RAKSHAK FOUNDATION

Financial Management and Project Analysis Of U.P. Irrigation Department

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Preface

I come from an economics background and am pursing B.A.(H) from Shri Ram College of Commerce. I come from an environment where people measure their growth in terms of monetary profits that they earn. The social condition around them, the problems that the society on the whole is facing is out of concern. But, gradually I realized, that we all complain about the problems we are facing, but no one wants to come forward and try to devise a solution for the problems persisting in the society.

“Someone has to initiate the change”. I, being the youth of the country, see it as my responsibility to improve the conditions because if not us, then who else will come forward to change the scenario. We all want a change. Some of us actually want to work for the improvement of society. But, what exactly can be done to improve the situation is not known. This is what drove me to Rakshak Foundation. It gave me a platform to study the problems and then devise possible solutions, which though look simple but can actually increase the welfare of a large proportion of Indian population. An idea to act as think tanks under civil servants infused a feeling of responsibility and confidence that change begins with us!

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I would also like to thank Mr. Arvind Gupta, Chief Engineer, UGC, Meerut for helping us understand the structure of Irrigation and helping us interact with the local farmers.

I would also like to thank Mr. Shashikanth Dalwi, founder of Prajanay, NGO, for guiding me throughout the research with a special emphasis on the methods of rain water harvesting.

I would like to extend my thanks to Mr. Ambuj Dwivedi, Executive Engineer, U.P. Irrigation Department, Mr. Rajesh Shukla, Assistant Engineer, U.P. Irrigation Department, Mr. Ganesh Kumar Shukla, President, Water User Association (WUA), Riabareli for helping me analyze the ground reality problems on my field visit to Lucknow.

I also want to express my gratitude to the coordinators of Rakshak foundation, Nikita Mam, Pritesh Sir ,Siddarth Sir and Ishika Mam for guiding me on even small issues and for helping me out whenever I got struck in between. I would also like to thank my fellow intern Saurav Dutt for helping me in running the regression and Arka Ghosh, for providing me essential data on water conservation.

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List of abbreviations used

UPID: Uttar Pradesh Irrigation Department

PIM: Participatory Irrigation Management

WUA: Water User Association

IPC: Irrigation Potential Created

IPU: Irrigation Potential Utilized

MBS: Modified budget system

PM: Performance Measurement

O & M: Organisation and Management

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Executive Summary

The report deals with analyzing the Irrigation Department of Uttar Pradesh along with the irrigation practices which followed in Uttar Pradesh. It then focuses on the scope of improvement and try to suggest some of recommendations which can be fruitful.

Uttar Pradesh has one of the most fertile plains of Northern India. In order to utilize the potential of this area, the government has built irrigation system consisting of canals, minors, branches and outlets. This was built to reduce the dependence of farmers on rainfall and provide them irrigation facilities at their doorstep. It was built in the pre colonial times by the Britishers. It is now managed by the Irrigation Department of Uttar Pradesh.

Irrigation structure of Uttar Pradesh is very old and obsolete and requires urgent attention. Also, the irrigation practices followed in this area are not up to date with the technology and the involvement of farmers in managing the system of irrigation (Participatory Irrigation Management) is very less in this area. The Department of Irrigation also follows a bureaucratic structure, with very less I.T. penetration in this area. So, the efficiency of the work done is very less and most of the times, the work done is delayed. There is no link in between the beneficiaries and the department officials. Along with that, the budget which is proposed by the department is not fully sanctioned by the state government, which disrupts the functioning of the department and leaves very less funds for the purpose of maintenance of the existing structure. The objective of this report is to focus on the above stated problems and devise some ways to solve them.

The analysis was done in the following manner. First the literature review of the whole structure was done, which involved going through already written research papers, past year budget of the department and going through the history of irrigation structure in Uttar Pradesh. It was then followed by field visits to various cities of Uttar Pradesh such as Meerut and Lucknow so as to grasp the ground reality of the problems. Informal surveys were also done with the farmers.

