

Research Paper: The Role of Local Participation in the Activation of Water Pumping Station Projects: Toward Sustainability in Rural Projects

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ABSTRACT

Purpose: The purpose of this study was to answer the following basic questions; Why has the implementation of rural development projects, including the water pumping station project, not been successful? What factors contribute to the success of these projects?

Methods: A three-pronged approach was designed to accomplish this purpose. In the first Phase, 46 indicators were discovered by combination of literature and interviews. The next step, 11 indicators were found in critical situation, according to the Eisenhower matrix, five indicators of them described urgent and necessary action. But it was important to address how to solve these problems. So in the third stage, practical solutions were extracted through in-depth semi-structured interviews with farmers.

Results: We found that the reason for the failure of many rural development projects, is not technical and macro-economic indicators. In fact social and micro-economic indicators at the local level are the critical factors. Farmers' consensus on improving the status of critical indicators has emphasized the following: "involving stakeholders in planning", "helping target area to develop income diversification", "allocating financial resources to stakeholders during projects", "using local people as labour" and "settling legal issues of land ownership".

Conclusion: Comprehensive policy frameworks for the successful implementation of rural development projects, should address the social and economic issues of local people. We argue that the policies in these frameworks should go beyond providing technical support and services, as well as address the socio-economic constraints. Using a participatory learning approach is a good way to achieve the goal.

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1. Introduction

Launching a water pumping station (WPS) is an especially important step for economic development in rural areas (Shenhav et al., 2017). These projects have always accounted for a high share of cost and energy (Sharifnejad & Parvaresh Rizi, 2016) and thus become one of the major concerns an authoritarian water resources organizations in all countries (Orang et al., 2008). Traditionally, rural water supplies have been overshadowed by urban ones. That must now change, when the sustainable Development Goals call for water for everyone (Omarova et al., 2019). Many Studies have shown that greater participation of rural people in decision-making, implementation, and assessment of water management activities is expected to improve efficiency and equity in water projects (Brookshire & Whittington, 1993; Sultana, 2009). Based on review findings, the slow rate of progress and cost overrun of most WPS projects in developing countries, such as Iran, was associated with ignoring local people's participation and engaging them as a stakeholder in WRMP. (Razzaque, 2009). In Iran, WPS efficiency was estimated under 30% (Najafi & Shirvanian, 2006). Despite these numbers, it has been documented that delayed or incompleteness of rural development projects had almost irreparable consequences such as damaging rural people's trust and reducing spirits of cooperation (Tilt et al., 2009). Despite increased government efforts to the development of expensive irrigation infrastructure, they do not have any focus on creating the institutional and legal framework to facilitate the management of this infrastructure (Najafi & Shirvanian, 2006). Therefore, since the 1990s and the adoption of structural changes and neoliberal policies, centralized control of water resources has given way to decentralized approaches that include collaboration

among stakeholders and the development of social learning (Hamdy, 2004). In other words, by facilitating the engagement of stakeholders in water resources projects and providing opportunities for them to improve interaction with local officials and planners. It is possible to increase the effectiveness of WPS (Nazari et al., 2018) and reduce disputes and conflicts between stakeholders in the future (Kalpakian et al., 2013). Six WPSs had designed and launched in 2012 in Kermanshah province in Western Iran. The primary goal of projects WPS is to produce orchards in rural areas. Despite the high costs for WPS, at the moment they are unused to working or do not work (Moradian, 2017). Qomshah is one of the target areas for WPS. This station has been laid out in two phases. Phase I, aimed at providing water for 150 ha of agricultural land through the Qarah Su River. Phase II, Increasing the area of local gardens by 600 hectares. During the implementation of Phase I, the problems arose in two categories. First, public trust decreased and second, they refused to cooperate with the government in Phase II. So, this study was designed and conducted to identify factors that affected to unsuccessful of WPS. The Authors finally demonstrated an effective approach to solving the problems. A highlight of the study is a critique of the method of project implementation and identifying the most common mistake of WRMP in developing countries, including Iran. Usually, policymakers and executives are reluctant to show their weaknesses in the field of projects. Some of the results of the unsuccessful implementation of the WPS projects in the study area are:

- The holes dug for planting the seedlings have been filled due to the constant movement of livestock and have become flat ground (Figure 1).

