

## INSTITUTIONAL STRENGTHENING AND P3A EMPOWERMENT LEVEL IN IRRIGATION WATER MANAGEMENT

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### ABSTRACT

*The insufficient irrigation water availability for paddy and crop planting program also occurred because of the increased of irrigation water users factor and an ineffective organization on irrigation water management. One of the water management and irrigation canal system societies that was developed from, by and for water user farmers in Indonesia is the Water User Farmers Society (P3A). The Law no 7 Year 2004, on Water Resource stated that the P3A is the irrigation water management society that is assigned to distribute the irrigation water to the paddy field. It is expected that water user farmer association members will be able to manage the irrigation water, so that the need for irrigation water for paddy farming can be fulfilled. In fact, most of P3A in Indonesia have not been able to act and function as a facilitator and catalyst. The top-down establishment of the irrigation water management was one of the factors that brought about the inability of the P3A to implement its role and function in the irrigation water management (Kurnia 1995; Pasandaran 2008), resulting in only a small number of P3A actively carried out the assignment to manage the irrigation water properly. Therefore, strengthening is needed to enable the P3A society carry out its duty and function. With regard to the strategic position of the P3A society in the irrigation water management, a suitable and continuous management that integrates the government support and extension service starting from the upstream to downstream that adapt to the supporting capacity of the P3A is needed. The research method being carried out was statistical analysis (correlation test) on the P3A institutional strengthening variables, and its empowerment level. The result of the analysis presented that the P3A institutional strengthening (Y1) clearly and positively correlated its empowerment.*

**Keywords:** Irrigation, P3A, Correlation (Tau Kendall)

### 1. INTRODUCTION

Water is the vital natural resource for the life of man, for agriculture the availability has become rare and limited. For farmer's business, the irrigation water availability is one of the factors that defined the productivity level. The low food crop (paddy and cash crop) intensity was the result of the unequal dispersal and inefficient irrigation water utilizing. The water irrigation for paddy field distribution tends to be conventional, wasteful and lack of cropping pattern consideration. The effect is, in a long dry season, the water stock in the reservoir or dam is sufficient enough to water the paddy. During the rainy season water is abundant, even caused disaster because the water is not distributed evenly to the entire irrigation canal system, resulting in the delayed planting season.

Furthermore, the Ministry of Agriculture effort to plant paddy and cash crop was unsuccessful due to insufficient water availability.

The availability of irrigation water for the paddy and cash crop planting program was also insufficient due to the increase of irrigation water users and ineffectiveness of irrigation water management society. One of the water management and irrigation canal system societies that was developed from, by and for water user farmers in Indonesia is the Water User Farmers Society (P3A). The Law no 7 Year 2004, on Water Resource stated that the P3A is the irrigation water management society that is assigned to distribute the irrigation water to the paddy field. (Budiasa IW. 2010) Historically, P3A had been appointed as irrigation water management organization, since the implementation of *Irrigation Management*

*Transfer* (IMT) in year 1987. It is expected that water user farmer society members will be to manage the irrigation water so that the need for irrigation water for paddy farming could be fulfilled. (Sundari et al 2015) In fact, most of P3A in Indonesia have not been able to act and function as a facilitator and catalyst.

The *top-down* establishment of the irrigation water management was one of the factors that brought about the inability of the P3A to implement its role and function in the irrigation water management (Kurnia 1995; Pasandaran 2008), resulting in only a small number of P3A carried out actively the assignment to manage the irrigation water properly. Therefore, in order for the P3A to carry out its role and function suitably, it needed to be strengthened. RI Law no 19 year 2013 on the Farmers Protection and Empowerment emphasized that farmer's empowerment (including water user farmers) is every effort to enhance the farmers' ability to carry out duty and irrigation water management to support better farm business through education and training that involved extension service in the assistance. With regard to the strategic position of the P3A society an accurate and sustainable irrigation water management that integrates the government support and extension service starting from the upstream to downstream that adapt to the supporting capacity of the P3A is needed.

## Method

### 1.1. Location

The research was carried out at AWO irrigation area that spread in 8 villages (Alesilurung, Benteng, Tobarakka, Lompoloang, Awota, Kaluku, Pangi, Simpellu, Bulete dan Lauwa), and in sub-district area (sub-district Pitumpanua and sub-district Keera), Wajo regency, South Sulawesi Province.

