

Karya Mandiri Irrigation System:  
A Case of Long-enduring Irrigation Management Institutions  
in West Sumatra, Indonesia.

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### **Abstract.**

Karya Mandiri Irrigation System (KMIS) is a community-managed irrigation system that has shown its institutional endurance in passing through management environment changes such as irrigation policy, institutional, economic and technological aspects. Local community has crafted irrigation institutions that enabled them to adapt to the pressures and changes, made necessary investments and performing various management functions. This has made the system continue to exist as a self organizing irrigation system and serve the farmers while many have not successful in responding to the changes.

The KMIS case is an interesting case to assess the applicability of design principles proposed by Ostrom (1992) which consists of: well-defined resource and user group boundaries; congruence between appropriation and provision rules of resource governance; ability of the user group to modify rules; monitoring, sanctioning and conflict resolution mechanisms; political autonomy and nested enterprises for larger system. This paper attempted to identify the commonalities and differences of institutional design principles adopted by the community with those of proposed by Ostrom (1992). In addition to those eight principles the stakeholders at KMIS have moved further to developed social entrepreneurship principle/orientation which tend to be one of the key factor for the sustainability of irrigation institutions.

## 1. Introduction.

Self-governing and long enduring CPR institutions has been at the center of attention to sustain benefits stream from any particular CPR. Ostrom (1990) has proposed eight 'Design Principles' for self-governing CPR institutions and emphasized the importance of these principles in crafting institutions for self-governing irrigation systems (Ostrom, 1992). Since then, the efforts have been made to test the applicability of the design principles with mix results, which then suggestions for modifications or expansions has been proposed especially in the context of self governing irrigation systems.

This paper attempted to provide an illustration from a long enduring, self-governing small-scale irrigation system in West Sumatra, Indonesia. The central lesson that this paper would like to present is that there is a need to include the social entrepreneurship orientation in the design principles, which means moving from social to social entrepreneurship orientation in irrigation management. The concept of social entrepreneurship will be clarified first and then, evolution of the irrigation management institutions at KMIS will be discussed with reference to the eight design principles proposed by Ostrom.

## 2. From social to social entrepreneurship orientation: A perspective in understanding factors affecting the long-enduring irrigation institutions.

There were indications that institutions which only concern with social mission without strategy to support the achievement of the social mission would not be sustainable or would end up as "just enough organization" (Bruns, 1992; Helmi, 2002). Brinkerhoff and Goldsmith (1992) defined institutional sustainability as "the ability of an organization to produce output of sufficient value so that it can acquire enough input to continue production at a steady or growing rate." In this connection Wilson (1992) and Cernea (1993) pointed out that it is both the weaknesses in institutional arrangements within which the organization responsible for production and provision of good and services operates and the insufficient attention to institutional sustainability which inhibits the continuation of benefits stream from development activities. These arguments indicate that there is a need to move from merely orientation toward achieving the social missions toward social entrepreneurship orientation. The point is that the social value creation required sustainability strategy in the form of income generating activities embedded in the provision of social services. In short, this means achieving the social mission (doing good) and generating sufficient income (and making money) to support the continuation of provision of social (in this case irrigation water provision) services (benefits stream).

The concept of social entrepreneurship is rooted from the concept of entrepreneurship itself. The following definitions presented to give better understanding of the concept. *First*, Martin and Osberg (2007) argued that "entrepreneurship describes the combination of a context in which an opportunity is situated, a set of personal characteristics required to identify and pursue this opportunity, and the creation of a particular outcome." Based on

the meaning of entrepreneurship, they define social entrepreneurship “as having the following three components:

- (1) identifying a stable but inherently unjust equilibrium that causes the exclusion, marginalization, or suffering of a segment of humanity that lacks the financial means or political clout to achieve any transformative benefit on its own;
- (2) identifying an opportunity in this unjust equilibrium, developing a social value proposition, and bringing to bear inspiration, creativity, direct action, courage, and fortitude, thereby challenging the stable state’s hegemony; and
- (3) forging a new, stable equilibrium that releases trapped potential or alleviates the suffering of the targeted group, and through imitation and the creation of a stable ecosystem around the new equilibrium ensuring a better future for the targeted group and even society at large.”