- Pools and canals for storing and directing water from the river to the pumping site with a dense straw cover have been turned into frog habitats (Figure 2).



Figure 1. The paved ground with livestock traffic



Figure 2. Pool with dense straw cover and frogs habitat

- And the enclosed area of the WPS has become a night shelter for livestock

In general, the WPS project is important for several reasons. First, the few social studies conducted in WPS stagnation by researchers. The finding in this paper can provide a better understanding of the challenges and issues of WPS programs. Also, Agricultural can be driven toward more growth and prosperity through the proper use of community management-based WPSs projects. On the other hand, the current research can serve as a basis for planning and policymaking to improve the status quo and rural development. The research is valuable in the sense that the publication of its results will draw the attention of planners, authorities and those in charge of future projects in different rural areas to take more successful action by understanding the conditions, strengths and weaknesses, and uncertain or less-known areas for advancing WPS projects. Then, the current research has the following main questions:

What leads the project to be incomplete?

In what areas had government officials performed poorly?

What solutions can be followed for the activation of the project?

Figure 3, presents the relationship between the component of the conceptual framework for a model of activation of WPS for policymakers and planners.

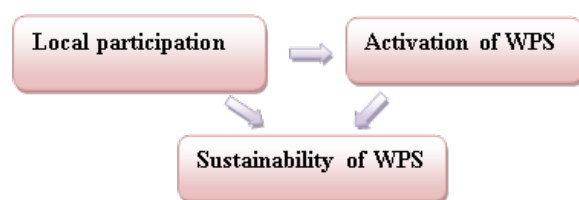


Figure 3. The conceptual framework for the study



2. Literature Review

There is a paucity of studies on how local participation can activate the WPS project in Iran. Consequently, there are gaps in the knowledge of this matter. The study reported here is intended to contribute to an effort aimed at bridging these gaps.

WPS project and community management

Community management has long been a declared model for rural water supply and is increasingly accepted as essential to its implementation and success (Hutchings et al., 2017). Hence, the community-managed project approach created a relatively higher and statistically significant sustainability outcome as compared to the different models (Senbeta, 2019). Alkhlaifat & Magasouba (2019) has accelerated that stakeholder participation plays an important role in project success. Ihuah & Kakulu (2014) have disclosed that if community-based hand pump-operated rural water supply projects are to be sustainable. The results of Swai (2016) showed that community members engaged in digging and burying trenches, contributing money to promote implementation, carrying building materials, and cleaning up the project area. Any community members contributed by encouraging other members to help with the project, managing and supervising the projects, and supervising the construction of the water kiosk. Hutchings et al. (2015) synthesis supported the assumption that for community management to be sustained at scale, community institutions require a 'plus' that includes long-term external assistance, with the majority of high-performance cases including financial support, professional guidance, and managerial advice. The characteristics of the internal community have also been found to have an impact on success, including collective initiative, strong leadership, and institutional transparency.

WPS project and other challenges

Perera & Halwatura (2012) pointed out that inclement weather conditions, contractors' financial difficulties, labour shortages, rules and regulations of the road authorities, delays in the work of subcontractors, material import delays, and ineffective planning and scheduling of projects by contractors are among the most important factors causing delays in the construction of medium-scale drinking water supply projects. Also, time overruns, cost overruns, funding difficulties, the development of unfair relations between the parties, and disputes are the most significant effects due to delay. Peter & Nkambule (2012) observed that the key reasons which made the water schemes unsustainable were: long fetching time; lack of participation in decision-making; lack of ability to contribute funds; absence of users committee; and lack of coordination between local leaders and the user's committee. Furthermore, Ibrahim (2016) found that 40% of water projects implemented were fairly sustainable, although they are considered to be young projects (1-4 years of age). This weak sustainability was mainly related to poor organizational and financial performance due to poor post-implementation

governmental and/or external agencies' involvement and support in terms of monitoring, capacity building facilities, and financial support.

