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Enhancing Independence in Farmer Groups during Tertiary Irrigation Network Rehabilitation: Insights from Contemporary Wisdom in West Java Province

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Abstract: The aim of this study is to highlight the significant enhancement in the autonomy of farm groups in West Java due to the implementation of contemporary wisdom-based strategies. Examining the impact of the Tertiary Irrigation Network Rehabilitation Program on the autonomy of farm groups in West Java. The method involves both qualitative and quantitative approaches. Qualitative data could be gathered through interviews or surveys with the farmers and government officials involved in the program. This would provide insights into the collaboration between water-user farmer associations and the government, and how this has influenced the autonomy of the farming systems. Quantitative data could be collected on the changes in cropping patterns and the increase in the cropping index as a result of the program. The resulted in changes in cropping, designs and a rise in the farming ratio, aiding in the ultimate aim of boosting agricultural food yield. The effectiveness of these methods is also credited to the partnership between agricultural water-user groups and the administration.

Keywords; Autonomy, farm, irrigation, cropping patterns, water -user farmers

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1. Introduction

Three types of independence that farmer groups need to have are: Intellectual Independence an increase in the cropping index, contributing to the overall goal of increasing food crop production. The success of these strategies is also attributed to the collaboration between water-user farmer associations and the government., Managerial independence and Material independence (Saparuddin, 2014).

1. Intellectual independence: in this sense of independence, as a field supervisor, his nature is only as a conveyor of both technical advice and existing government policies, so farmer groups can make their own decisions.
2. Managerial independence: farmer groups have been able to distribute tasks between each existing management.
3. Material independence: in this material independence, farmer groups have been able to manage and utilize natural and human resources in the environment.

Parker (2006) stated the characteristics of independence as follows:

1). Responsibility means having a duty to complete something and being held accountable for the results of one's work.

2). Independence is a condition where a person does not depend on authority and does not need direction.

3). Autonomy and freedom to make your own decisions. The ability to determine one's own direction (self-determination) means being able to control or influence what will happen to oneself.

4). Problem solving skills.

5). With adequate support and direction, individuals will be encouraged to find solutions to their own practical relational problems.

Supriyono (1998) determined that strategy comes from the Greek word Strategos with the roots stratos and ag, stratos means "military" and ag means "to lead" (Haming, 2011). The word strategy means choosing how resources might be used effectively to achieve a stated goal. Strategies are planned to adapt to the internal and external environment.

Strategy is the key policies and decisions used by management, which have a major impact on holistic performance. These policies and decisions usually involve important resource commitments and cannot be easily replaced Buzzel and Gale (1987) *in* Anoraga (2004). In addition, strategy is in one word, competitive advantage, the sole purpose of strategic planning is to enable a company to obtain, as efficiently as possible, the ultimate position that can be maintained in the face of its competitors (Ohmae 1983 *in* Anoraga 2004).

Under the Indonesian Republic's Statute No. 18 of 2002, development is defined as an endeavor in science and technology that leverages validated scientific theories and principles with the goal of enhancing the functionality, utility, and implementation of existing science and technology, or to generate new technology.

Irrigation network rehabilitation activities can run well, if supported by initial data, both planning data and implementation data, at least supporting data must be available, including: Overview Map scale 1:25,000; Irrigation area scheme depicting the location and names of main & secondary canals; Construction implementation drawings; Planning Explanation Note (design note); Damage report book and maintenance log book (BCP); Disaster incident reports include natural disasters in the form of floods, earthquakes and ordinary disasters such as cliff landslides; overtopping, gate jams, cracked embankments, water theft, disputes between irrigation water users, etc. (Ministry of PUPR 2016, Kesume *et al* 2017). Ministry of PUPR (2016) states that this data and information will be very useful for decision makers in determining the scope of rehabilitation, as well as useful for rehabilitation planners in finding the causes of damage and determining how to repair it.

Local wisdom in this research is related to how the management/maintenance of a local innovation, tertiary irrigation networks, can still be a facility that plays a role in increasing the income of farmer groups, while maintaining environmental sustainability. Thus, local wisdom is a formulation of the identity of the community. This identity includes vision, mission and values in one's life, these values are also what can be learned as an effort to continue living with others and at the same time as an effort to maintain the environment based on local wisdom which has universal meaning. Order (*cosmos*) in a system will radiate the value of beauty which is supported and formed by order (Sandiasa, 2015). Beauty holds a lot of information, so that interaction patterns between various subsystems with dimensions can occur in a proportional, balanced, harmonious manner (Sulistyo et al., 2010).

Local wisdom in the contemporary era is related to changes in behavior, in this case related to tertiary irrigation networks, namely how changes in the construction of irrigation networks have occurred from ancient times to the present day. Irrigation network is the irrigation network has changed from the past to contemporary times. The development of irrigation in Indonesia towards an advanced and resilient irrigation system cannot be separated from traditional irrigation which has been developed thousands of years ago. Advanced or modern irrigation may arise due to efforts to improve or continue the development of existing traditions, in general it is strongly influenced by local geographical characteristics and the development of agricultural cultivation.

Local wisdom related to irrigation networks in Indonesia in the contemporary era can be related to the irrigation category which is experiencing changes in handling irrigation development, to changes in irrigation network management models, as well as changes to priority programs related to irrigation networks in Indonesia. Starting from the 19th century until now entering the 20th century, many changes have occurred in the management of irrigation networks related to

aspects of local wisdom. Four categories of irrigation are considered in handling irrigation development.

1. The government is implementing a comprehensive irrigation system, including the need to distribute water regularly.
2. The irrigation system is considered important, the construction of which was pioneered by the local community with permanent irrigation buildings.
3. Irrigation systems built by local communities with local characteristics with less permanent buildings.
4. The community uses drainage channels and rivers in a very simple way. However, these categories do not yet describe the level of development in irrigation system management.

There are two irrigation management models.

1. A management system based on the policy of planting patterns that have been determined in the irrigation system built by the government. The planting pattern in question is a rotation between sugar cane plants which received support from the colonial government as an export commodity and people's crops, namely rice and secondary crops.
2. A management system based on local irrigation practices with proportional distribution of water according to the size of the area irrigated. This second model is prominently practiced in Subak in addition to traditional irrigation in Java.

The main buildings are all structures planned in rivers or streams to divert water into irrigation networks, usually equipped with mud bags to reduce excessive sediment content and make it possible to measure and regulate incoming water. Irrigation is the business of providing, regulating and disposing of irrigation water to support agriculture, the types of which include surface irrigation, underground water irrigation, pump irrigation and pond irrigation. In irrigation, a network is needed in the form of channels and complementary buildings which are a single unit required for regulating irrigation water which includes the provision, distribution, delivery, use and disposal of irrigation water. The irrigation network itself is divided into:

i. The principal water distribution system is a component of the irrigation system that includes the central structure, main/primary conduit, drainage canal, structure for diversion, diversion structure, and auxiliary structures.

ii. The secondary water distribution system is a component of the irrigation system that includes secondary conduits, drainage conduits, structure for diversion, structure for diversion, structure for diversion, and auxiliary structures.

iii. A tertiary water distribution system is a water distribution system that serves as irrigation water service infrastructure in tertiary plots consisting of tertiary conduits, quaternary conduits and drainage conduits, tertiary compartments, quaternary compartments, and auxiliary structures.

On the other hand, the irrigation network in Indonesia began to be developed since Indonesia was no longer able to achieve rice self-sufficiency. Initially, irrigation itself was considered important by the government in general and farmers themselves in particular. Bacha et al.'s research (2009) shows that irrigation is useful for reducing poverty.

Government policy regarding the management of irrigation systems has been established in 2 (two) legal bases, Law No. 7 of 2004 concerning Water Resources and Government Regulation no. 20 of 2006 concerning Irrigation. These two policies mandate: (i) the responsibility for managing tertiary irrigation networks up to the farming level is the authority of the Ministry/Institution/Department in charge of Public Works Sector Affairs, Water Resources Sub-Affairs and (ii) village (tertiary) irrigation networks are the rights and farmers' responsibilities as water users. In maintaining tertiary networks, farmers will usually form groups gathered in the Water User Farmers Association (P3A) which will maintain the channels based on their capabilities.

