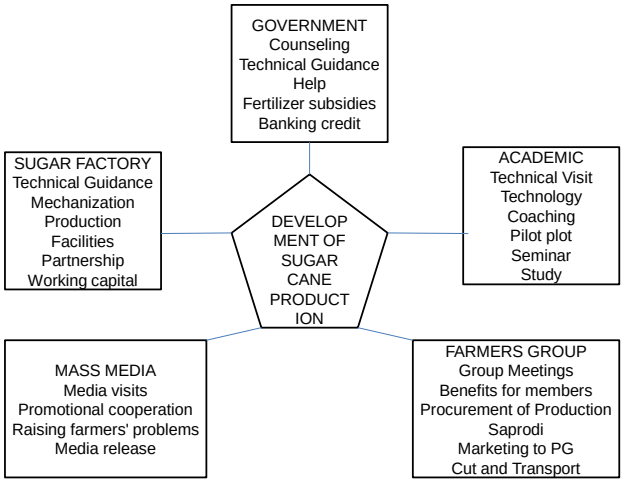


Figure 1. Pentahelix Synergy in Guiding Sugarcane Production

As in Figure 1 above, the role of each actor is as follows; (1) The government's role is to carry out counseling, technical guidance from related agencies, assistance with equipment, seeds, subsidized fertilizer, and capital facilitation from banks. (2) The role of the Sugar Factory includes technical guidance, mechanization facilitation, procurement of production facilities, partnerships, working capital loans. (3) The role of academics includes technical visits, guidance, organizing pilot plots, meetings/discussions/seminars, research. (4) The role of farmer groups includes group meetings, group benefits for members, production cooperation with cooperatives, marketing and transport cooperation with sugar factories. (5) The role of mass media, visits to cover farmer

 https://doi.org/10.5281/zenodo.14597773

activities, production promotion, radio broadcasts, television, print media, as mediators when farmer problems arise.

## Research Method

The research uses a qualitative descriptive method, where data is collected from main sources through interviews. The research was carried out in Sidoarjo, Tulungagung, Ngawi, Situbomdo Regencies. A total of 120 main sources answered all the researchers' questions about the role of actors in the pentahelix. Do the actors play a role in coaching farmers by choosing answers: 'never', 'ever', 'rarely'. 'often' (Likert scale). Score = 0 if the respondent answered never, score = 1 if never, score = 2 if rarely, score = 3 if often

## Result and Discussion

The results of the analysis show that the role of each stakeholder as a research variable is expressed in percent (%) of involvement in developing sugar cane production. As a result of questions to 120 respondents, answers were obtained that the role of each stakeholder in developing sugar cane farmers was as follows:

**Table 1. Role of Stakeholders in Pentahelix Synergy**

| Regency | Government (%) | Sugar Factory (%) | Academics (%) | Farmer Group (%) | Media (%) |
|---|---|---|---|---|---|
| Sidoarjo | 27 | 35 | 3 | 34 | 1 |
| Tulungagung | 35 | 22 | 7 | 36 | 0 |
| Ngawi | 30 | 20 | 6 | 44 | 0 |
| Situbondo | 36 | 17 | 10 | 36 | 1 |
| Average | 32 | 23,5 | 6,5 | 37,5 | 0,5 |

In table 1 it can be seen that the five pentahelix actors work together to support each other in increasing sugarcane production. If the amount of synergy is 100%, then the role of farmer group actors is 37.5%. Farmer groups as cultivation subjects are aware that they must try hard, even independently, to fulfill their agricultural needs. The second role of 32% is the government, as a motivator, dynamist, facilitator, regulator, regarding sugar cane cultivation activities. The actor with the third role is the Sugar Factory at 23.5%. Play a coaching role for farmers so that the production produced is of good quality. Furthermore, academics and the media did not play enough of a role, only getting scores of 6.5% and 0.5%.