3. Methodology

Study area

The present study was conducted at WPS in Qom-shah village in Kermanshah province, Iran. The village lies 20 km southeast of Kermanshah province, between 47°13' - 47°18' E longitude and 34°14' - 34°16' N latitude. The area is bounded by the Qarah Su river. Nearly 519 people have lived in this rural and an estimated 1,400 arable land; about 43 per cent are covered by the "Orchard Development Project in Rainfed Crop-land". The stakeholders should have planted seedlings, such as quince, almond, and grape. In this way, there has not been any consolidation. To this end, WPS had to be launched. The WPS project was developed in two phases in 2012. Phase I, aimed at providing water for 150 ha of agricultural land through the Qarah Su River. Phase II, increased local orchards to an area of 600 ha. that it had not yet completed. The stakeholders had to spend a lot of money (50 million IRR per ha) to create orchards, and then they could reap 80 million IRR of free state grants. The project was initially accepted by local people, but after the completion of Phase I, the stakeholders refused to take part in the project anymore.

Materials and Methods

A mixed methodology was used for this study because a combination of quantitative and qualitative research method is more likely to achieve accurate findings. In this way, a three-pronged approach was developed to define and identify any practical and executive solutions. The phases are described in more detail below.

Phase 1

Identifying indicators for project assessment

In this step, we attempted to define indicators of successful WPS projects. After examining related literature and interviewing key informants, including; stakeholders and experts, the investigators identified 46 indicators. It is important to note that after 26 in-depth interviews no longer generated new information and theoretical saturation occurred. Then, Data were transcribed and analyzed by conventional content analysis techniques. To improve the reliability and validity of results, three researchers

analyzed and interpreted the data and gave feedback to participants.

Phase 2

Checking the status of indicators of successful WPS projects in the region

the second step of the analysis determined the status of 46 indicators of successful WPS projects. All the data were collected in a questionnaire and relied on the knowledge of the participant to report indoors. The items were measured by a five-point Likert-type scale ranging (from 5=strongly optimal to 1=never optimal). The questionnaire's reliability had been verified by Cronbach's alpha. The study population consisted of 32 stakeholders and WPS authorities during the third quarter of 2019. Data were analyzed by the importance-performance matrix(IPM). IPM was divided into four quadrants, each containing a different situation: high importance/low performance (concentrate here), high performance/high importance (keep up the good work), low importance/low performance (low priority), and low importance/high performance (possible overkill) (Raymond & Tat Choi, 2000). In this regard, a one-sample t-test using SPSS was conducted to assess the extent of the WPS situation in each of the indicators. Therefore, we hypothesize that if the mean value of the indicator was ≤ 3 , it would indicate an unacceptable performance, but if the mean value of the indicator was > 3 , it would suggest an acceptable performance. Also, the Entropy technique calculated the importance of the indicators. The formula has the following components:

$$K = \frac{1}{h M}$$

$$E_j = -K \cdot \sum_{i=1}^m P_j \cdot \ln(P_j)$$

$$d_j = 1 - E_j$$

$$W_j = \frac{d_j}{\sum_{i=1}^m d_j}$$

Where K is a constant value (coefficient of entropy), M is the number of stakeholders and related officials, d_j is the degree of deviation or uncertainty, and W_j is the weight of the indicators.