The recommendation to create a water maintenance institution from the government, at the farmer level there was already an institution that regulated it (local wisdom). Local wisdom is customs in society which are the embodiment of cultural values based on the results of local innovation, which can be utilized optimally and directed positively in various forms and efforts to overcome problems (Supadi, 2009). Besides that, local wisdom will continue to guide society throughout the ages (Hidayat & Vidjanarko, 2008). One of the local wisdoms in maintaining tertiary networks at the farmer level is the Subak system in Bali Province. The Subak framework contains the values contained in the concept of local wisdom. "The local wisdom subscribed to by the Balinese, that life must be adapted to the changing environment, and that happiness can only be achieved if the life is in balance, a concept locally known as "Tri hita karana" (Pitana, 2010). According to (Rachman 2009), in order to manage water resources (irrigation) efficiently and with the dimension of empowering farmers, institutional adjustments are needed, both for government, private and farmer institutions.

1.2 Problem Formulation

Irrigation network rehabilitation activities carried out by the village government are carried out at the tertiary irrigation network level, as well as village irrigation networks or also for the construction of small-scale dams, village reservoirs, spring ponds, river basins, etc. Implementing a participatory approach in rehabilitation activities is an effort to empower farmer groups in managing irrigation in their respective work areas. The existence and performance of farmer groups greatly determines the success of the participation approach implemented in irrigation network rehabilitation and OP activities. In line with these conditions, Molden (2002), Katumi et al. (2002), and Bouman (2003) stated that agricultural production in the future will

continue to be influenced by climate anomalies and uncertainties which have an impact on fluctuations in water supply, the occurrence of droughts and floods, which are detrimental to farming.

Rehabilitation of the tertiary irrigation network in rice fields was carried out to improve the availability of tertiary irrigation water at the farm level. By ensuring a guaranteed supply of tertiary irrigation water for rice farming, farmer groups are expected to be motivated to adopt rice technology according to recommendations. Based on this, the hypothesis is that the more guaranteed the irrigation water supply, the more responsive the farmer group will be to adopting rice cultivation technology for the success of their farming business.

1. What are the internal and external factors in the participation of farmer groups in the management of tertiary irrigation networks in West Java Province?
2. What are the internal and external factors in the sustainability of the irrigation network system on corporate management in West Java Province?
3. What are the priority strategies in developing the independence of farmer groups receiving the tertiary irrigation network rehabilitation program with contemporary wisdom in West Java Province?

1.3 Research Purposes

In general, it is analyzing the internal and external factors of the tertiary irrigation network rehabilitation program with contemporary wisdom to obtain alternative strategies for developing the independence of farmer groups receiving assistance programs. The objectives of this research are as follows:

1. Analyzing internal and external factors in farmer group participation in tertiary irrigation network management in West Java Province.
2. Analyzing internal and external factors in the sustainability of irrigation network systems on corporate management in West Java Province.
3. Determining priority strategies in developing the independence of farmer groups receiving tertiary irrigation network rehabilitation programs with contemporary wisdom in West Java Province.

1 .4 Implications of Empirical Studies

1). The results of this research are generally expected to be useful for policy suggestions on strategies for developing the independence of farmer groups receiving tertiary irrigation network rehabilitation programs using contemporary wisdom.

2). This research is related to the aim of developing the independence of farmer groups receiving the tertiary irrigation network rehabilitation program with contemporary wisdom. Furthermore, the results of the analysis of the independence strategy of farmer groups receiving the tertiary

irrigation network rehabilitation program are useful in knowing the internal and external factors in the program being implemented, which will then determine how the strategy is selected based on the level of interest related to developing the group's own independence from the impact of the aid program. All of these results will become input and alternative material for policy suggestions in determining alternative strategies for the independence of farmer groups receiving tertiary irrigation network rehabilitation programs with the wisdom of Farmer Group Ecoliteracy through Evaluation of the Level of Damage to Irrigation Rehabilitation.

The availability of good irrigation facilities and infrastructure is of course highly expected by farmer groups. Failure to function or damage to one of the buildings and tertiary irrigation networks will affect the performance of the existing tertiary irrigation system, resulting in decreased efficiency and effectiveness of tertiary irrigation. The decline in the performance of the existing tertiary irrigation system will certainly affect the farming process and have a direct impact on the quality and quantity of crops, especially rice plants, which are the main commodity of paddy field farming in Indonesia. With the availability of tertiary irrigation facilities, one of which is a good tertiary irrigation channel, it will be able to increase the rice planting index (IP) which was previously once a year to twice or more.

Management of irrigation water from upstream to downstream of tertiary irrigation channels requires adequate irrigation facilities and infrastructure. These facilities and infrastructure can be in the form of small dams, as well as farm level canals. Malfunctioning or damage to one of the tertiary irrigation structures will affect the performance of the existing tertiary irrigation system, resulting in efficiency and effectiveness.

The role of farmer groups in maintaining damaged irrigation networks in West Java province is very necessary in all aspects of irrigation, where farmer groups are required to participate in this activity from the planning process to implementation. This participation can be realized in the form of labor, building materials, funds and so on. Repair/rehabilitation of rural irrigation networks includes rehabilitation/repair of water protection structures, both in the form of weirs and supporting structures, as well as repairing channels including channel linings and other structures, such as dividing boxes, siphons, gutters, waterfall buildings, culverts, etc.

Irrigation is functional and sustainable, development needs to reduce external investment as much as possible, in accordance with the economic capabilities of the community and farmers and the independence supported by farmers. Irrigation will run well if the participation and cooperation of farmer groups and communities with stakeholders goes well. In line with the above efforts, the role of social capital is very determining in managing small irrigation, therefore the role of social capital needs to be increased. The function of social capital as social glue will maintain the unity of members of society from the smallest or household level to the national level together. In the construction and development of irrigation, it is better to include the participation of farmer groups in dealing with the level of damage to irrigation networks, farmer groups through self-management rather than a tender system (which is usually complicated) and target-oriented. Apart from better performance, the self-management system

fosters a sense of belonging to the farmer group and a high sense of responsibility. In this way, high self-reliance will grow, resulting in efficiency, and targets can be achieved and sometimes even exceed targets. Another advantage is mutual supervision and cross-control between members of the farmer group.

The importance of agricultural collectives needs to be amplified as their current influence is still restricted and has not yet resulted in a significant enhancement in their duties and responsibilities in the progression and administration of irrigation systems. When it comes to the restoration of damaged irrigation systems, it should be a collaborative effort involving governmental bodies and local community stakeholders. This collaboration is anticipated to elevate the earnings of farmers, broaden job prospects within and beyond the agricultural sector and outside farming, as well as preventing damage to land and the environment and ownership of productive assets. Sustainability of the Irrigation Network System on Farming Corporate Management. Competition for water use is increasing over time due to the need for and additional education.

1. 5 Ecoliteracy of Farmer Groups through Evaluation of the Level of Damage to Irrigation Rehabilitation

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Another advantage is mutual supervision and cross-control between members of the farmer group. The role of farmer groups must be further enhanced because currently it is still limited and has not yet led to an increase in function and role in the development and management of irrigation, especially irrigation. At the level of damage, irrigation rehabilitation should involve the role of government and local (village) stakeholders, so that it is hoped that it can improve farmers' income levels, expand employment opportunities in farming and outside farming, as well as preventing damage to land and the environment and ownership of productive assets.

1.6. Sustainability of the Irrigation Network System on Farming Corporation Management

Competition for water users are increasing over time due to demand and population growth. In addition, drought and flood problems will continue to affect water supplies (Molden, 2002; Katumi et al., 2002, Bouman, 2003). If not managed well , food security will be threatened, the frequency of conflict will increase, and poverty will spread (Gleick , 2000) . ; Rizani . 2010 ; Jocom et al. 2016) . One type of management that needs to be considered is the issue of irrigation, which flows water from a certain source through channels to irrigate crops on farmers' land. Irrigation network management is an activity that includes operation, maintenance and rehabilitation of irrigation networks. Sustainable irrigation management is needed in an effort to optimize the potential of water resources and reduce problems that arise (Bakar 2008).