## The Government's Role in Pentahelix Synergy

The government's role in pentahelix synergy is 32% among the other 4 stakeholders. The government plays a regulatory role and actively encourages collaboration between pentahelix actors to be well integrated. The indicators assessed are what the government has done in providing guidance to sugar cane farmers, including; (1) Counseling by Field Agricultural Extension / PPL

 https://doi.org/10.5281/zenodo.14597773

officers, (2) Technical guidance carried out by Regency Service agencies, (3) Assistance provided by the government, (4) Provision of fertilizer subsidies, (5) Provision of working capital credit facilities. The results of the analysis of 5 indicators of the government's role are as shown in the following table:

**Table 2. Role of Government in Developing Sugarcane Production**

| Regency | PPL Counseling | Departmental technical guidance | Government assistance | Fertilizer subsidies | Banking credit |
|---|---|---|---|---|---|
| Sidoarjo | 51 | 31 | 7 | 72 | 57 |
| Tulungagung | 87 | 52 | 22 | 74 | 0 |
| Ngawi | 39 | 16 | 5 | 80 | 48 |
| Situbondo | 70 | 34 | 37 | 83 | 61 |
| Number of values | 242 | 133 | 71 | 309 | 166 |
| Average value | 2,01 | 1,11 | 0,6 | 2,57 | 1,38 |

Table 2 shows the value/score regarding the frequency of counseling carried out by PPL 2.01, tennis guidance from the Department 1.11, government assistance 0.6, fertilizer subsidies 2.57, bank credit 1.38, out of a maximum value of 3 (often carried out by the government ). The percentage between the score obtained compared to the maximum score is presented in the following graph:

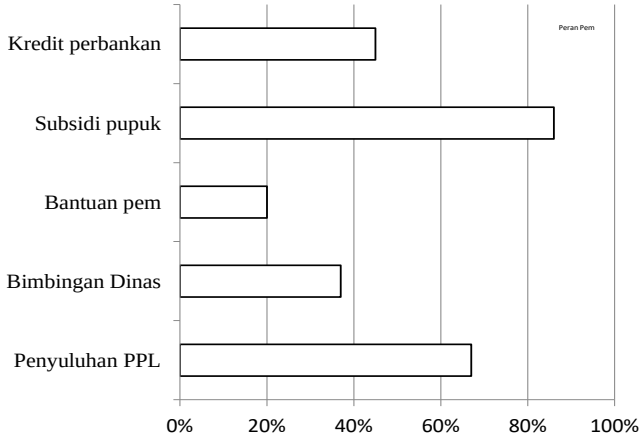


Figure 1. Graph of the Government's Role in Developing Sugarcane Production

The graph above shows that the government's role in extension > 60% and provision of subsidized fertilizer facilities > 80% is quite significant in the often done category. , soy. Provision of assistance < 20%, category was carried out 10 years ago. Meanwhile, the provision of a credit scheme <50% falls into the rarely implemented category, even though the government has actually provided a KUR credit package for farmers' working capital needs. However, the farmers responded.

 https://doi.org/10.5281/zenodo.14597773

Based on observations in the field, the counseling by PPL was quite good. However, guidance by the District Service is felt to be lacking, partly because the District Service is more focused on handling the commodities of rice, corn and soybeans. Assistance programs in the form of dismantling ratoons, maintaining ratoons, assistance with new varieties of seeds, assistance with machine tools, no longer exist. Even if there is, the volume is very small compared to the existing sugar cane area. The last ratoon dismantling program was implemented in 2013 as explained by the source as follows:

> "The ratoon dismantling program was implemented in 2013, when the researcher was Head of the East Java Province Plantation Service. After that, until now, there has never been another one." (Mudjiono – Former Head of Plantation Division, Ngawi Regency)

> "In Tulungagung Regency, we received assistance with a 4-wheeled tractor, a klentek machine, a tool for lifting sugarcane onto a truck, during the ratoon unloading activity in 2015." (Nur Amin - Tulungagung Regency Sugarcane Farmers Association).

Based on Law No. 16 of 2006 concerning Agricultural, Fisheries and Forestry Extension Systems, implemented by the Regency Government. The limited number of existing instructors is an obstacle, because instructors must carry out counseling to all farmers with various commodities in their work area. A priority scale emerged for certain commodities. This is different from the extension policy when extension agents were monovalent, only limited to sub-sector commodities. During the monovalent policy period, there were food crop instructors, plantation instructors, fisheries instructors, livestock instructors, and forestry instructors. Each instructor is based at the Agricultural Extension Center, controlled by the Head of the sub-sector Service. Government policy has changed, sub-sectors at the district level have merged into the Department of Agriculture, with various nomenclature in each district. The extension workers, who are controlled by the Head of the Extension Implementing Agency who is also the Head of the Service in charge of agriculture, provide more education on food commodities. The sugar cane crop will be handled when there are programs such as ratoon unloading, etc. As stated by Mr. Mudjiono as follows:

> “Sugarcane plants lack development due to lack of funding. "Like in 2013 when there was the Bongkar Ratoon program, coaching was carried out intensively." (Mudjiono – Former Head of Plantation Division, Ngawi Regency).