### 1.2. Data Collection Method

The research was carried out through structured interview technique using questionnaire as a tool to obtain data. (Effendi R, Tukiran. 2014) Data collection activity was done by the researcher assisted by an enumerator. The total number of respondent was 150. Respondents were purposely chosen (*purposive sampling*) i.e. water user farmers (management and/or P3A member)

### 1.3. Data Analysis Method

$$T = \frac{2S}{n(n-1)}$$

Where:

T = tau Kendall Correlation coefficient

S = rank X and Y total difference

n = total number of sample

## 2. RESULTS

### 2.1. P3A Institutional Strengthening

The P3A institutional strengthening is the effort and processes taken by various parties (government, private, extension service instructor and farmer groups) to improve the P3A ability in irrigation water management. The strengthening efforts and processes carried out by the government, private parties, (Prabowo A. 2015) extension service instructor and P3A administration is meant as an entire intervention (regulation socialization, program implementation, sanction uphold) that had been done or provided by the government in strengthening the irrigation water management, as an extension service function implementation, carried out by the existing instructors to motivate, facilitate and catalyst the P3A administration in water irrigation management, and as a manifestation of farmers group function in cooperating, discussing and information sharing.

### Government Regulation Socialization

One of the Government Regulation Socialization to support the P3A farmers is through regulation socialization; (Liou J. 2004) it is the government effort and process to implement formal regulation related to irrigation water management. Regulation socialization indicator by various parties could be implemented as a regulation where its function covered the establishment of an extension system carried out by experts to assist, as a concern in motivation, facilitation and catalyst the P3A administration in the irrigation water management, and as a manifestation of the farmers group function as cooperation. From the obtained interview result, in general the respondents have the ability to socialize the agreed regulation, as shown in the socialization graphic as followed: 42 respondents chose the regulation socialization, 23

respondents chose regulation implementation statement, 11 respondents chose water distribution statement, and 74 respondents chose the sanction upholding statement, these described that the regulation socialization implemented by the government has a big influence on the irrigation water management and the P3A empowerment.

### **Private and Extension Instructor Regulation Socialization**

One of the Extension Instructor/Private Regulation Socialization support to the P3A farmers is through regulation socialization of effort and process, that is carried out by the extension instructor and private in implementing formal regulation regarding the irrigation water management. From the obtained interview, in general the respondents have high determination to increase their involvement in the irrigation water management, the regulation socialization indicator is as followed; 5 respondents chose the regulation socialization statement, 56 respondents chose the regulation implementation statement, 86 respondent chose the regulation information statement, and 3 respondents chose the regulation upholding, these showed that the regulation socialization that had been carried out by the extension service instructor and private were well accepted by the respondents.

### **C. Regulation Socialization by the P3A Administration**

The regulation socialization carried out by the P3A administration in irrigation water management, by the socialization is meant that the member and P3A administration accept and implement the entire regulation on the irrigation system management and the complement buildings/infrastructure such as the operation of regulator box and tertiary box. From the obtained interview, in general the respondents have the capability to implement and socialize the regulation to the P3A group, it can be observed in the regulation socialization graphic as followed; 19 respondents chose regulation socialization statement, 62 respondents chose regulation implementation statement, 48 respondents chose regulation information statement, 21 respondents chose the regulation upholding

statement, this showed most of the respondents (62 respondents) chose the regulation implementation.

### **Sanction Applied by the Government**

The government applied sanction to the members and P3A administration in order that the P3A farmers comply with what was agreed by, and this is the responsibility of all members and P3A administration, this shows the government role in the irrigation water management had deeply affected the farmers' participation. From the interview it was obtained that the respondents have the capability to carry out the entire management regulation. The sanction implemented to the members or the administration who violated the regulation, can be observed at the following graphic sanction; 42 respondents chose the sanction information statement, 18 respondents chose the sanction socialization statement, 15 respondents chose the sanction implementation statement, and 75 respondents chose the sanction upholding statement. Most of the respondents have chosen sanction upholding statement and few respondents chose the sanction implementation and sanction socialization.