Damage to irrigation networks can be caused by various factors, including (i) natural factors such as floods, volcanic eruptions, landslides, erosion and sedimentation; (ii) animal disturbance factors such as livestock crossing channels and embankments, rats and crabs breaking holes in the walls of irrigation water channels; (iii) human factors that intentionally or unintentionally damage water gates, break into embankments, building blocks, graze livestock on embankments, and create fish ponds in channels; (iv) error factors in planning and exploitation such as miscalculations, incorrect consideration of the situation and conditions of the field, falsification

of cement mixtures and building materials, wrong measurements, and errors when operating doors (Indriani, et.al. 2019).

According to Rachman (2009), several problems arise in irrigation management, namely: (a) the number of water class areas increases, without control; (b) the location of rice fields relative to the channel is not taken into account in water distribution, and in technological recommendations at the downstream (tail end); (c) illegal tapping of water with pumps continues without sanctions; (d) many water gates are not functioning; and (e) rice productivity varies greatly between upstream and downstream areas. This is inseparable from institutional elements and policy tools that have not functioned effectively in efforts to make the public aware of the importance of water management. Rachman (2009) further pointed out other problems in irrigation water management: (i) the view that irrigation water is a public good causes people to tend to be less efficient in using water, (ii) unclear *water rights* . and obligations in water use, causing water user association organizations to be less effective, (iii) institutional mechanisms for allocating water resources are not functioning, which in turn will lead to inefficiency in water use and the potential for conflict in water allocation.

Institutions that operate and maintain irrigation networks are carried out in stages. According to the Government Regulation of the Republic of Indonesia Number 20 of 2006, especially in Chapter IV articles 16, 17 and 18, it explains that the authority for managing main irrigation (primary and secondary) is the responsibility of the central government and regional governments with the following provisions: 1. Irrigation Areas (DI) with areas above 3000 ha are the authority and responsibility of the central government, 2. Irrigation areas (DI) between 1000 ha–3000 ha are the authority of the provincial government. 3. Irrigation areas (DI) smaller than 1000 ha are fully the authority and responsibility of the district government, whereas if they are across districts then they are the responsibility of the provincial government. 4. The tertiary network is entirely the responsibility of farmer organizations (P3A).

Efforts to overcome irrigation problems have been implemented, starting from practical efforts to improve the performance of an irrigation system, then reforming the bureaucracy that manages the irrigation system, reform involving the redefinition of the relationship between the bureaucracy and farmers who use water, up to the transfer of management (Mollinga and Bolding, 2004). Management transfer involving water users is very important because investing in infrastructure development in the water resources sector is increasingly expensive (Pasandaran, 2002, Rosegrant et al., 2002). Previously reminded by Van der Giessen (1946); Pasandaran and Rosegrant (1995), that the construction of this infrastructure takes quite a long time, for large-scale irrigation and large reservoirs it takes around 10 years.

Water management involves cross-ministries, water has an important role in every human life. Therefore, managing corporate governance is a necessity. The establishment of the Irrigation Management Institution (KPI). The KPI is composed of three main components: (1) government institutions, which include the Central Government, provincial governments, and district/city government bodies are responsiblities for irrigation, (2) water user farmer associations, such as

P3A, GP3A, and IP3A, and (3) the Irrigation Commission (Komir), which includes provincial, inter-provincial, and district/city Irrigation Commissions. Each of these components has unique characteristics when viewed from the perspective of their membership. Government institutions are made up entirely of government members, while the Irrigation Commission is composed of a mix of government and non-government members (other stakeholders). The water user farmer associations, whether P3A, GP3A, or IP3A, are entirely made up of members from the farming community. P3A is an association of water-using farmers, GP3A is a combination of P3A and IP3A, and IP3A is the parent of GP3A.

From the explanation above, it can be concluded that the problem of successful agricultural irrigation is greatly influenced by various related institutions as well as water users. Therefore, the role of institutions becomes important and the question is how big this role is implemented. And what is no less important is the wisdom of farmers as water users in maintaining the irrigation network. Farmers' behavior in managing irrigation channels is greatly influenced by each farmer's ownership of ecoliteracy.

On the other hand, the current performance of small irrigation is very worrying. The damage to the irrigation network in Indonesia is quite large and the recent climate change phenomenon has greatly influenced the degradation of irrigation functions. Meanwhile, food production growth is largely determined by the availability of irrigation water. In this regard, the role of government is very important. Government steps and policies that must be implemented play a role in encouraging the realization of adequate irrigation facilities.

The facts in the field of tertiary irrigation networks in local wisdom are that we often hear of overlapping use of irrigation water channels . Because water is not only a source of life for drinking and household needs, as well as functioning as transportation infrastructure, Te but also a need for other sectors, such as industry, washing services and other business activities. And there are still no buildings for water, which the building is a building that functions to share water from primary channel or secondary channel of both fruits channel or more, each of which has a discharge smaller.

Affects the inside distribution of irrigation water ultimately evenly in a tertiary irrigation canal when it will cause conflict fighting for water. It is acknowledged that institutions such as P3A are management and maintenance of tertiary irrigation networks existing, does not rule out the possibility that it will Undesirable things happen if P3A officers are unable to distribute water regularly evenly, it will cause jealousy so that conflict can occur.

1.7 Farmer Group Theory and Concepts

Aditama (2014) states that a group is a group of people who have a common goal, who interact with each other to achieve a common goal, get to know each other, and view them as part of the group. In reality, humans establish relationships and form groups based on awareness of the formation of groups or unconsciously forming groups. This group makes people move more

dynamically in society. Farmer groups are groups of farmers/breeders/planters formed on the basis of similar interests, similar environmental conditions (social, economic, resource) and familiarity to improve and develop members' businesses (Danim, 2004).

Farmer group membership is 20-25 people or adjusted to the environmental conditions of the community and farming business (Haradi 2011). A farmer group is a group that consisting of adult men or women farmers as well as cadet farmers or young farmers who are informally bound in a group area on the basis of harmony and common needs and are in the sphere of influence and leadership of a farmer contact (Hurarah, 2010). The condition of farmer groups from year to year can be said to have not developed as expected or can be said to be stationary or even declining. Empirically, the description of the farmer groups is as follows: (1) The group classes do not correspond to the actual situation, their class status is higher but their activities, when measured by assessment scores, have low dynamics, and (2) some farmer groups have "disbanded" but are still registered (Ministry of Agriculture, 2012). Mardikanto (1993) states that a group is an association or unit of people who live together so that there is a reciprocal relationship and influence each other and have the awareness to help each other. Understanding the movement of agricultural development, you need to pay attention to farmer groups in the village (Nuryanti et al , 2011) .

Farmer groups are agricultural or livestock institutions that are formed on the basis of shared interests, similar environmental conditions (social, economic and resource) and familiarity to improve and develop the businesses of their members and are developed from, by and for farmers who know each other, are intimate, trust each other, have interests in farming, similarities both in terms of traditions, settlements, and the expanse of farming land (Mulayana, 2000). A farmer's group is an institution that unites farmers horizontally and can be formed by several units in one village, based on commodities, agricultural planting areas and gender (Rosdakarya, 2012). Thus, to understand the movement of agricultural development, is necessary to pay attention to farmer groups in the village (Soekartawi, 1986). A farmer group is defined as an institution at the farmer level that is formed to organize farmers in running their farming business (Suhardiyono, 1992).