When there are development funds attached to a project, guidance is carried out in order to deliver the project to sugar cane farmers. In contrast to rice and corn crops, there is a development budget at all times (Mudjiono). This means that the sugar cane plant can be said to run on its own based on a makeshift mechanism, namely farmers grow their own sugar cane without any direction, the results are sold to the sugar factory, continuously like that. There is no guidance from the government. Moreover, district officers, staff, currently do not have competence in sugarcane farming techniques. All of them are based on food plant experience. However, Mr. Sanusi denied that there was no guidance on sugar cane plants. There is still guidance from the government in the form of providing subsidized fertilizer.

> "Currently coaching in sugar cane, in subsidized fertilizer services through e-allocation" (Sanusi - Sugarcane Farmers Cooperative, Ngawi District).

In Tulungagung Regency, farmers receive guidance from extension officers. Even though farmer group meetings are rarely held, extension workers have created WhatsApp groups with farmer groups. So that communication is established well. Meanwhile, there has never been any guidance from the Department that handles agriculture, as explained by Mr. Nur Amin below:

 https://doi.org/10.5281/zenodo.14597773

> "There has never been any coaching/meeting with the District Agriculture Service. "From the Provincial Plantation Service, there is actually something about controlling wormwood pests" (Nur Amin - Sugarcane Farmers Association).

According to field instructors, the district Agriculture Service provides guidance during the distribution of subsidized fertilizer. Banking that offers working capital credit to sugar cane farmers. However, the credit loan offers from banks are not taken by farmers, as stated by Mr. Nur Amin, as follows:

> "BNI offers credit without collateral for individuals with joint responsibility for 5 people. "There are no farmers who prefer to be independent using personal capital." (Nur Amin – Sugarcane Farmers Association)

In Sidoarjo Regency, plantation instructors routinely provide guidance to sugar cane farmers. Because they are accompanying officers for sugar cane farmers whose honorarium is paid by the Directorate General of Plantations. Almost all farmers partner with sugar factories, therefore all farming needs are covered in the form of loans that will be repaid at harvest. For Situbondo district, sugar cane area is shrinking from year to year because farmers switch to rice and secondary crops. Development is more directed at food crops, especially rice, in order to meet food production targets. Counseling to sugar cane farmers is only limited when applying for subsidized fertilizer.

> "Guidance for sugar cane farmers is only carried out once a year, namely when registering for subsidized fertilizer. "Compared to the development of rice and polowijo plants, which is done up to 3 times a year by the Department of Agriculture, and field instructors are often present regularly." (Chandra – Head of Duwet Village, Situbondo Regency).

Regarding capital, farmers access banking individually through the KUR/People's Business Credit scheme for agriculture. As stated by the Head of Duwet Village as follows:

> "For working capital for sugar cane farmers, take credit from KUR/KreditUsaha Rakyat individually/individually. I know because I had to get a recommendation from the Village Head." (Chandra – Head of Duwet Village, Situbondo Regency).

Thus, the government's role is very vital in fostering sugar cane production, together with other pentahelix actors. The absence of continuous government programs every year results in uncertainty in sugar cane production.

## The Role of Sugar Factories in Pentahelix Synergy

The role of the Sugar Factory in Pentahelix synergy is 23.5% among 4 other stakeholders. Sugar factories as an industry that processes sugar cane into sugar have an obligation to provide guidance to farmers. The assessment indicators consist of; (1) Sugar Factory provides technical guidance for sugar cane farming, (2) Provides loans for mechanization equipment, (3) Loans for production facilities, (4) Implements partnerships with farmers who need them, (5) Provides working capital loans. The results of the analysis of the 5 indicators are as follows:

**Table 3. The Role of Sugar Factories in Developing Sugar Cane Production**

| Regency | Technical Guidance | Loan Machine | Saprodi Loan | Partnership | Capital Loan |
|---|---|---|---|---|---|
| Sidoarjo | 50 | 66 | 77 | 82 | 73 |
| Tulungagung | 58 | 17 | 31 | 26 | 16 |
| Ngawi | 41 | 12 | 70 | 72 | 68 |
| Situbondo | 58 | 5 | 61 | 28 | 11 |

 https://doi.org/10.5281/zenodo.14597773

| | | | | | |
|---|---|---|---|---|---|
| Number of values | 207 | 100 | 299 | 260 | 168 |
| Average value | 1,72 | 0,83 | 2,49 | 2,16 | 1,4 |