The recommendations proposed include the measurement of performance of different employees, more emphasis on involvement of farmers in the management of irrigation system and establishing a link between the higher authorities and the beneficiaries. For the same purpose, an external body is also proposed. This report also focuses on various methods of water conservation which can be easily followed by the farmers which will reduce the dependence of farmers on water supplied by the Irrigation Department.

Below are some of the key findings which are encountered during the research work

- The distribution of water is through the approach of area instead of volume. There is less focus on schemes of water conservation, rain water harvesting. More reliance of farmers on private tube wells, instead on the government run canals, even when the government spends huge amount of money on irrigation system. Presence of ground water markets, which has lead to the problems of depletion of ground water level and over irrigation. Because the role of beneficiaries is minimal in the system, this has lead to inefficient allocation of resources.
- The gap between IPC(Irrigation Potential Created) and IPU(Irrigation Potential Utilized) is as high as 20%,i.e., $1/5^{th}$ of the potential goes unutilized. The gap between IPC and IPU is increasing more and more. The main concern is not only the creation of Irrigation Potential but also more and more utilization of the potential, hence reducing the gap more and more.
- The penetration of I.T. in the irrigation department is also very less, it leads to problem with maintaining the records. The work is also done comparatively slowly. There is a lack of transparency and accountability in the system. Because of huge human resource, it is very difficult to manage the whole system. The system of passing contracts to different bidders is primarily based on the amount quoted by them, irrespective of the quality of material used by them.
- The report is able to identify the problems prevailing in the system. The PIM(Participatory Irrigation Management) act passed by Uttar Pradesh in 2009 is the future of irrigation in India. As per this act, the beneficiaries i.e. the farmers will directly participate in the system of irrigation by forming Water User Associations (WUAs). The government of Uttar Pradesh is trying to maximize the role of WUAs by engaging them more and more in managing activities of irrigation. This is also helpful because the people at the grass root level have better knowledge of the problems emerging in their area/district.

1. Introduction

1.1 Irrigation System in Uttar Pradesh

1.1 a) Irrigation System in Uttar Pradesh: A Historical background

The Irrigation System in Uttar Pradesh goes back to the colonial times. Because of the presence of fertile plains of River Ganga and ample water resources, the yield of this state was high as compared to the other states. British government tried to utilize the potential of this state and decided to build canals and dams for providing irrigation facilities so as to sustain an increase in production. Irrigation facilities were needed because of the irregular nature of rainfall. Along with the irregular nature of rainfall in Uttar Pradesh, there was one more consideration which was the irregular effects of the rivers flowing from the Himalayas. The sudden rises in floods independent of the monsoon rains caused a lot of devastation in the area. So as to increase the yield and prevent failing of crops, the government built canals and irrigation structure so as to channelize water to farms. It was in 1830s that the first canal of eastern Yamuna was built. It was then followed by the construction of Upper Ganga Canal. The return on these outlays was approximately 8 percent and it was definitely a financial success.

Irrigation system of India also suffered because of partition. After partition, India was left with 80% of the population and lost about 31% of the irrigated area. It also suffered a loss of canals according to which nearly half of 4,00,000 cusecs of water carried by the rivers were lost.

1.1b) Progress in Irrigation System Of Uttar Pradesh: After Independence

According to the land use table 1, it can be inferred that the net irrigated area has increased from 159.64mha to 17.3mha in 25 years period, implying an increase of 0.37mha per year. And in the following years, it has remained constant to 17.3 mha. Even if there is a minimal increase in the irrigated area because of user reclamation and other measures, it is offset by the factors such as urbanisation and increasing the area under forests and horticulture. So, the net irrigated in future is expected to remain more or less same. So to increase the production in future, there is a need to increase the yield per hectare by using better inputs and improved techniques of irrigation.