Phase 3

Setting forward an agenda for critical indicators

In this step, the study team focused on “concentrate here” indicators in IPM and found practical solutions for them. Since numerous indicators were in the quadrant of the “concentrate area”, the research team used the Eisenhower matrix to rank them and identify the critical indicators. So, the activities were divided into four groups important and urgent, important and not-urgent, not-important and urgent, and non-important and not-urgent (Krogerus et al., 2012). The researchers also presented stakeholders and project authorities with those put in the “important and urgent” group to express their opinions on practical strategies to revive the project. After the two groups proposed, the common strategies that both groups supported were extracted. The percentage of agreement with each of them was calculated by the following equation to give priority to the specific strategies:

$$\text{Percentage of agreement} = \frac{2 \times \text{Number of agreements}}{\text{Total number of codes}} \times 100$$

lowing equation to give priority to the specific strategies:

4. Findings

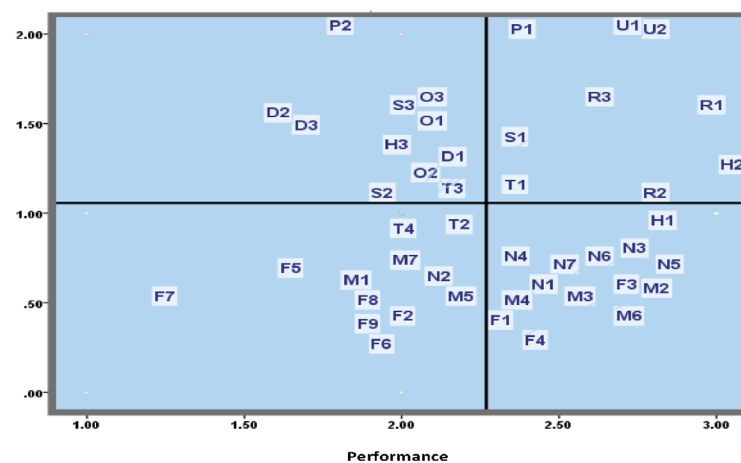
Table 1. Identification of indicators of successful WPS projects

Codes	Concepts
Participation of rural labour force(P1); The willingness of local people to cooperate with authorities and contractors (P2)	Local participation
Informing people about the progress of the project (N1); informing people about problems and limitations of project (N2); Holding a meeting before implementing of the project (N3); informing local people about WPS (N4); informing people on budgets (N5); improving cooperation with local people (N6); trust - building by authorities (N7)	Informing
Respond immediately to complaints by stakeholders (O1); Dividing irrigation rights (O2); Clarifies land ownership (O3)	Institutionalization
security of project (F1); emphasizing of on understanding social values (F2); doing social studies before running project (F3); existing a spirit of cooperation and partnership among stakeholders (F4); attention to socio-cultural background of participants (F5); Risk management by Authorities (F6); Attention to contextual (F7); correct location (F8); climate change adaptation in the project (F9)	Feasibility of implementing
Clarity of project objectives (T1); make a timeline for project execution (T2); do not long run (T3); being high yield(T4)	Schedule of the project
Learning lessons from past mistakes (S1); attention to the economic and political environment (S2); preventing replication and repeat past mistakes (S3)	Systematic view
having spencer (H1); allocating appropriate and sufficient expenditure (H2); stakeholder should pay a portion of the cost (H3)	Budgeting & financial protection
Unchanging administrative authorities until the end of the project (M1); certainty in project management (M2); having experienced and expert manager (M3); motivation of managers and authorities (M4); Managers and authorities keep them promise (M5); the desirability of station spatial facilities (M6); protection of arable lands (M7)	Stability of management
using a professional expert in implementation (R1); expertise in project design software (R2); using expertise workforce (R3)	Experienced workforce
Using other institution (U1); using rural local force (U2)	Outsourcing
Improving rural livelihood (D1); creating jobs (D2); improving stakeholders income (D3)	Income diversification