Table 3 shows the value/score regarding the frequent implementation of technical guidance by Sugar Factories at 1.72, providing loans for mechanization equipment 0.83, loans for production facilities 2.49, implementation of partnerships 2.16, capital loans 1.4. from a maximum value of 3 (often carried out by Sugar Factories). The percentage between the score obtained compared to the maximum score is presented in the following graph:

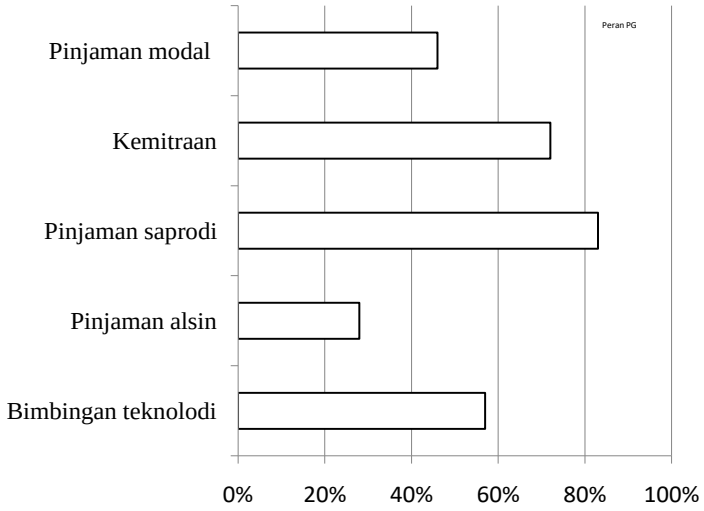


Figure 2. Graph of the Role of Sugar Factories in the Development of Sugar Cane Production

The graph above shows that the role of Sugar Factories in providing technological guidance > 50%, providing input loans > 80%, partnerships with farmers > 70%, is quite significant (often carried out). Meanwhile, loans for mechanical equipment and capital < 50% are in the category of rarely done.

As a result of observations of what was done by respondents in Sidoarjo and Ngawi districts, all farmers' sugar cane production must be transferred to sugar factories which provide facilities for sugar cane cultivation. Different for farmers in Tulungagung and Situbondo districts, they are independent farmers who do not collaborate with sugar factories. All cultivation needs are met by themselves, so they are free to sell their sugarcane to anyone who buys it at a high price or what is called a drop-buy system. Farmers sell sugar cane at the agreed price, and receive immediate payment. The buyers are sugar cane entrepreneurs, and it will be sent to sugar factories that need it.

Sugar factories, as the core that has scientific, technological and financial capabilities, are obliged to provide guidance to farmers. Farmers are in a weak position and need help with all their problems in order to be able to produce quality production. In this case, farmers' resources have

 https://doi.org/10.5281/zenodo.14597773

been mobilized to plant sugar cane to support the fulfillment of raw materials for the Sugar Factory. Farmers as land owners need help in meeting their farming needs. Bearing in mind that currently farmers are free to choose what commodities to plant, taking into account the profits they will get. So that sugar factories can provide better services, in order to avoid a shift in the choice of sugar cane plants to other plants as sugar cane competitors. The role of the sugar factory as a stakeholder that requires sugar cane raw materials from farmers is that it is obliged to help farmers in sugar cane farming.

## The Role of Academics in Pentahelix Synergy

Academic is a general term that refers to someone who is highly educated, or intellectual, or someone who pursues a profession as a teacher and professor at a university. Academics as part of nation and state development have a very big role, as producers of reliable and skilled human resources. Play a role in helping the government formulate development policies. However, currently the role of academics in regional development feels minimal. According to Yossita Wisman (2024) (in rri.co.id) states that the central/regional government and universities carry out their respective main tasks and functions. As a result, government programs do not run well. Because there is no dialogue with universities. In fact, if this synergy occurs, academics will also gain benefits in mapping and planning future directions, so that the knowledge learned is very useful to be applied for development. The workforce needed for regional development can be supplied from local universities.

The results of this research show that the role of academics in pentahelix synergy is 6.5%. Academics are scientific sources who have a variety of knowledge, it is important to be involved in developing sugar cane farmers. However, its role is still very small, it cannot provide any meaning for the development of sugar cane production. According to the Head of Duwet Village and several farmers from Situbondo Regency, academic visits to farmers were carried out by students for KKN/Real Work Lecture and research activities. Never been present by providing technology guidance. According to Agriculture Service staff, academics come to Situbondo once every year, during a survey to determine the basic price of sugar. One of the teams is from a university. In Tulungagung district, farmers never receive visits from universities. Likewise, Ngawi district never received visits from academics.