Farmer groups are essentially to mobilize farmers' human resources. Farmer group development plays a role in improving farmers' knowledge, attitudes and skills (Sukiono, 2013). Farmer groups help farmers who are members to facilitate all needs ranging from purchasing production facilities to handling post-harvest and marketing (Tohir, 1991). Farmer groups are also an important point for implementing and translating the concept of farmers' rights into policies, strategies and programs that are feasible in a unified whole and developed into operational steps (Trimo, 2006). Farmer groups have three main functions, namely as a learning unit, a cooperation unit and a production unit. If these three units are already running, they will be directed to become business group units. The success of farmer groups in carrying out these functions cannot be separated from the influence of members' hard work in group activities to achieve mutually agreed goals (Yusnadi, 2011).

1. 8 Theories and Concepts of Local Wisdom

Local wisdom in the humanities disciplines is also called local genius, local genius is cultural identity, local wisdom is the personality or social character of a country which makes that country have the option to assimilate, even develop cultures from outside or different countries into its personal and capacity. (Agus et al 2006, Blignaut & Moolman 2006). The character and personality are clearly in accordance with the perspective of existence in the local area so that there is no change in quality (Darusman, 1993). Local wisdom as a method for developing society and protecting oneself from bad foreign society (Depdikbud, 1993). Local wisdom can also be interpreted as a lifestyle and information as a methodology for daily life such as activities carried out by the wider community to meet their needs (Dirjen PMD, 1999) . Local wisdom is practices and tendencies that have been used by a group of individuals from one era to another until today it is still maintained by society as standard law in a particular area (Dumairy 1987, Sidharta 1997) . Based on this agreement, it can be explained that local wisdom can be considered as clever environmental thinking, full of environmental intelligence, good value, which is instilled and followed by individuals from the local area (Mac Kinnon 1996, Soeprapto 1993) . So it can be said that local wisdom is framed from the social benefits that exist in local communities and is identified with geological conditions from a broad perspective (Mitchell, 2000).

Basically, local wisdom is a way of thinking about life and information as well as a methodology different lives such as exercises carried out by the community in responding to various problems in meeting their needs (Nasikun, 1979). This term in English is conceptualized as local wisdom (local policy) or local knowledge (local knowledge) or local genius (local intelligence) (Prijono, 2000). Community groups have understanding, programs, training, implementation related to following, improving, developing components of their needs, taking into account the climate and human resources in their environment (Ostrom, 1992).

Departing from this understanding, local wisdom is something that is explicitly identified with a particular culture (neighborhood culture) and reflects the lifestyle of a particular local area (neighborhood local area) (Ryadi, 1981). In other words, local wisdom resides in local culture, Shiddiq (2014) explains that local wisdom is the primitive wisdom or knowledge of the community, which originates from the noble values of cultural traditions, and is used to regulate community life (Satria, 2002) . Local wisdom is real information that emerges from a significant stretch of development together with the environment and climate within the closest framework that has been able to come together (Soemarwoto, 1997). Such long and intrinsic transformative interactions in the public arena can make environmental insight a potential source of energy from the local area's information framework for each of us to live strongly and calmly (Soemarwoto, 1999). Local wisdom is not only a guide to a person's behavior, but on the other hand, it is equipped to dynamize an individual's life which is full of feelings of salt

1.9. Local Wisdom in Irrigation Systems

The administration of irrigation systems at the farm level has been established on a legal foundation, specifically through Government Regulation No. 20 of 2006 concerning Irrigation. This legal framework underscores that the "management of tertiary irrigation systems is the prerogative and duty of water-using farmers' associations" (Hafsari, 1999). In essence, this implies that the entire responsibility for the development and oversight of irrigation systems at the tertiary level rests with water-using farmers' associations, which are known by various names in different regions, such as Mitra Cai, Subak, HIPPA, Dharma Tirta, and groundwater-using farmers' associations (P3AT) (Tjahjono, 2000).

To ensure effective and sustainable development and management of irrigation systems, it is imperative to establish robust, autonomous, and empowered P3A institutions (Sebayar, 2014). These institutions play a pivotal role in enhancing agricultural productivity and output, thereby contributing to the well-being of farmers and bolstering national food security efforts (Mansoer, 2013). In essence, the principles governing irrigation management are rooted in justice (Sumardi, 1997). Therefore, there needs to be a regulatory mechanism to reach land on time, in the right amount and with the right money (Hansen and Stringhan, 1992). No matter how good the irrigation building design technology is, it still does not achieve justice if it excludes the aspect of deliberation or consensus (Hupper and Walker, 1989). Based on the government paradigm, the definition of good irrigation management requires a series of activities involving all aspects of operation and maintenance, starting from mobilizing personnel for cleaning, repairs and resolving conflicts regarding water distribution and planning for the next planting season (Syaukat 2009, Marica 2000).

Ideally, irrigation operations in the form of providing, regulating and distributing water are said to be good if the network, officers and central P3A are ready to achieve their targets, namely (1) the irrigation network is functioning well; (2) optimal water distribution is achieved; (3) pay attention to economic age according to plan (Wardana, 2000). There are four main components that can be used as measuring tools to see the reliability of technology according to Nur Afifah (2008), Setyawan et al (2013), namely being able to increase production and productivity; a stable water distribution system with increased reliability and predictability in the amount and time of water delivery; creating fair and equitable distribution of water, so that conflicts can be avoided; and ensuring sustainable development with physical and technological quality measures (which involve cost aspects) and environmental preservation (Redjekiningrum, 2011). The key word for irrigation is actually sustainability (Pusposutardjo, 1995). The definition of sustainability is the search for a set of policies and practices with the belief that the irrigation system will survive and function well (Pasandaran et al, 1984). Sustainability cannot work without culture, there must be cultural values that give soul and enthusiasm to sustainability (Prihatman, 2000). The idea and implementation of P3A, which began in Pelita V in the New Order era, has not been able to manage irrigation in a sustainable manner (Helmi, 1992).

2. Area of Study and Research Method

1.2. Research Approaches and Types

Approach study done through interviews, recording, observation and documentation. Types of research is to study descriptive combining qualitative with descriptive quantitative. Interview result will quantify with giving mark weights and ranking as well calculation percentage weighting and ranking based on thoughts and experiences respondents key.

1.3 Role Management as Researcher

The role of the researcher that can produce data and information in a way detailed, as well as, deep from respondents key related developing the independence of farmer groups receiving tertiary irrigation network rehabilitation programs with contemporary wisdom in West Java Province. Thus, researchers will provide data and information related to priority strategies for developing the independence of farmer groups receiving the tertiary irrigation network rehabilitation program with contemporary wisdom in West Java Province. The strategies obtained have a role in providing information for policy makers, both in the Central Government and Regional Governments in creating programs related to the development of tertiary irrigation networks with contemporary wisdom.

1.4 Research Sites

The Study was done in several location sub-districts in Karawang and Indramayu Regency. Execution time planned for September to November 2023.

Interview; The data collection technique that can be done by means of questions and answers addressed directly to the source. This technique is carried out to obtain the necessary data by using supporting facilities in the form of a list of open questions and will become questions that develop while at the research location.

Recording; This is one way to obtain data by recording the data obtained in the field and then entering the data into the recording system media.

Observation: A data collection method that involves various factors in its implementation. Observations are carried out without asking questions but are carried out by observing objects (surveys) at the research site. The aim is to match the data obtained with the actual situation.

Documentation: This is a qualitative data collection method. Documentation is used to obtain data and information in the form of books, archives, documents and images that can support researchers in conducting research.

Data analysis technique: This research uses a qualitative descriptive research approach. Descriptive research is a way of solving research problems by describing or depicting the condition of research subjects/objects based on existing facts. In other words, this qualitative descriptive method is able to analyze, describe and summarize conditions and situations from the

data collected. This method is widely used for research objects that develop as they are, cannot be manipulated, and the presence of the researcher cannot influence the dynamics of the object. On research qualitative formulation problem is the focus of research in nature, where later will develop after researcher plunge to field. After all identified in a way detailed and detailed, made matrix in accordance theory by David (2004). Next, match all over internal and external factors, the later strategy alternative generated from compile factors the until become an alternative strategy for sure more from one strategy. Analysis (SWOT) consisting of from Strengths (strengths), Weaknesses (weaknesses), Opportunities (opportunities), and Threats (threats) are one of the analysis that describe in a way clear circumstances faced by the company SWOT analysis is method systematic. For identify fourth factors these and the strategies that describe them best match between them. (Septiana Yuyun . 2013).