Table 2. Checking the status of indicators of successful WPS projects in the region

t	(Wj M)	Wj	M	Codes	t	(Wj M)	Wj	M	Codes
-3.53	2.05	0.49	4.18	P01	-5.18	1.13	0.26	4.34	T03
-5.75	2.20	0.51	4.31	P02	-5.93	0.97	0.23	4.21	T04
-3.20	0.53	0.13	4.07	N01	-4.00	1.37	0.34	4.02	S01
-2.63	0.54	0.14	3.85	N02	-6.94	1.08	0.29	3.72	S02
-1.43	0.64	0.15	4.26	N03	-3.48	1.53	0.37	4.13	S03
-3.73	0.65	0.14	4.64	N04	-0.29	1.40	0.34	4.11	H01
-1.29	0.59	0.13	4.53	N05	0.12	1.37	0.32	4.28	H02
-2.60	0.66	0.14	4.71	N06	-4.23	1.40	0.33	4.24	H03
-2.22	0.62	0.14	4.42	N07	-6.11	0.64	0.15	4.26	M01
-4.93	1.52	0.35	4.34	O01	-0.35	0.57	0.14	4.07	M02
-5.01	1.33	0.29	4.58	O02	-2.96	0.59	0.14	4.21	M03
-4.23	1.64	0.36	4.55	O03	-3.03	0.56	0.14	4.00	M04
-2.23	0.45	0.10	4.50	F01	-4.29	0.58	0.14	4.14	M05
-6.37	0.49	0.11	4.45	F02	-1.64	0.40	0.12	3.33	M06
-1.39	0.53	0.12	4.41	F03	-5.13	0.71	0.17	4.17	M07
-2.68	0.43	0.09	4.77	F04	0.15	1.51	0.35	4.31	R01
-9.72	0.52	0.12	4.36	F05	-1.12	1.09	0.28	3.89	R02
-5.50	0.46	0.10	4.60	F06	-1.68	1.61	0.37	4.35	R03
-6.39	0.50	0.11	4.54	F07	-0.92	2.34	0.52	4.50	U01
-8.75	0.55	0.12	4.58	F08	-0.65	2.09	0.48	4.35	U02
-5.69	0.45	0.10	4.50	F09	-4.34	1.37	0.32	4.28	D01
-2.36	1.15	0.27	4.25	T01	-10.71	1.54	0.34	4.52	D02
-6.48	1.04	0.24	4.33	T02	-8.97	1.51	0.34	4.44	D03

JSRD

**Figure 4.** The Importance-Performance Matrix

JSRD

Table 3. Degree of consensus among stakeholders and Authorities on the practical solution

No.	Practical solution	Frequency	Number of agreements	Consensus %	Rank
1	Settling legal issues of land ownership	20	7	70	5
2	Rapidly resolving the problems and shortening the time required for orchard construction with the planting of 2-3-year seedlings	20	4	40	11
3	Initiation and termination of Phase II within the deadline set by AJO	15	6	60	8
4	Allocating financial resources to stakeholders during projects	18	8	85	3
5	AJOs help rural people found cattle farms, mushroom farms, and bee-keeping farms (helping target areas to develop livelihood diversification)	21	9	88	2
6	Specifying the lands protected by the Phase II facility	13	4	61	7
7	Recruiting a professional and fixed manager until the end of the project	15	5	66	6
8	involving stakeholders in planning	23	11	95	1
9	Supplying equipment to stakeholders until the initiation of the orchards		3	46	10
10	Using local people as labour	20	7	80	4
11	Hiring guards from rural people for the station	16	4	50	9