The results of observations in the field regarding what academics have done in coaching sugar cane farmers include; (1) Academic visits to sugar cane groups/farmers, (2) Technical guidance, (3) Providing examples through demonstration plots, (4) Seminars and discussions with farmers, (5) Research according to the material needed by local farmers. The results of the analysis are as shown in the following table:

 https://doi.org/10.5281/zenodo.14597773

**Table 4. The Role of Academics in the Development of Sugarcane Production**

| Regency | Visit University | Guidance Technical | Plot Pilot | Seminar | Research |
|---|---|---|---|---|---|
| Sidoarjo | 8 | 5 | 0 | 5 | 3 |
| Tulungagung | 15 | 11 | 1 | 11 | 3 |
| Ngawi | 15 | 8 | 0,5 | 5 | 3 |
| Situbondo | 24 | 19 | 5 | 9 | 20 |
| Number of values | 62 | 43 | 6 | 30 | 29 |
| Average value | 0,5 | 0,35 | 0,05 | 0,25 | 0,24 |

Table 4 shows the value/score regarding frequent academic visits to farmer groups of 0.5, technical guidance 0.35, making pilot plots 0.05, seminars and discussions with farmers 0.25, research 0.24, out of a maximum value of 3 (often done by academics). The percentage between the score obtained compared to the maximum score is presented in the following graph:

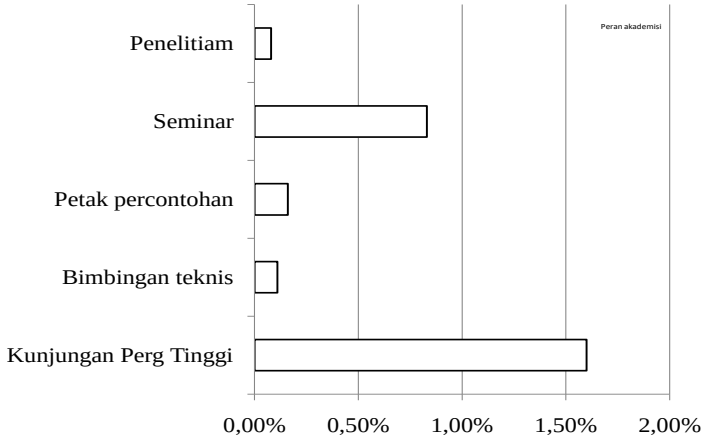


Figure 3. Graph of the Role of Academics in the Development of Sugarcane Production

The graph above shows that the role of academics in visiting farmers is < 2 %, holding seminars and discussions with farmers < 1 %, technical guidance, creating pilot plots, research < 0.5 % of the value 3 (often carried out). Academics are a source of knowledge in the form of theory, application, and the latest development models that are relevant to existing conditions. However, the reality on the ground does not match expectations. What is done < 2% of the frequent category. This is in accordance with what was conveyed by key sources:

> “here have never been any visits from universities to the sugar cane fields in Sidoarjo." (Taufik – Plantation Extension Officer - Sidoarjo).
>
> “Universities sometimes come, usually conducting surveys or research. However, it is rare and does not provide guidance to farmers." (Mudjiono – Former Head of Plantation Bid - Ngawi).
>
> “Academics come to Situbondo every year as members of the sugar price survey team." (Erza – Situbondo Agricultural Service Staff).

 https://doi.org/10.5281/zenodo.14597773

> "KKN students often come from universities in Surabaya." (Chandra – Head of Duwet Village – Situbondo).
>
> "Academics from Tulungagung University have never provided guidance to farmers, if students have ever come for research. There was also a KKN student from Surabaya." (Nur Amin - Sugarcane Farmers Association - Tulungagung).

The role of academics in pentahelix synergy in developing sugar cane production is highly expected in the future. It is not expressly stated in the form of a coaching coordination decision, but is called upon to serve the Tri Dharma of Higher Education to the community. Each university makes adjustments to locations that have potential for the sugar cane commodity. Be present and involved in developing sugar cane production with the district office, sugar factory, mass media and other stakeholders. As Muhamadiyah Gresik University has done in the last 5 years by building a garden collection of superior varieties. Currently we are focusing on testing new superior varieties with the Variety Release Commission.