*Second*, Alvord, Brown and Letts (2004) pointed that “social entrepreneurship creates innovative solutions to immediate social problems and mobilizes the ideas, capacities resources and, social arrangements required for sustainable social transformation.” *Third*, Dees (2001) describe social entrepreneurs as “one species in the genus entrepreneur, ...they are entrepreneurs with a social mission.” Furthermore, he added that “for social entrepreneurs, the social mission is explicit and central and mission-related impact becomes the central criterion, not wealth creation, ...wealth is just a means to an end for social entrepreneurs.” *Fourth*, Mort, Weerawardena and Carnegie (2002) defined social entrepreneurship as “a multidimensional construct involving the expression of entrepreneurially virtuous behaviour to achieve the social mission, a coherent unity of purpose and action in the face of moral complexity, the ability to recognize social value-creating opportunities and key decision-making characteristics of innovativeness, pro -activeness and risk taking.”

In this paper, I would like to analyze the case of KMIS in the context of social entrepreneurship concept beside the eight Design Principles by Ostrom (1990 and 1992) and identify factors affecting the endurance of irrigation management institutions.

### **3. Karya Mandiri Irrigation System (KMIS): Evolution and endurance of irrigation management institutions.**

KMIS is an irrigation system located in Agam District, West Sumatra (precisely at the Sungai Janiah Sub-village, Tabek Panjang). It has 87 Ha service areas, which in 1995 extended to be 127 Ha after neighboring sub-village (named Salo) agreed to integrate their rice field into the service areas of KMIS and follow the rules of irrigation service provision. In 1994, the population of the sub-village were more than 1,200 and in 2008 it has increase to became more than 1,500 people. The population are divided into four major clans, namely: (1) Suku Tanjung; (2) Suku Jambak; (3) Suku Koto; and (4) Suku Sikumbang. Resources mobilization for irrigation management were done based on the clan groupings. Rice paddy is the major crop with some farmers might prefer to plant different kind of vegetables. However, Rusdi (2008) reported that nowadays the farmers

concentrated more on planting high quality of rice (with relatively higher price) since they experienced diseases infected chili and tomato plants.

An irrigation management institution at KMIS consists of three components, namely the council of clan leaders, the representatives of the clans or the group which responsible to manage or perform irrigation management tasks, and the farmers and other water users. The council of clan leaders is the last resort for important decisions on irrigation management (like assign the representative of the clans or approving the group which will be responsible to actually manage the system) and for conflict resolution. The representatives of the clans or the group are those who got the mandate from the council of clan leaders to perform irrigation management tasks and when they found themselves could not bear the tasks anymore, they would return the mandate to the council of clan leaders. The farmers and other water users are the actual water users be it for agriculture or for religious activities.

The KMIS management institutions have evolved through three different forms with different approaches in performing irrigation management tasks. The first form was using collective action approach which characterized by: (1) labor mobilization by clans leaders for rehabilitation and maintenance of brush dam and canal cleaning and maintenance; and (2) contribution of materials required (to repair brush dam) proportional to land holding size. This approach was in place approximately until 1950s and replaced by new approach since it no longer effective in facilitating labor mobilization to implement irrigation management tasks.

The second form was using partial contractual approach<sup>1</sup> which characterized by: (1) the implementation of major irrigation tasks (e.g. operation and maintenance/rehabilitation of brush dam, and main canal maintenance) were contracted to a group of farmers (known as Group of Sixteen) representing farmers from all four clans in the village; (2) collective action in branch canals maintenance which channeling water to farmers' field; and (3) payment of irrigation service fee at the rate of 20% of rice yield every harvest season. This was practiced from 1950s to 1988. This approach replaced by the third one because the cost of replacing the brush dam every time washed away by flood and rehabilitation of main canal from landslide at the main canal closed to the head works and other operational costs could no longer be covered by the irrigation service fee collected.