Strategic planning must analyze factors strategic company (strengths, weaknesses , opportunities and threats) in conditions existing at the time. The Factors strategic company arranged in SWOT matrix, which describes in a way clear how opportunities and threats external facing company can customized with its strengths and weaknesses. Technical strategy formulation used for analyzing, evaluating, and selecting strategies consists from three stages; collect summarizing data information and input basic requirements required by the organization for formulate is a strategy. Furthermore, is stage matching, focusing on viable alternative strategies with combine factors external and internal. For choose the specific and best strategy from various alternative strategies that exist for implemented.

SWOT Matrix

The scheme representing the SWOT Matrix is presented in Table 1, where the SWOT Matrix consists of 9 cells. There are 4 key factor cells, 4 strategy cells and 1 cell left blank (top left cell). Four strategy cells, labeled SO, WO, ST, and WT; developed after completing four key factor cells, labeled S, W, O, T. The aim of this step is to produce an alternative strategy which in this research is abbreviated as SA (Alternative Strategy) that can be implemented. The strategy formulation guidelines used can help speed up the process of matching key external and internal factors. When alternative strategies have been created based on the internal and external factors that have been compiled, the four quadrants must be taken into account in the process of selecting priority alternative strategies through subsequent analysis, namely QSPM .

QSPM Matrix

The fundamental structure of the QSPM (Quantitative Strategic Planning Matrix) results is as follows: The leftmost column of the QSPM comprises both external and internal factors, while the top row represents alternative strategies that can be put into action. Specifically, the left column of the QSPM draws information directly from the SWOT Matrix. In the adjacent column, which aligns with the external and internal factor columns (referred to as "Table 2, Column 1"), the weight assigned to each factor is documented—this weight is derived directly

from the QSPM Matrix. These matching tools typically generate alternative strategies that are viable for execution. However, it's essential to exercise discernment: not every strategy proposed by matching techniques should undergo assessment within the QSPM. Strategic planners can rely on sound intuitive judgment when selecting strategies to include in the QSPM (David, 2004).

Checking Validity towards Conclusion

Checking validity to conclusion done through analysis weighting and ranking in identification internal and external factors carried out in a way be careful and through based on results interviews and observations from respondents key. Additionally, results analysis calculation mark attraction on the QSPM matrix will be become checking validity to conclusion. Because of the conclusion obtained of priority strategies from results analysis on the QSPM matrix. When the total power value pull from the priority strategy obtained in the QSPM matrix has been determined with standard value of the QSPM strategy, i. e more from 4.00, then results conclusion has declared valid.

The Stages of Study

Analyzing internal and external factors in farmer group participation in tertiary irrigation network management in West Java Province . The steps for compiling a SWOT Matrix are as follows (David 2004, Weningsari 2012):

1) Identifying external opportunities from farmer group participation in tertiary irrigation network management in West Java Province .

2) Identifying external threats from farmer group participation in tertiary irrigation network management in West Java Province .

3) Identifying the internal strength of farmer group participation in the management of tertiary irrigation networks in West Java Province .

4) Identifying internal weaknesses in farmer group participation in tertiary irrigation network management in West Java Province .

5) Matching internal strengths with external opportunities and recording SO strategies in obtaining alternative strategies and priorities from farmer group participation in tertiary irrigation network management in West Java Province .

6) Matching internal strengths with external threats and recording ST's strategy in obtaining alternative strategies and priorities from farmer group participation in tertiary irrigation network management in West Java Province .

7) Matching internal weaknesses with external opportunities and recording WO strategies in obtaining alternative strategies and priorities from farmer group participation in tertiary irrigation network management in West Java Province .

8) Matching internal weaknesses with external threats and recording WT's strategy in obtaining alternative strategies and priorities from farmer group participation in tertiary irrigation network management in West Java Province . Analysis steps presented in Table 1.

Table 1 . SWOT Matrix in farmer group participation in tertiary irrigation network management in West Java Province .

	Strength (S)	Weakness (W)
Opportunities	SO Strategy (Quadrant I) Using power to take advantage of opportunities in farmer group participation in the management of tertiary irrigation networks in West Java Province.	WO Strategy (Quadrant III) Overcoming weaknesses by taking advantage of opportunities in farmer group participation in the management of tertiary irrigation networks in West Java Province.
Threats	ST Strategy (Quadrant II) Using force to avoid threats in the participation of farmer groups in the management of tertiary irrigation networks in West Java Province.	WT Strategy (Quadrant IV) Minimizing weaknesses and avoiding threats in the participation of farmer groups in the management of tertiary irrigation networks in West Java Province

Source: David (2004)

The aim of this step is to produce an alternative strategy which in this research is abbreviated as SA (Alternative Strategy) that can be implemented. The strategy formulation guidelines used can help speed up the process of matching key external and internal factors.

The steps for compiling a SWOT Matrix are as follows (David 2004, Weningsari 2012):

1) Identifying external opportunities from the sustainability of the irrigation network system for corporate management in West Java Province .

2) Identifying external threats from the sustainability of the irrigation network system to corporate management in West Java Province .

3) Identifying the internal strengths of the sustainability of the irrigation network system on corporate management in West Java Province .

4) Identifying internal weaknesses in the sustainability of the irrigation network system on corporate management in West Java Province .

5) Matching internal strengths with external opportunities and recording SO strategies in obtaining alternative strategies and priorities for the sustainability of the irrigation network system for corporate management in West Java Province .

6) Matching internal strengths with external threats and recording ST's strategy in obtaining alternative strategies and priorities for the sustainability of the irrigation network system for corporate management in West Java Province .

7) Matching internal weaknesses with external opportunities and noting WO Strategy in deriving alternative strategies and priorities from sustainability of the irrigation network system on corporate management in West Java Province .

8) Matching internal weaknesses with external threats and recording WT's strategy in obtaining alternative strategies and priorities for the sustainability of the irrigation network system for corporate management in West Java Province . Analysis steps presented in Table 2.

Table 1. SWOT Matrix in the sustainability of irrigation network systems for corporate management in West Java Province .

	Strength (S)	Weakness (W)
Opportunities	SO Strategy (Quadrant I) Using strengths to take advantage of opportunities in the sustainability of the irrigation network system for corporate management in West Java Province.	WO Strategy (Quadrant III) Overcoming weaknesses by exploiting opportunities in the sustainability of irrigation network systems for corporate management in West Java Province

Threats	ST Strategy (Quadrant II) Using force to avoid threats to the sustainability of the irrigation network system to corporate management in West Java Province.	WT Strategy (Quadrant IV) Minimizing weaknesses and avoiding threats in the sustainability of the irrigation network system to corporate management in West Java Province.

Source : David (2004)

The aim of this step is to produce an alternative strategy which in this research is abbreviated as SA (Alternative Strategy) that can be implemented. The strategy formulation guidelines used can help speed up the process of matching key external and internal factors. Then, when alternative strategies have been created based on the internal and external factors that have been compiled, the four quadrants must be taken into account in the process of selecting priority alternative strategies through subsequent analysis, namely QSP.

Determining priority strategies in developing the independence of farmer groups receiving tertiary irrigation network rehabilitation programs using contemporary wisdom in West Java Province .

Alternative strategy results obtained for develop independence of farmer groups receiving tertiary irrigation network rehabilitation programs with contemporary wisdom at the research location. Then alternative strategies will be sorted again based on the level of importance and attractiveness from good perceptions, in the form of experience, theory to realization in the field at the stakeholder level that is relevant to the research objectives. So the analysis is carried out using the QSPM (*Quantitative Strategic Planning Matric*) method.