Involving stakeholders in planning

According to the finding of the study, stakeholders involvement in planning is the most important solution to the activation of the WPS project. [Meniga et al. \(2019\)](#) confirmed that community participation was less in the planning process. [Rafiu Adewale & Esther \(2012\)](#) accelerated that the lack of stakeholders' participation caused the majority of them to become de-motivated. [Sarin \(1999\)](#) claimed that the involvement of rural people in planning and implementing development projects increases success and the sustainability of the projects implemented. [Ihuah & Kakulu \(2014\)](#) confirmed this finding. In sum, [Morrison \(2003\)](#) believed that stakeholder participation was either an essential aspect of sustainable water management or a luxury to be used to complement conventional approaches. Moreover, [Aga et al. \(2017\)](#) and [Marks and Davis \(2012\)](#) reported engaging stakeholders in rural water schemes are a great way to promote a sense of psychological ownership and compassion. Along similar lines, [Avey et al. \(2009\)](#) discussed that psychological ownership is a positive resource impacting human performance. For example, [Van Dyne & Pierce \(2004\)](#) stated that a sense of ownership could lead to an improvement in self-esteem, behaviour, satisfaction, and commitment. Hence, [Senbeta \(2019\)](#) emphasized that the community-managed project approach is essential for the sustainability of the water management project.

helping target areas to develop livelihood diversification

Looking at the results of the research, it became obvious that the majority of participants have fairly diver-

sified income resources. A closer look at this finding showed that stakeholders have faced different livelihood challenges encountered during the implementation of the WPS project. So, diversifying sources of income (cattle raising, mushroom farming, and beekeeping) during the implementation of the project is a necessary solution. [Senadza \(2014\)](#) observed that household features, location, and facilities all play a role in understanding the adoption of income strategies rather than a purely on-farm approach by households. Also, [Sultana et al. \(2015\)](#) confirmed that it has a meaningful and significant impact on the well-being of households.

Allocating financial resources to stakeholders

providing loans for stakeholders with very low-interest rates and long grace periods, are some other common solutions proposed by participants. [Perera & Halwatura \(2012\)](#) pointed out that funding difficulties could postpone the construction of a water project. [Hutchings et al. \(2015\)](#) believed that there is a relationship between the success of a water project and the prevailing socio-economic wealth in a society. [Omid et al. \(2012\)](#) identified problems common in water projects including dissatisfaction of member farmers towards PIM, network ineffectiveness, inequitable distribution of water, lack of trust towards managers, lack of government support, and lack of in-group coherence.

Using local people as a labour

[Conning and Kevane \(2002\)](#) present another aspect of participating stakeholders in projects. They agreed that the introduction of a sufficient number of rural labour into the projects could mitigate maintenance costs, con-

licts, and so on. Overall, [Omarova et al. \(2019\)](#) claimed that achieving the goal of sustainable development, decentralization of water management, and regulation of water supply, and use by the local beneficiaries are important and valuable. Regardless of what has been said, if this approach is adopted, then it can have a positive impact on the interest and engagement of the stakeholders and enhance their ability to own orchards, foster a sense of ownership and responsibility among rural people, and take care of villager's project equipment and facilities. Results showed that the station's construction not only created jobs in the village, but also had negative consequences on unemployment, immigration, addiction, and sometimes even divorce. The results are consistent with the findings of [Abdollahzade et al. \(2017\)](#). Such results dispute [Hope's \(2007\)](#) observation, which argues that the consequences of these projects are short-run and are more effective in seasonal employment and planting pattern changes. It seems that if the solution suggested is adopted, the villagers will earn more money and they will have less economic pressure. [Rajaei et al. \(2015\)](#) point out that job - creation in rural areas would alleviate unemployment and poverty, improve the quality of life, and reduce rural migration.