The third form of approach is (and still functioning until current period) contracting the provision of irrigation services to a group of farmers (known as Group of Eight). The third approach characterized by: (1) the Group of Eight is responsible for financing the construction concrete dam and main canal and performing all irrigation management tasks (Group of Eight as service provider); (2) payment of irrigation service fee at the rate

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<sup>1</sup> There were four points of agreement in the contract as following: (1) handing over the responsibility for the management of the brush dam and main canal to the Group of Sixteen; (2) The main tasks of the Group were to develop and/or rehabilitate the dam and the main canal, while the branch canals still the responsibility of respective farmers receiving water from them; (3) the period of the contract was 20 years; and (4) all the farmer water users obliged to pay 20% of the yield every season for irrigation service fee (Helmi, 1994).

of 20% of yield; and (3) opportunities for the service provider to access fund from other sources (parties) than the farmers (such as government) and used it to repay the construction cost borrowed from the members of the group or other villagers<sup>2</sup>.

The agreement in the contract specifically cover the following points: (1) The Group of Eight build the concrete dam by using the design provided by the district office of Ministry of Public Works and all the construction costs are mobilized by the Group; (2) The contract last for 25 year (but later revised and extended to be 30 years because of the dam broken after 2 years has to be rebuild) and the farmer water users will pay 20% of the yield as irrigation service fee; (3) The Group of Eight responsible to manage the system such that all the farmers could be provided with sufficient water every season; (4) If in any case the rice field temporarily planted with vegetable, then the farmers still have to pay irrigation service fee equal to the amount of 20% yield of rice paddy; and (5) If in the future the irrigation system got financial assistance from the government or other source, the Group of Eight is eligible to received that to repay the costs of construction for both the fund mobilized from the member of the group or borrowed from other village members (Helmi, 1994 and Rusdi 2008).

The three forms of approaches clearly need to fulfill the seven (or eight) principles developed by Ostrom (1990). Unless otherwise it would not be possible for them to enforce the rules they were agreed upon. However, in addition to those eight principles the stakeholders at KMIS have moved further to developed social entrepreneurship principles/orientation (please see Table 1 for description of those principles), which consists of two aspects as following:

- Aspect 1: provide irrigation services and making money out of that and distribute the benefits through the co-financing of the infrastructures (dam and main canal) development, and
- Aspect 2: building the mechanisms to ensure stable (or increase) revenue from irrigation service provision: ensuring irrigation water availability at on farm level, develop planting schedule, assisting the farmers with land preparation through the use of hand tractor (make sure that no rice field uncultivated), provide additional services to the farmers in term of availability of agriculture inputs (fertilizer), and agriculture technology transfer (the used of HYVs of rice), and “selling” irrigation water service to the neighbor sub-village.

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<sup>2</sup> Rusdi (2008) found that the Group of Eight mobilized their own money and borrowed additional amount to farmers or other village members and they are responsible to returned it back by using part of the 20% irrigation service fee. He calculated at the time the contract agreed upon, the level of interest the Group of Eight could give at that time is 13% per annum, lower than the bank interest which was 15%.

Table 1: Ostrom’s design principles for long enduring irrigation institutions and the principles adopted at the KMIS.