### **A. Sanction Implementation by the Extension Service Instructor/Private Party**

Sanction implemented by the extension service instructor and the private party provided support for the sanction implementation, this is the extension service instructor and the private party participation to establish cooperation in the irrigation water management. The outcome of the interview presented was that in general the respondents have the capability or determination to improve the irrigation water management, can be seen in the graphic of sanction implemented by the extension service instructor and private party as followed; 7 respondents chose sanction information statement, 49 respondents chose sanction socialization statement, 87 respondents chose sanction implementation statement, and 7 respondents chose the sanction upholding statement, this showed that most of the respondents chose sanction implementation statement, and only few chose sanction upholding and information statement.

### **Sanction implemented by the P3A administration.**

The sanction implemented by the member and P3A administration, had confirmed that to have the irrigation water distributed evenly and fairly, the P3A administration supported the implementation of sanction for any violation being taken by the member and the administration. The outcome of the interview was, that in general the respondent had the capability to accept the water irrigation management with binding quality can be seen in the above mentioned graphic as followed; 19 respondents chose the sanction information statement, 71 respondents chose the sanction socialization statement, 41 respondents chose the sanction implementation statement, and 19 respondents chose the sanction upholding, this pointed out that most of the respondents chose the sanction socialization and implementation statement, few respondents chose the sanction upholding and information statement.

#### **Extension Service Improvement by the Government**

The deep concern of the government on the irrigation water management had brought about the effort of the government to improve the extension service for the member and P3A administration. The obtained output of the interview was that in general the respondent has the capability to improve the extension service as shown in the following extension service improvement graphic; 10 respondents chose the socialization statement, 21 respondents chose the assistance statement, 15 respondents chose the technical assistance statement, and 104 respondents chose the active extension service instructor statement, this pointed out that majority of the respondents chose the active extension service instructor statement and only few respondents chose the socialization, assistance and technical support statement.

#### **B. Extension Service Improvement by Extension Service Instructor and Private Party**

Peningkatan penyuluhan yang melibatkan pihak penyuluh maupun pihak swasta memberi gambaran bahwa peningkatan penyuluhan bagi petani sangat di harapkan untuk terwujudnya peningkatan tata kelola air irigasi dan penguatan kelembagaan P3A dalam pengelolaan air irigasi yang berkesinambungan. The obtained output of the interview was that in general the respondents have the capability to improve the extension

service as shown in the following graphic; 1 respondent chose socialization statement, 20 respondents chose supporting statement, 110 respondents chose technical assistance, and 19 respondents chose active extension service instructor statement, this pointed out that the majority of the respondents chose the technical assistance statements and small number of respondents chose socialization, support, and active extension service instructor statement.

#### **C. P3A Administration Extension Service Improvement**

Improvement on the Extension Service by the P3A administration, describes the role of the P3A administration role in the irrigation water management, presented an anticipation for the P3A farmer group to enhance their enthusiasm to the continuous irrigation water management. The result of the interview stated that in general the respondent had the capability in irrigation water management, this can be seen in the above-mentioned graphic as followed; 12 respondent chose socialization statement, 103 respondents chose assistance in the irrigation water management, 19 respondents chose technical assistance in the irrigation water management, and 16 respondents chose active extension service instructor in irrigation water management, this showed that the majority of the respondents chose assistance in the water irrigation management and small number of the respondents chose socialization, active extension service instructor, and technical assistance.

#### **D. Government Discipline Level**

The farmers' community in the rural area was enthused by the Government level of discipline. That the role of the government to improve the members and the P3A administration loyalty has a motive and the regulation implementation is very important for the P3A farmers and its members. The interview result presented that in general the respondent had the capability in the matter of irrigation water management discipline, shown in the above-mentioned graphic as followed; 51 respondents chose discipline socialization statement, 32 respondents chose collective obedience statement, 12 respondents chose collective agreement statement, and 55 respondents chose collective discipline statement, this pointed out that the majority of the respondents chose

collective and socialization obedience statement, and a small number of the respondents chose collective agreement and discipline statement.