A QSPM describes the elements of alternative strategies, key factors, the weight of the AS (*Attractiveness Score*), the attractiveness value, and the TAS (*Total Attractiveness Score*), which is called the total attractiveness value. The three new terms that have just been introduced are: (1) AS = Attractiveness value; (2) TAS = Total Attraction Value, and (3) Number of TAS. Definition and The explanation of the six steps to develop QSPM is as follows:

1) List the key external opportunities/threats and key internal strengths/weaknesses of the company in the left column of the QSPM.

2) The information is taken directly from Matirks SWOT. At least 10 internal success factors are included in the QSPM.

3) Give weight to each key external and internal factor. These weights are presented in the column to the right of the external and internal critical success factors column (2nd Column). Weights are obtained directly from the sample interviewed during the identification of external and internal factors.

4) The weight obtained from each sample is reprocessed, because the sample consists of 4 units. In addition, the total weight for the combined internal and external factors of the four samples for all external and internal factors is divided by 4.

5) Determining the AS value is defined as a number that indicates the relative attractiveness of each strategy over a particular set of alternatives. The AS value was determined by the four samples based on the level of interest in each stakeholder or corn agribusiness actor. The attractiveness value does not all have to be included in every external or internal factor, but is adjusted to the level of needs and interests of each corn agribusiness actor, in this case the four samples.

6) The range of AS values is from 1 to 4, namely: 1 = not interesting; 2 = somewhat interesting; 3 = reasonably attractive; and 4 = very interesting. For key factors that are not given an AS value, there is no need to add up the AS value (leave it blank). This means that external and internal factors have no influence on the choice of alternative strategy.

7) Calculating TAS is defined as the result of multiplying the converted weight by the AS value. The higher the total attractiveness value, the more attractive the alternative strategy is.

8) Calculate the total TAS value, namely by adding up the TAS in each QSPM strategy column. The number of TAS (STAS = *Score Total Attractiveness Score*) reveals the most attractive strategy in each set of alternatives. The higher the value indicates the more attractive the strategy is, taking into account all relevant internal and external critical factors that can influence strategic decisions. Analysis steps presented in Table 2.

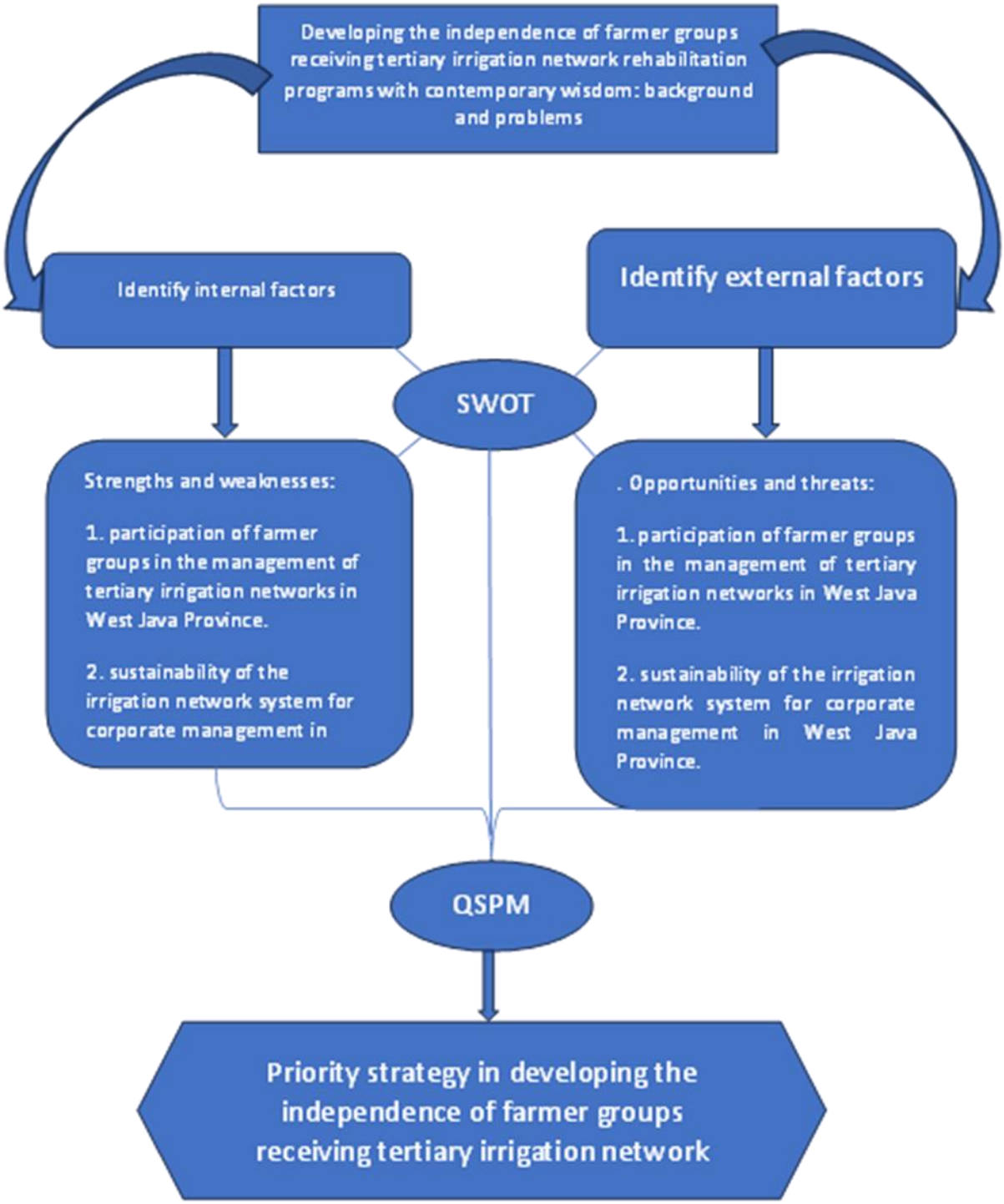
Developing the independence of farmer groups receiving tertiary irrigation network rehabilitation programs with contemporary wisdom: background and problems
Identify internal factors
Identify external factors
SWOT
Strengths and weaknesses:
1. participation of farmer groups in the management of tertiary irrigation networks in West Java Province.
2. sustainability of the irrigation network system for corporate management in
. Opportunities and threats:
1. participation of farmer groups in the management of tertiary irrigation networks in West Java Province.
2. sustainability of the irrigation network system for corporate management in West Java Province.
QSPM
Priority strategy in developing the independence of farmer groups receiving tertiary irrigation network

Table 1. QSPM matrix in developing the independence of farmer groups receiving tertiary irrigation network rehabilitation programs with contemporary wisdom in West Java Province

Key Factors	Weight	Strategy 1		Next Strategy	
		US	BAG	US	BAG
(1)	(2)	(3)	(4)	(5)	(6)THS
Strengths and weaknes for the result					
of Interview with the Respondents					
External with Key Factors	**0-1**	**0-1**	**0-1**	**0-1**	**0-1**
Numbers of Bags (STAS)	**0-1**	**0-1**	**0-1**	**0-1**	**0-1**
Sources (David 2004)					

3. Discussions and Result Analysis

Research Question 1. **What are the internal and external factors in the participation of farmer groups in the management of tertiary irrigation networks in West Java Province?**

The participation of farmer groups in the management of tertiary irrigation networks can be influenced by a variety of internal and external factors.

Internal Factors. Socio-economic characteristics of farmers, these include the number of dependents a farmer has and the land area owned by each farmer. Group participation; The level of participation within a Water Users Association (WUA), a farmer institution responsible for managing and developing irrigation networks at the tertiary level, can significantly impact how irrigation network management activities are carried out.