## The Role of Farmer Groups in Pentahelix Synergy

The role of farmer groups in pentahelix synergy is 37.5%. This is the biggest role among other Pentahelix actors. The role of farmer groups as farming business units is; (1) Sugarcane farming, with efforts to strengthen, facilitate and encourage the development of sugarcane production. (2) Aims to obtain income from sugarcane farming. (3) Improving welfare through a harmonious social, economic, cultural, spiritual life system. Farmer groups as learning classes as a forum; (1) Extension as a learning effort aimed at increasing productivity, business efficiency, income, and increasing awareness in preserving environmental functions. (2) Training, to increase technological knowledge and skills. (3) Demonstration, in the form of technology application in pilot plot practice. Farmer Groups as a vehicle for cooperation; (1) Procurement of inputs from suppliers, input kiosks, seed breeders, mechanization rental. (2) The use of labor that prioritizes family, local labor before taking it from outside. (3) Capital, through collaboration with formal financial institutions. (4) Partnering with Sugar Factory processing units.

As a result of observations in the field regarding what the farmer groups had done, the results of an assessment of 5 indicators were obtained; (1) Group meetings, (2) Group benefits for members, (3) Cooperation in the procurement of inputs with cooperatives, (4) Marketing cooperation with Sugar Factories, (5) Cutting and transport cooperation with Sugar Factories. The results of the analysis of 5 indicators of the role of farmer groups are as follows:

 https://doi.org/10.5281/zenodo.14597773

**Table 5. Role of Farmer Groups in Developing Sugarcane Production**

| Regency | Meeting Group | Benefit Group for Members | Cooperation in Procurement of Inputs with the Cooperative | Marketing collaboration with Sugar Factory | Collaboration with Sugar Factories |
|---|---|---|---|---|---|
| Sidoarjo | 47 | 59 | 30 | 76 | 64 |
| Tulungagung | 60 | 53 | 18 | 51 | 59 |
| Ngawi | 67 | 56 | 6 | 64 | 64 |
| Situbondo | 64 | 72 | 38 | 62 | 55 |
| Number of values | 238 | 300 | 92 | 253 | 242 |
| Average value | 1,98 | 2,5 | 0,76 | 2,11 | 2,01 |

Table 4 shows the value/score regarding frequent group meetings of 1.98, group benefits for members 2.5, cooperation in procurement of inputs with cooperatives 0.76, marketing cooperation with Sugar Factory 2.11, cutting and transport cooperation with Sugar Factory 2, 01, from a maximum value of 3 (often carried out by farmer groups). The percentage between the score obtained compared to the maximum score is presented in the following graph:

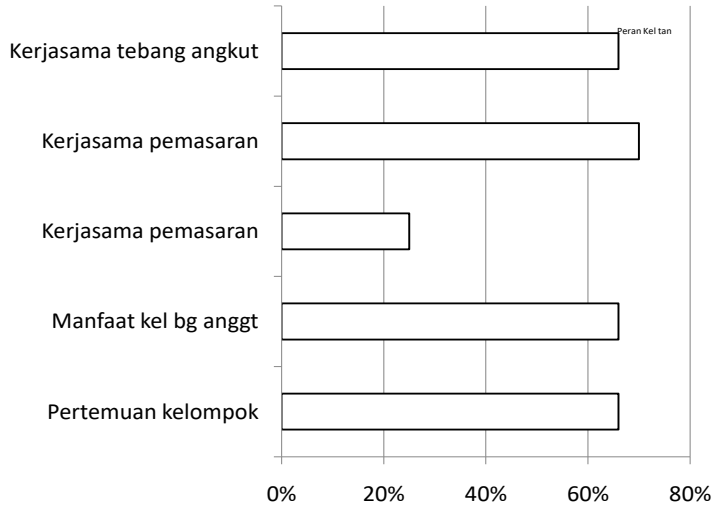


Figure 4. Graph of the Role of Farmer Groups in Developing Sugarcane Production

The graph above shows that the role of farmer groups in developing sugar cane production as assessed by the frequency of holding group meetings > 60%, group benefits for members > 60%, marketing cooperation with sugar factories > 60%, cutting and transport cooperation > 60, is quite significant (often done). Meanwhile, the procurement of inputs from cooperatives is <50%, which is categorized as rarely done.

 https://doi.org/10.5281/zenodo.14597773

Farming groups consisting of individual farmers as sugarcane cultivating subjects are a determining factor in efforts to increase production. In accordance with the Decree of the Minister of Agriculture No.881/Kpts/OT.210/12/1988, it is stipulated that farmer groups play a role and function as farming production units, learning classes, and vehicles for cooperation between groups and other parties. Farmer groups are a forum for farmers to get various information about various things including: strengthening relationships between farmer group members, modern farming business systems, solving problems in the agricultural sector, as a learning space, organizing and as a production unit.