#### **E. Private Party and Extension Service Instructor Discipline level**

The Extension Service Instructor and Private party discipline level showed that extension service instructor role in improving the member and P3A administration discipline in irrigation water management is very big and the implementation of the discipline is very important for the P3A farmer and its members. From the interview result it was obtained that in general the respondents have the capability to improve their discipline. The interview result presented that in general the respondents have the capability to improve their discipline in the irrigation water management, this can be noticed at the above-mentioned graphic as followed; 3 respondents chose discipline socialization statement, 53 respondents chose the collective obedience statement, 90 respondents chose collective agreement statement, and 4 respondents chose collective obedience statement, this pointed out that the majority of the respondents chose collective agreement and obedience statement and a small number of respondent chose collective discipline and discipline socialization statement.

#### **F. P3A Administration Discipline level**

P3A discipline level in the irrigation water management showed member best participation level and effort to develop the role of the P3A administration in the irrigation water management, showed that the P3A member discipline improvement in the irrigation water management has a significant influence. From the interview result it was obtained that in general the respondents have the capability to improve their role in irrigation water management as showed in the graphic as followed; 11 respondents chose discipline socialization statement, 55 respondents chose the collective obedience statement, 45 respondents chose collective agreement statement, and 39 respondents chose collective discipline statement, this pointed out that most of the respondent chose collective obedience, discipline and agreement statements, and a small number of respondents chose discipline socialization statement.

## **2. P3A Empowerment Description**

P3A empowerment is characteristics to farmer's resource (member as well P3A administration) that differentiate them with another. In this research the indicators of the member and P3A empowerment process are: the participation level, competency level, the ability to synergize associate and evenly distributed irrigation water application level carried out individually as well as in group and the effort to have irrigation water management in order and continuously.

#### **A. P3A Member Participation Level**

The P3A member participation level in the irrigation water management is good and has a responsibility towards the P3A group member necessity for the realization of continuous irrigation water management. From the interview result it was obtained that in general the respondents have the capability to enhance the member and administration participation as shown in the above mentioned graphic as follows; 60 respondents chose active meeting statement, 1 respondent chose P3A regulation socialization statement, 3 respondents chose active P3A with Extension service instructor statement, and 86 respondent chose active P3A voluntary work statement, this is pointed out that the P3A members participation irrigation water management is sufficient, most of the respondents chose the active P3A voluntary work and active meeting statements, and a small number of respondents chose P3A regulation socialization statement and active P3A with the extension service instructor statement.

#### **B. P3A Administration Participation Level**

The P3A Administration participation level has big influence in irrigation water management; the participation of P3A Administration can improve the members role in controlling continuous irrigation water management. From the interview result it was obtained that in general the respondents, the members of P3A and also the P3A administration have the capability to manage the irrigation water properly, as shown in the above-mentioned graphic as follows; 6 respondents chose active meeting statement, 11 respondents chose P3A regulation socialization statement, 124 respondents chose active P3A with the extension service instructor statement, and 9 respondents chose active P3A voluntary work statement, this

showed that the P3A members participation in the irrigation water management is very good.

### C. Extension Service Instructor Participation

Extension service instructor participation level described the influence of the extension service instructor in the irrigation water management is very big, towards the members and P3A administration necessity in the irrigation water management. From the interview it was found out that in general the respondents responded to the efforts of the extension service instructor to develop farmers' capability to participate in the irrigation water management as showed in the graphic as followed; 20 respondents chose active meeting statement, 58 respondents chose regulation socialization statement, 17 respondents chose active P3A with Extension Service Instructor statement, and 55 respondents chose active P3A voluntary work statement, this showed that the respondents majority chose active P3A with Extension Service Instructor and regulation socialization. 58 respondent chose regulation socialization and 55 respondents chose active P3A voluntary work.

### A. P3A Member Competency Level

Kompetensi anggota P3A tercermin adanya usaha-usaha pemenuhan pelayanan pemanfaatan air irigasi ini menggambarkan bahwa pengelolaan air irigasi sangat baik, anggota P3A memiliki semangat kuat untuk dapat memenuhi harapan atas pengelolaan air irigasi. From the interview it was found out that in general the respondents have the ability to manage and organize the irrigation water in a kinship spirit, showed in the graphic as followed; 76 respondents chose water distribution statement, 19 respondents chose conflict dealing statement, 12 respondents chose financial administration statement, and 43 respondents chose P3A contribution management statement, this showed that the P3A member competency level in irrigation water management is sufficient, as showed in the graphic as follows; the majority of the respondents chose water distribution statement and P3A contribution management.