Table 2

Factors	Strengths	Weaknesses
Internal Factors	Farmers with larger landholdings may have more resources and motivation to engage in network management.	Smaller-scale farmers might face challenges due to limited resources and time constraints.
	High levels of participation within Water Users Associations (WUAs) can	Low participation levels may hinder collaboration, reduce

Factors	Strengths	Weaknesses
	lead to effective decision-making and better resource allocation.	accountability, and result in suboptimal network management.
External Factors	Favorable government policies, financial incentives, and technical assistance can encourage farmer groups to participate.	Inadequate government support or conflicting policies may hinder participation.
	Access to markets, value-added processing facilities, and infrastructure can enhance the economic viability of irrigation-based agriculture.	Lack of market access or poor infrastructure can discourage participation.
	Adapting to climate change through sustainable water management practices can improve network efficiency.	Climate variability, water scarcity, and environmental degradation pose challenges to effective network management.

External Factors: In Indonesia, government regulations have facilitated farmers' involvement in water resource management through Law No. 7/2004 and Government Regulation No. 20/2006 specifically related to irrigation. Additionally, the physical condition of the irrigation network significantly impacts the operational and maintenance activities undertaken by farmers. It is crucial to recognize that these factors may exhibit variations based on the unique context and geographical location. For a deeper comprehension, referring to specific studies or reports concerning the management of tertiary irrigation networks in West Java Province would be advantageous.

External Factors: Government regulations in Indonesia, farmers' participation in water resource management has been accommodated through Law No. 7/2004 and Government Regulation No. 20/2006 regarding irrigation. Physical condition of the irrigation network: The state of the irrigation network can affect the operations and maintenance activities carried out by the farmers.

It is important to note that these factors can vary depending on the specific context and location. For a more detailed understanding, it would be beneficial to refer to specific studies or reports related to the management of tertiary irrigation networks in West Java Province.

The QSPM analysis in a table 3 format:

Factors	**Strengths**	**Weaknesses**
Internal Factors		
Socio-economic characteristics	Farmers with larger landholdings generally have more resources and are more motivated to participate in network management.	Smaller-scale farmers might face challenges due to limited resources and time constraints.
Participation in WUAs	High levels of participation can lead to effective decision-making and better resource allocation.	Low participation levels may hinder collaboration, reduce accountability, and result in suboptimal network management.
External Factors		
Government regulations	Law No. 7/2004 and Government Regulation No. 20/2006 in Indonesia have facilitated farmers' involvement in water resource management.	Inadequate government support or conflicting policies may hinder participation.
Physical condition of the irrigation network	Access to markets, value-added processing facilities, and infrastructure can enhance the economic viability of irrigation-based agriculture.	Lack of market access or poor infrastructure can discourage participation.
Climate change adaptation	Sustainable water management practices can improve network efficiency.	Climate variability, water scarcity, and environmental degradation pose challenges to

Factors	Strengths	Weaknesses
		effective network management.

Research Question 2. **What are the internal and external factors in the sustainability of the irrigation network system on corporate management in West Java Province?**

The sustainability of the irrigation network system in West Java Province, Indonesia, is influenced by several internal and external factors:

Internal Factors:

1.Infrastructure condition, as of 2018, 46% of Indonesian irrigation infrastructure was reported to be moderately to heavily damaged. This affects the efficiency and effectiveness of the irrigation systems.

2. Management strategies: The irrigation management strategies, both human and structural, play a significant role in water demand and water efficiency.

3. Institutional strength: The strength of institutions and regulatory organizations managing water resources is crucial. Weak institutions can lead to mismanagement of water resources.

External Factors:

1. Climate change: influences water availability for irrigation. Rice production with a constant water ponding system has been found to contribute to climate change, as it emits methane (CH4) and other greenhouse gases.

2. Population Growth: The increasing population leads to higher food demands, which in turn increases the pressure on irrigation systems.

3. Multi-Stakeholder involvement: The government, farmers, water user associations (WUA), and local research institutions need to work together on the modernization of irrigation systems.

These factors need to be considered for the sustainable management of the irrigation network system in West Java Province. The important thing is to note that the modernization of irrigation systems needs to balance the increasing food demands of the growing population and the impacts of agriculture on climate change.

The **SWOT Matrix** for the sustainability of the irrigation network system in **West Java Province** is as follows:

Table 4. Internal Factors:

Strengths (S)	**Weaknesses (W)**
Infrastructure Condition	-
Management Strategies	X
Institutional Strength	X

Table 5.

External Factors:

Opportunities (O)	**Threats (T)**
Climate Change	T
Population Growth	O
Multi-Stakeholder Involvement	O

1. **Infrastructure Condition**:

As of 2018, 46% of Indonesian irrigation infrastructure was reported to be moderately to heavily damaged. This affects the efficiency and effectiveness of the irrigation systems.

2. **Management Strategies**:

The irrigation management strategies, both human and structural, play a significant role in water demand and water efficiency. Strengthening management practices can enhance sustainability.

3. **Institutional Strength**:

The strength of institutions and regulatory organizations managing water resources is crucial. Weak institutions can lead to mismanagement of water resources. Strengthening institutional capacity is essential.

4. **Climate Change**:

Opportunity: Climate change influences water availability for irrigation. Adapting irrigation practices to changing climate patterns can improve sustainability.

Threat: Rice production with a constant water ponding system contributes to climate change by emitting methane (CH4) and other greenhouse gases. Balancing food production and environmental impact is critical.

5. **Population Growth**:

Opportunity: The increasing population leads to higher food demands, creating opportunities for sustainable irrigation practices to meet these needs.

Threat: The pressure on irrigation systems intensifies as the population grows. Proper management is crucial.

6. **Multi-Stakeholder Involvement**:

Opportunity: Collaboration among the government, farmers, water user associations (WUA), and local research institutions can drive modernization of irrigation systems.

Threat: Lack of coordination may hinder progress. Engaging all stakeholders is vital.

The achieving sustainable irrigation in West Java Province, it i requires addressing both internal weaknesses and external threats while capitalizing on opportunities and leveraging existing strengths. Balancing food security and environmental impact is essential for long-term success.

Analyze the internal and external factors affecting the sustainability of the irrigation network system in West Java Province a QSPM (Quantitative Strategic Planning Matrix).

Internal Factors:

1. **Infrastructure Condition**:

Strength (S): The existing infrastructure provides a foundation for irrigation systems.

Weakness (W): Damaged infrastructure affects efficiency and effectiveness.

2. **Management Strategies**:

Strength (S): Effective human and structural management strategies enhance water demand and efficiency.

Weakness (W): Inadequate management can hinder system performance.

3. **Institutional Strength**:

Strength (S): Strong institutions are crucial for proper water resource management.

Weakness (W): Weak institutions may lead to mismanagement of water resources.

External Factors:

1. **Climate Change**:

Opportunity (O): Addressing climate change can improve water availability.

Threat (T): Rice production contributes to climate change through methane emissions.

2. **Population Growth**:

Opportunity (O): Meeting food demands due to population growth.

Threat (T): Increased pressure on irrigation systems

3. **Multi-Stakeholder Involvement**:

Opportunity (O): Collaboration among government, farmers, and research institutions.

Threat (T): Lack of coordination may hinder modernization efforts.

SWOT Matrix: Table. 6

Factors	**Strengths (S)**	**Weaknesses (W)**
Internal	Infrastructure Condition	Management Strategies

Factors	**Strengths (S)**	**Weaknesses (W)**
	Institutional Strength	
External	Climate Change (Opportunity)	Population Growth (Threat)
	Multi-Stakeholder Involvement (Opportunity)	

Balancing food demands, environmental impact, and efficient irrigation management is critical for sustainable development in West Java Province. The SWOT analysis provides insights for strategic decision-making in irrigation system modernization.

Research Question 3. What are the priority strategies in developing the independence of farmer groups receiving the tertiary irrigation network rehabilitation program with contemporary wisdom in West Java Province?

The priority strategies for developing the independence of farmer groups receiving the tertiary irrigation network rehabilitation program in West Java Province could involve several key aspects:

1. Improving Infrastructure; One of the primary strategies is to improve the tertiary irrigation networks. This can lead to changes in cropping patterns and an increase in the cropping index. The Indonesian government has prioritized increasing food crop production, and one of the adaptations to climate change in agriculture is to establish policies for the development and modification of infrastructure that can save water resources management.