The results of Lestari's research (2023) in Tulungagung district, show that the role of farmer groups in efforts to increase farmer independence includes as a study group for members of the farmer group in an effort to increase farmer knowledge, farmer skills and farmer attitudes, teach farmers to be more independent, as a means of farmer cooperation.The obstacles faced in not being able to run the organization optimally are the limited level of knowledge of human resources, the reluctance of farmers to participate in farmer groups. Farmers become members of farmer groups only to be able to get subsidized fertilizer assistance, or other forms of assistance.

In carrying out farming activities, farmers are expected to be able to be independent and resilient in carrying out farming activities, no longer expecting subsidies and protection from the government. Farmer independence to realize farming resilience is a condition that can be grown through the empowerment process. Regarding farmer independence, key sources conveyed the following:

> “Currently, sugar cane farmers are starting to become independent in terms of financing their farming business. Collective credit offers from banks were rejected because they had been able to provide enough from the previous season's farming results. ZA fertilizer is now no longer subsidized. Farmers prefer to be independent because they can choose where the sugarcane will be sold, after the buy-and-drop system is implemented. Due to the increase in production inputs, the income of sugar cane farmers decreases, the profits are smaller compared to rice and corn commodities. However, farmers here still grow sugar cane because the soil is sandy, not suitable for rice and corn." (Nur Amin - Sugar Cane Farmers Association - Tulungagung).
>
> “In Situbondo, sugar cane farmers prefer to be independent because they are not tied to sugar factories. Sugarcane sales are free, whenever the farmer likes, and the money earned is cash. If you partner with a sugar factory, you will get money after the sugar is sold at auction." (Chandra – Head of Duwet Village – Situbondo).

## The Role of Media in Pentahelix Synergy

The role of mass media on pentahelix synergy 0.5%. This is the smallest role among the other actors. According to farmers, media is not needed for production promotion as in promotion in the tourism sector. The emergence of the figure of 0.5% comes from the presence of the media as a function of controlling government activities, when the arrival and distribution of subsidized fertilizer, or other project assistance in Tulungagung district.

The results of observations on indicators that influence the variable role of the media in coaching sugar cane farmers include; (1) Media visits to sugar cane groups/farmers, (2)

 https://doi.org/10.5281/zenodo.14597773

Promotional cooperation, (3) voicing problems to other stakeholders. (4) Facilitate broadcasting of farmers' successes. The results of the analysis are as follows:

**Table 6. The Role of the Media in the Development of Sugarcane Production**

| Regency | Media Visits | Promotional Cooperation | Voicing Problem | Media Release |
|---|---|---|---|---|
| Sidoarjo | 3 | 0 | 0 | 1 |
| Tulungagung | 0 | 0 | 0 | 0 |
| Ngawi | 0 | 0 | 0 | 0 |
| Situbondo | 0 | 0 | 3 | 1 |
| Number of values | 3 | 0 | 3 | 2 |
| Average value | 0,03 | 0 | 0,03 | 0,02 |

Table 6 shows the value/score regarding frequent media visits to sugarcane farmers of 0.03, promotional cooperation 0, voicing farmers' problems 0.03, facilitation of media broadcasts on farmers' successes 0.02, out of a maximum value of 3 (often carried out by the media) . The percentage between the score obtained compared to the maximum score is presented in the following graph:

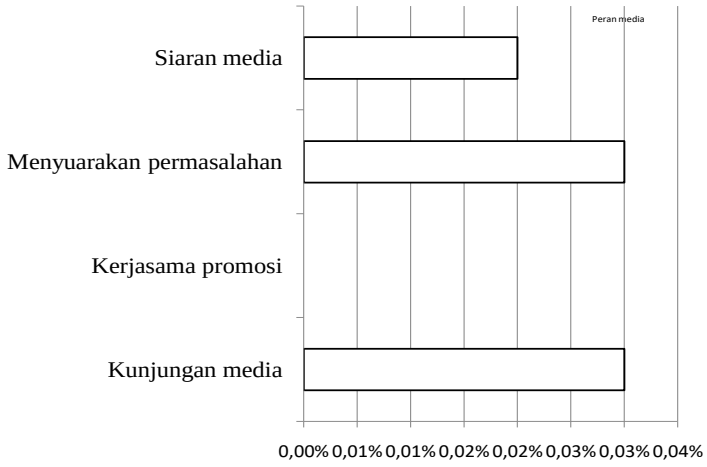


**Figure 5. Graphic of the Role of Media in the Development of Sugarcane Production**

The graph above shows that the role of the media in visiting farmers and voicing farmers' problems is <0.03%, holding media broadcasts on farmers' successes <0.03%, and product promotion collaboration is 0% (never implemented). In Tulungagung, the mass media is sometimes present during the distribution of subsidized fertilizer. In Situbondo, the media was present to voice the wishes of farmers. For example, in determining yields, setting cutting times, sugar auction disputes, and so on.

 https://doi.org/10.5281/zenodo.14597773

"Mass media are usually present when subsidized fertilizer is distributed." (Nur Amin, Sugarcane Farmers Association – Tulungagung)

"The mass media helps farmers' problems, including voicing transparency in determining yields by sugar factories, delays in DOs, equal distribution of subsidized fertilizers. "Recently the media has highlighted the existence of points regarding permits and indications for the scales used." (Reza, Situbondo Regency Agricultural Service Staff).

The media informs news, opinions, to society in general. The aim is for it to be read by the public and stakeholders, including the government, sugar factories, supplier entrepreneurs, people's representatives, so that those concerned can solve problems together regarding things experienced by farmers. According to 'Kompas', there are 6 functions of mass media, namely monitoring, information, interpretation, value transmission, education and entertainment. The supervisory function is more appropriate to carry out during this time in the cane fields, even though the role is still very small.

## Conclusion

he results of research conducted by researchers, and then we analyzed the data, we can conclude that the role of developing government actors/stakeholders is 32%, sugar factories 23.5%, academics 7%, farmer groups 37.5%, and mass media 0 .5 %.

### Reference

Aribowo,H, Wirapraja Alexander, & Dian Putra Yudithia, 2018. Implementasi Kaloborasi Pentahelix Dalam Rangka Mengembangkan Potensi Pariwisata Di Jawa Timur Serta Meningkatakan Perekoniam Domestik. Surabaya : Jurnal Menajemen Bisnis (Mebis). Vol 3 no 1.

Carayannis, E. G., Barth, T. D., & Campbell, D. F, 2012. The Quintuple Helix Innovation Model: Global Warming as a Chal-lenge and Driver for Innovation. Journal of Innovation and En-trepreneurship, 1(1), 2. https://doi.org/10.1186/2192-5372-12

Creswell, J. W. (2016). Research Design Pendekatan Kualitatif, Kuantitatif, dan Mixed.Yogyakarta: Pustaka Belajar

_____and Leydesdorff L, 1995. The Triple Helix. University-Industry-Government Relations: Laboratory for Knowledge-Based Economic Development.

Fyodorov,M.V, Peshina, E V, Gredina, O V, & Avdeev, P A, 2012. Pentahelix as a Concept of Knowledge Production in Innovative Economy. Upravlenec.Gaspersz,Vincent, 2005. Total Quality Management. Jakarta: PT. Gramedia. Pustaka Utama. Harinoto. 2011

Lestari,Fitria, 2021. Sinergitas Aktor Penta Helix Dalam Pembangunan Inklusif Pada Sektor Pariwisata Berbasis Agrowisata Kampoeng Kopi. Skripsi. Fakultas Ilmu Sosial Dan Ilmu Politik Universitas Lampung.

Permentan no 67 tahun 2016. Tentang Kelembagaan Petani.

Undang-Undang no 19 tahun 2013. Tentang Perlindungan Dan Pemberdayaan Petani.

Undang-Undang no 16 tahun 2006. Tentang Sistem Penyuluhan Pertanian.

Undang-Undang no 23 tahun 2014. Tentang Pemerintahan Daerah.

Undang-Undang no 40 tahun 1999. Tentang Pers.

Yunas,N, Setia. 2019. Implementasi Konsep Penta Helix dalam Pengembangan Potensi desa melalui Model Lumbung Ekonomi Desa di Provinsi Jawa Timur. Matra Pembaharuan Jurnal Inovasi Kebijakan. Vol 3 No 1.Hal 37-46