### B. P3A Administration Competency Level

The P3A administration competency level has a big influence in the irrigation water management, especially in the members participation improvement in the irrigation system

management, being active with the extension service instructor, good conflict dealing, sufficient administration management and active P3A contribution management. The outcome obtained from the interview stated that in general the respondents have capability as shown in the following graphic; 16 respondents chose water distribution, 113 respondents chose conflict dealing, 17 respondents chose financial administration, and 4 respondents chose P3A contribution management, this showed that the P3A administration competency level in the irrigation water management is sufficient, shown in the administration competency level graphic, most of the respondents chose conflict dealing and a small number of respondents chose water distribution, financial management, and P3A contribution management.

### C. Extension Service Instructor and Government Competency Level

The government and extension service instructor competency level in the irrigation water management influence is very high towards the improvement of the role of extension service instructor, government and the extension service instructor are the motivator for the existence of farm area management that give enough attention for presence of healthy environment as the facility and infrastructure to improve the agricultural yield. The output of the interview was the respondents has the capability to improve their capacity in P3A farmer skill, so that it will be easier to look for performance innovation expected by the respondent whereas the extension service instructor competency is not sufficient yet, although the government provided the opportunity to prepare the extension service instructor potency, this is shown in the graphic as followed; 39 respondents chose water distribution statement, 15 respondents chose conflict dealing statement, 33 respondents chose financial administration statement, and 63 respondents chose P3A contribution management statement, this was inspiring that the government and the extension service instructor competency is sufficient.

### D. P3A Administration Association Synergy

P3A Administration association synergy in the irrigation water management is the effort of the P3A farmers group to facilitate member in fulfilling the need for irrigation water, this described that the association synergy established by the P3A (Marliati. 2008) administration need a

respond from the community especially farmers and the community at the irrigation location.

The output of the interview presented that in general the respondents have the capability to establish the association synergy between P3A administration as the representative of the farmers' group with the business party runs well and have an abundant production, the graphic showed the following; 42 respondents chose business association statement, 15 respondents chose association with the administration statement, 19 respondents chose the association with the water manager statement, and 74 respondent chose the production statement, this described that the P3A administration association synergy has an important role in the irrigation water management, the majority of the respondents chose business association and production association.

#### **E. P3A Member Association Synergy**

P3A member association synergy in the irrigation water management has a very big influence on the P3A member performance, to be able to establish an association with business enterprise, especially those who can accommodate farmers' harvest. The out of the interview concluded that in general the respondents have the capability to establish business that will provide profit to both side, between farmers and business man so that the association synergy for the farmer can be implemented as expected by P3A. The above-mentioned graphic described the participation of the farmer to develop association synergy in agriculture business, as followed; 25 respondents chose business association statement, 43 respondents chose association with the administration statement, 73 respondents chose association with the water management statement, and 9 respondents chose production association statement, this showed that most of the respondents chose association with water management, association with the administration and business association.

#### **F. Private party and Extension Service Instructor Association Synergy**

Private party and Extension Service Instructor Synergy in the irrigation water management is sufficient. This synergy is collaboration in the effort to develop an association on the agriculture production supplying chain whereas the association

among various effective and efficient economic performers, however the established association is not suitable to the association concept.

#### **Association Synergy**

The outcome of the interview stated that in general the respondents have limited capability to establish association with business enterprise however the respondents were motivated to develop an association at the farmer business as presented in the above-mentioned graphic; 14 respondent chose business association statement, 60 respondents chose association with the administration statement, 34 respondents chose association with the water management statement, and 42 respondents chose association in production statement, this showed that the role of the extension service instructor and private party in the irrigation water management, has a big influence in the farmer business association development.