2. Community Involvement; In the implementation of irrigation network improvement activities, the community of farmers using water usually works together in determining the location for repairs and making suggestions for improvements to the government. This collective decision-making process can foster a sense of ownership and responsibility among the farmers, thereby promoting their independence.

3.Addressing Climate change; Climate change is a significant obstacle in increasing production. Therefore, strategies should also focus on climate change adaptation measures. This could involve the development of drought-resistant crop varieties and the implementation of sustainable farming practices. Enhancing agricultural Productivity. There is a positive and significant relationship between poverty and agricultural productivity growth. Therefore, strategies to enhance agricultural productivity can contribute to the economic independence of farmer groups.

4. Promoting Efficient Water Management; The study shows a significant negative relationship between irrigation and poverty, highlighting the critical role irrigation plays in helping small-scale farmers increase their income. Therefore, promoting efficient water management practices can be a key strategy.

There are four principal elements of the irrigation network system:

1. The main building: This is a complex structure planned and built along a river or water source to divert water to the irrigation channel.

2. Network carrier and equipment: The network carrier building carries water from the main and tertiary networks. The main network channel consists of primary and secondary channels.

3. Waste channels: The waste channel consists of the main waste channel, which drains excess water from the secondary and tertiary networks out of the irrigation area.

4. Tertiary Plot: The tertiary plot comprises rice field plots (100 ha, 150 ha) equipped with a tertiary channel and a quarter channel.

Table. 7 The priority strategies for developing the independence of farmer groups receiving the tertiary irrigation network rehabilitation program in West Java Province:

Priority Strategies	**Objective**	**Impact**	**Rationale**
1. Improving Infrastructure	Enhance tertiary irrigation networks	Changes in cropping patterns, increased cropping index	Vital for efficient water management and food crop production
2. Community Involvement	Engage farmers in decision-making	Fosters ownership and responsibility	Active participation leads to system success
3. Addressing Climate Change	Adapt to climate change	Implement adaptation measures (e.g., drought-resistant crops, sustainable practices)	Resilience against climate challenges
4. Enhancing Agricultural	Boost productivity	Economic independence	Linked to poverty reduction

Priority Strategies	Objective	Impact	Rationale
Productivity			
5. Promoting Efficient Water Management	Optimize water use	Sustainable irrigation	Balancing yield and environmental conservation

These integrated strategies can empower farmer groups and contribute to the sustainable development of West Java Province's irrigation systems.

Table. 8 SWOT (Strengths, Weaknesses, Opportunities, and Threats) matrix

	Positive	Negative
Internal	**Strengths:** 1. Infrastructure improvements can increase the cropping index. 2. Community involvement fosters ownership and responsibility. 3. Strategies to enhance productivity can contribute to economic independence. 4. Efficient water management practices can increase farmers' income.	**Weaknesses:** 1. Potential lack of resources for infrastructure improvements. 2. Possible resistance to change among farmers. 3. Dependence on external support for productivity enhancement strategies. 4. Challenges in implementing efficient water management practices.
External	**Opportunities:** 1. Climate change adaptation measures can help increase production.	**Threats:** 1. Impact of climate change on farming practices.

	Positive	Negative
	2. External opportunities for farmer group participation in network management.	2. Potential changes in government policies or funding.

The direction of the hypothesis towards goal 3 involves determining priority strategies. Depending on the total value of the attractiveness results from the analysis, and the number of identified internal and external factors that influence the formation of alternative strategies, 4-8 strategies can be determined. Each type of strategy (SO, ST, WO, WT) has 1-2 priorities, from a total of 4 types of strategies, 4-8 priority strategies related to developing the independence of farmer groups receiving tertiary irrigation network rehabilitation programs with contemporary wisdom in West Java Province can be obtained.

The study was carried out in several locations sub-districts in Karawang Indramayu, Regency. Execution time is planned for September to November 2023. The results of this research provide insight into the results of interviews with 10 farmers at groups in West Java.

Table. 9 result of interview with farmers at West Java.

Section	Question	Response
Demographic Information	Role in the farmer group	Farmer Group Member
	Duration in the farmer group	Averagely 90 years
Tertiary Irrigation Network Rehabilitation	Knowledge about the program	Repairing the channel network has a very good impact on farmers’

Section	Question	Response
Program		land
	Understanding of the program	Very good because it has a real impact on farmers
	Impact on farming practices	Very good because it can increase the planting index
Farmer Group Independence	Independence rating (1-10)	80%
	Main factors contributing to independence	Processing livestock manure into usable organic fertilizer
	Challenges to independence	Finding water sources
Contemporary Wisdom Use	Incorporation into practice	Find out about every new thing and innovation on YouTube
	Example of useful contemporary wisdom	Making the latest innovations in agricultural products
SWOT Analysis	Strengths	Compactness
	Weaknesses	There is still a lack of knowledge and innovation
	Opportunities	Can create the latest innovations in the agricultural sector

Section	Question	Response
	Threats	Crop failure due to pests
SWOT Matrix	Strategies	Creating solidarity and trying new things that can increase the group's cultivation

Conclusion

The implementation of contemporary wisdom-based strategies has significantly bolstered the autonomy of farm groups in West Java. These strategies, meticulously designed to optimize material flows within the system, enhance system functionality and management, and align with socio-economic values, have yielded remarkable improvements in the tertiary irrigation network. As a result, cropping patterns have shifted, and the cropping index has risen, contributing to the overarching goal of augmenting food crop production. The success of these strategies owes much to the collaborative efforts between water-user farmer associations and the government. However, it is essential to recognize that self-governance within agricultural structures is multifaceted, encompassing elements of biotechnology and decision-making. A comprehensive analysis, focusing on integration, reliance, and impact, underscores the need for ongoing initiatives to safeguard and enhance the self-sufficiency of these farming communities

Internal factors: Socio-Economic Characteristics of Farmers: Strengths: Farmers with larger land holdings may have more resources and motivation to engage in network management.

Weaknesses: Smaller-scale farmers might face challenges due to limited resources and time constraints. Group Participation within Water Users Associations (WUAs**)** have strength**s**: High levels of participation within WUAs can lead to effective decision-making and better resource allocation. Weaknesses, is low participation levels may hinder collaboration, reduce accountability, and result in suboptimal network management. External factors: Favorable Government Policies, Financial Incentives, and Technical Assistance: Strengths: Encouraging policies, financial incentives, and technical support can motivate farmer groups to participate. Weaknesses: Inadequate government support or conflicting policies may hinder participation. Access to Markets, Value-Added Processing Facilities, and Infrastructure: Strengths: Improved market access and infrastructure enhance the economic viability of irrigation-based agriculture. Weaknesse**s**: Lack of market access or poor infrastructure can discourage participation. Adapting to Climate Change through Sustainable Water Management Practice**s**: Strength**s**: Sustainable water management practices can improve network efficiency. Weaknesses: Climate variability, water scarcity, and environmental degradation pose challenges to effective network management.

The external factors wield considerable influence. Favorable government policies, financial incentives, and technical assistance encourage farmer groups to actively participate. Conversely, inadequate policies or insufficient support can pose challenges. while substantial progress has been made, continuous efforts are necessary to maintain and enhance the self-sufficiency of farming communities. Ongoing initiatives should address both internal and external factors to ensure sustained success. Regarding internal factors, the socio-economic characteristics of farmers play a significant role. Farmers with larger land holdings may have more resources and motivation to engage in network management. However, smaller-scale farmers might face challenges due to limited resources and time constraints.

Group participation within Water Users Associations (WUAs) is another internal factor. High levels of participation within WUAs can lead to effective decision-making and better resource allocation. External factors, such as favorable government policies, financial incentives, and technical assistance, also play a critical role. Encouraging policies, financial incentives, and technical support can motivate farmer groups to actively participate. However, inadequate policies or insufficient support can pose challenges. The significant progress has been made, ongoing initiatives are essential to ensure the continued success and self-sufficiency of these farming communities. Addressing both internal and external factors is crucial for sustained progress.

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