Settling legal issues of land ownership

A further important practical solution was "specifying the area of land occupied by the project in Phase II and addressing the land ownership question in a legal manner" is another approach widely adopted by the authorities and stakeholders to resolve the land ownership confusion problem. The issue of ownership is of crucial importance for the lands protected by the station, so it should be taken seriously as huge investments have been made in WPSs power, management, transport, and delivery of water. Ignoring customary rules and civil law in the execution of the project and involving the Natural Resources Organization and stakeholders in the Qomshah village hindered the economic exploitation of resources and the achievement of the initial goal, i.e. the development of rainfed orchards. This is consistent with reports from [Golbaz et al. \(2017\)](#), [Seyyed Almasi \(1994\)](#), and [Salehi and Chizari \(2014\)](#) which named it as an adverse effect of irrigation projects. This approach will lead to empowering villagers to secure their rights with the support of the government, enabling them to embrace the related institutions' legal decision and less to resist the project's start and restoration. Other problems arising from the project are the decline in people's income and the rise in unemployment. The village's dominant economy in Kermanshah, like Qomshah, is based on agriculture and then animal farming. Before the building of the

water pumping station, Qomshah Faraman had a strong potential to produce crops and animal products, but the station's inefficiency caused a large part of the land to stagnate and desolate, so the owner sacrificed stakeholders income and forage for food.

5. Discussion

The purpose of this study was to find out how local participation can activate the WPS project in Kermanshah province Qomshah village in west Iran. The researchers studied this water-resource management initiative, with two main concerns. On the one side, field observations revealed that the project is stagnate in Phase II despite huge costs. It was necessary to conduct a study based on the social perspective to understand the factors responsible for this inefficiency. Various methods and collecting information from different sources for gaining that insight is required by researchers. Up to date, there was limited literature available concerning factors underpinning the successful WPS projects in Iran concerning local participation. Therefore, this paper provides novel and important information for local participation in the field of MAWR in Iran. Moreover, the result of the present study can contribute to our understanding of the indicators of the success WPS project. Also, it can provide a critical review of the literature for future research. Besides, by identifying the practical solutions to activate the WPS project, we can facilitate efforts to prevent this from happening in the future and improve the efficiency of the projects for stakeholders, planners, and authorities. data also revealed that it is feasible to develop approaches accepted by both authorities and the rural population. These approaches will be implemented with high reliability by authorities and developers and this will ensure the activation and viability of the project. Ultimately, the present research has used a scientific, rigorous, and participatory process involving stakeholders and authorities to establish operational approaches that are endorsed by all stakeholders. Briefly, these approaches include "involving stakeholders in planning", "helping target area to develop income diversification", "allocating financial resources to stakeholders during projects", "Using local people as workforce", and "settling legal issues of land ownership". According to these conclusions, the following should be considered for the implementation of future projects:

The first policy mistake

Some of the WPS projects are not according to the potential of the area. For example, the area of this research is suitable for animal husbandry. Unfortunately,

because of drought in recent years, its pastures have been destroyed. Therefore, a suitable project for this area is watershed management for rangeland rehabilitation. But policymakers insisted on implementing a WPS project and expanding horticulture in the area.

The second policy mistake

The second mistake is not paying attention to the social context of the region. For example, in the study area, several social classes have social competition and conflict. At the beginning of the project, executives rented the labour and machinery from some social classes and did not pay attention to other social classes. so the social classes that were not involved in the implementation of the project and did not earn income in this way always tried to fail the project. for example, they broke some of the equipment.

Third policy mistake

The third mistake of policymakers and executives is the lack of participation of local people in the design and implementation of the project. They think this is a technical job and Indigenous people do not know about it. They are oblivious to the rich knowledge of the Indigenous people. So people are upset by the top-down view of the policymakers. Therefore, not only they don't consider the project as their own, but also they think it is a mandatory project. So, they do not cooperate effectively in the implementation of the project.

The suitable policy (Participatory Learning Approach)

Effective management of water resources is an important policy in arid and semi-arid regions such as Iran. It is very important for policymakers to understand the social and natural situation of the region as well as to believe in the comprehensive management of water resources. Therefore, it is so essential to empower the local community through the "Participatory Learning Approach". This approach provides an interactive structure between local stakeholders and policymakers and implementers of water resources management projects and also enables the exchange of local experiences and Indigenous knowledge with academic and technical knowledge.

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Conflict of Interest

The authors declared no conflicts of interest.

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