#### **G. Water Utilizing Distribution Level**

The level of water utilizing distribution by the P3A member and administration in irrigation water management, and in the water utilizing sometimes is uncontrollable, some of the member farmer gets the water improperly, do not conform with rice field they have, this often created conflict between the irrigation water users. From the output of the interview it is concluded, that in general the respondents have the capability to control themselves if the water supply is limited and the water distribution is disturbed, the areal grouping system is not properly controlled so that the need for water is not easy to fulfill, as shown in the above-mentioned graphic; 7 respondents chose limited water debit statement, 24 respondents chose limited water distribution statement, 65 respondents chose sufficient water distribution statement and 54 respondents chose fair water distribution, this described that water utilizing and distribution is sufficient, however the respondents majority chose sufficient and fair water distribution.

#### **H. Water utilizing distribution level**

The water utilizing and distribution by the government and the extension service instructor in the irrigation water management is good enough, however there are still people who distribute water unevenly, when the water distributed looked uneven, this was due to what farmers did, they built their own waterway not within the agreed rule

by the farmer group. The above-mentioned graphic showed that based on the result of the interview, in general the respondents have the following capability; 11 respondents chose limited water debit statement, 17 respondents chose limited water distribution statement, 66 respondents chose sufficient water distribution statement and 56 respondents chose fair water distribution statement, this showed that the water distribution and utilizing by the government and the extension service instructor is sufficient, however most of the respondent still chose sufficient and fair water distribution.

### 3. The relation of P3A potency level and P3A Institutional Empowerment

The P3A capacity relation development correlated significantly and positively with the P3A institutional empowerment and potency based on the correlation analysis result that the correlation is real and positive in other words  $H_0$  hypothesis is rejected or  $H_1$  is accepted.

### 3. CONCLUSION

Based on results of analysis and discussion obtained some conclusions as follows: The result of the analysis and study on the institutional empowerment and P3A potency level, it is concluded that the P3A capacity improvement significantly and positively correlated with the P3A institutional empowerment and P3A potency.

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### REFERENCES

1. Agus F, Subagyono K, Surmaini E. 2014. Teknologi konservasi air dan irigasi suplemen untuk optimasi pertanian lahan kering. *JITV*. 19(3):233-244.
2. Aryawan IPS, Windia W, Wijayanti PU. 2013. Peranan Subak dalam aktivitas pertanian padi sawah (Kasus di Subak Dalem, Kecamatan Kerambitan, Kabupaten Tabanan). *E-Jurnal Agribisnis dan Agrowisata*. 2(1):1-11.
3. Budiasa IW. 2010. Peran ganda Subak untuk pertanian berkelanjutan di Provinsi Bali. *AGRISEP*. 9(2):153-165.
4. Effendi R, Tukiran. 2014. *Metoda Penelitian Survei* Edisi revisi. Jakarta (ID): LP3ES.
5. Kurnia G. 1995. *Hemat Air Irigasi dalam rangka Mencegah Terjadinya Krisis Penyediaan Air*. Bandung (ID): Pusat Dinamika Pembangunan- Unpad.
6. Liou J. 2004. Community capacity building to strengthen socio-economic Development with spatial asset mapping.[prosiding] Conference 3rd FIG Regional, October 3-7, Jakarta.
7. Marliati. 2008. Faktor-faktor penentu peningkatan kinerja penyuluh pertanian dalam memberdayakan petani. *Jurnal Penyuluhan IPB*. 4(2):42-52.
8. Muljono P. 2007. Learning society, penyuluhan dan pembangunan bangsa. *Jurnal Penyuluhan*. 3(1):55-62.
9. Pasandaran E. 2008. Reorientasi pembangunan pengairan dalam mendukung pembangunan multi sektoral di Indonesia.[makalah]. Malang (ID): Universitas Brawijaya.
10. Prabowo A. 2015. Karakteristik dan peranan lembaga petani pemakai air dalam mendukung produktivitas hasil padi di Kecamatan Toboali Kabupaten Bangka Selatan. *Jurnal Pembangunan Wilayah & Kota*. 11(3):272-286.
11. Sundari, Hamid A, Yusra A, Nurliza. 2015. Peran penyuluh pertanian terhadap peningkatan produksi usahatani di Kabupaten Pontianak. *Jurnal Social Economic of Agriculture*. 4(1):26-31.