No.	Ostrom’s Design Principles (1990 and 1992).	Karya Mandiri Irrigation System (KMIS) 1994 (Helmi, 1994).	Karya Mandiri Irrigation System (KMIS) 2008 (Rusdi, 2008).
1.	Clearly defined boundaries.	The service area of the system is 87 Ha, within the Sungai Janiah Sub-village with 6 clans (4 bigger and 2 smaller).	The service area became 127 Ha as 40 Ha rice field in neighboring Salo sub-village requested to get water and agreed to follow the rules.
2.	Congruence between appropriation and provision rules and local conditions.	The farmers would pay 20% of the harvest and their rice field guaranteed to get sufficient irrigation water to plant rice crop.	The farmers would pay 20% of the harvest and their rice field guaranteed to get sufficient irrigation water to plant rice crop.
3.	Collective choice arrangements.	The management agreements were developed by clan leaders together with member of the clans/villagers and they can modify the agreement as necessary.	The management agreements were developed by clan leaders together with member of the clans/villagers and they can modify the agreement as necessary.
4.	Monitoring.	The “Group of Eights” as service provider contactor is responsible for monitoring and ensuring proper service provision.	The “Group of Eights” as service provider contactor is responsible for monitoring and ensuring proper service provision
5.	Graduated sanctions.	The clan leaders are responsible for resolving any complaint both from the farmers and the service provider.	The clan leaders are responsible for resolving any complaint both from the farmers and the service provider.
6.	Conflict resolution mechanisms.	Conflicts are resolved through the meeting of clan leaders, service provider and the farmers/villagers.	Conflicts are resolved through the meeting of clan leaders, service provider and the farmers/villagers.
7.	Minimal recognition of rights to organize.	The customary institutions are recognized by law and their roles in society are respected by the government.	The customary institutions are recognized by law and their roles in society are respected by the government.
8.	Nested enterprise.		In 1995, the neighbor Salo sub-village requested to get irrigation services and agreed to follow the rules applied in Sungai Janiah sub-village.

Table 1: (continued)

9.		<i>Social entrepreneurship principle/ orientation: provide irrigation services and making money out of that and distribute the benefits through the co-financing of the infrastructure development.</i>	<i>Social entrepreneurship principle/orientation: provide irrigation services and making money out of that and distribute the benefits through the co-financing of the infrastructure development.</i>
10		<i>Social entrepreneurship principle/orientation: building the mechanisms to ensure stable (or increase) revenue from irrigation service provision by providing additional services to the farmers in term of availability of agriculture inputs (fertilizer).</i>	<i>Social entrepreneurship principle/orientation: building the mechanisms to ensure stable (or increase) revenue from service provision by providing additional services to the farmers in term of availability of agriculture inputs (fertilizer) and technology transfer (rice HYVs).</i>

On top of those principles, they tried to maintain social trust among them through the role of clan leader council and participatory processes in all decision taken. As mentioned in earlier part, the council of clan leader is the last resort for important decisions regarding irrigation management (such as which group would be given responsibility or contract for the management, the group could also returning the contract back when the revenue they generated from irrigation service fee could no longer cover the management and capital costs, the amount of service fee should be paid by the farmers) and resolution of conflict. The application of those principles has enabled institution managing KMIS to develop major infrastructures (concrete dam and main canal lining) which cost them Rp.90 million (in 1992) and sustain benefits stream from the system (please see Picture 1 about the condition of the concrete dam and Picture 2 for piping irrigation water to neighboring sub-village).



Picture 1: The concrete dam of KMIS.



Source: Rusdi (2008).

Picture 2: Piping irrigation water to the neighboring sub-village (Salo).



Source: Rusdi (2008).

#### 4. Conclusion and lessons learned.

Local community has crafted irrigation institutions at KMIS that enabled them to adapt to the pressures and changes, made necessary investments and performing various management functions. This has made the system continue to exist as a self organizing irrigation system and serve the farmers. The design principles of irrigation institutions at KMIS are applied those principles proposed by Ostrom (1990 and 1992). In addition to those eight principles the stakeholders at KMIS have moved further to developed social entrepreneurship principles/orientation, which consists of two aspects as following:

- Provide irrigation services and making money out of that and distribute the benefits through the co-financing of the infrastructures (dam and main canal) development, and
- Building the mechanisms to ensure stable (or increase) revenue from irrigation service provision: ensuring irrigation water availability at on farm level, develop planting schedule, assisting the farmers with land preparation through the use of hand tractor (make sure that no rice field uncultivated), provide additional services to the farmers in term of availability of agriculture inputs (fertilizer), and agriculture technology transfer (the used of HYVs of rice), and “selling” irrigation water service to the neighbor sub-village.

The eight design principles and the social entrepreneurship orientation has enable the irrigation institutions for the management of KMIS enduring through long period of time.

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