SL No.	Description of Land		During the year(lac ha)		
		1953-54	1961-62	1969-70	1978-79
	PLAINS				
1.	Forest	23.66	18.76	22.34	22.16
2.	Barren and uncultivated area	12.73	11.24	10.16	09.74
3.	Land put to non agricultural use	18.37	19.30	20.22	20.09
4.	Culturable Waste	20.24	16.05	13.73	12.00
5.	Permanent pastures & other grazing lands	00.29	0.48	00.78	00.81
6.	Land under misc., trees, bushes and groves not included in net sown area	10.93	6.81	6.28	6.01
7.	Fallow land	14.85	13.85	12.28	14.24
8.	Net cultivated area	159.54	166.63	167.23	167.83
	HILLS				6.98
	TOTAL				
	Net cultivated area in State 1978-79				174.81 Lac ha.

TABLE: 1 Land use pattern in Uttar Pradesh
Source: A perspective of Water Resources Development, Irrigation Department,U.P.,1984

1.1c) Current scenario of Irrigation in Uttar Pradesh

In the present world, the irrigation in Uttar Pradesh is supported by the canal system which is provided by the government, by the private tube wells which are owned by the farmers and the monsoon rainfall.

Canal System: The government owned system of irrigation is divided into canals: Upper Ganga Canal, Lower Ganga canal and so on. These canals are derived basically from the rivers. These canals are further divided into branches. From the supply points of these branches, there goes a distributary (called Rajwaha) which is them divided into minors which goes to the farms for providing water to the farmers in the form of outlet. The water which is left after irrigation flows into drains.

River -> Canal -> Branches -> Distributary -> Minor -> Outlet -> Drains

The water is distributed to the farmers according to a roaster system. This roaster system is a document which depicts the scheduling of water and is separate for each and every canal. It is made according to the different cropping seasons namely Kharif and Rabi. It gives prior information to the farmers about the amount of water which

will be flowing in their area in the respective months. The farmers then divide the water according to their specifications in terms of days and hours.

Tube Wells: The next system that is prevalent in Uttar Pradesh is the private tube wells that are installed in the farms by the farmers themselves. The expense of installing tube wells is incurred by the farmers themselves. They use diesel and electricity to run these tube wells and hence, irrigate their fields. But since, it requires a high initial investment; it is afforded only by the rich farmers.

Accordingly, this system creates a market for water [2]. In this market, farmers are divided into four types. First, Self Users who use the water for irrigation of their own fields, second, Self Users + Sellers, farmers who use water for their own fields and side by side sell water in the markets. Third, Self Users + Buyers of water, farmers who cannot complete their demand of water from the sources provided to them. So, they rely on water markets buying water from sellers of water to satisfy their demand. Fourth, Buyers, those farmers who solely rely on water markets for fulfilment of their water demand.

This system leads to over exploitation of ground water resources by the rich farmers who can afford diesel. The poor farmers depend on these water markets for the satisfaction of their water needs. Hence, poor farmers are available to afford crops with low water incremental output ratio.

Incremental water output ratio = Total Ground Water applied/(value of yield)

This extensive exploitation of water has lead to fall in the level of ground water. This can well be explained by the “tragedy of commons”. According to the tragedy of commons, everyone in the economy cares about his/ her own utility and tries to derive the maximum out of the economy. Because of this, the huge fall in level of ground water, it is not replenished by the monsoon rainfall. Also, sudden replenishment of ground water leads to cracks in the farms which decreases the productivity of the area.

Third is the dependence on monsoon rainfall. Because of the irregularity in monsoon rainfall, the dependence has decreased in the past few years. Most of the farmers rely on the irrigation facilities provided by the government or on the private tube wells installed in their farms or on the water markets prevalent in that area

Also, the approach followed in Uttar Pradesh is Area Distribution approach instead of volumetric approach. According to the volumetric approach, the farmers are given water by measuring the volume of water that they will need for irrigation and hence, will pay accordingly. But, considering the Area Distribution approach, the farmers are supposed to pay according to the area owned by them, considering the crops grown by them.

Volumetric approach is generally preferred over Area approach. Because in area approach, farmers generally give a false report of crops grown by them, i.e., they pay according to the crops with low incremental water output ratio and grow crops that uses more amount of water. But it is very difficult to measure water taken by the farmers because stealing of water is very much prevalent which disables proper measurement of water. Metering of water can also be implemented, but then taking care of meters is also a big issue.

From past one-two years, irrigation facilities are available for free to farmers. No revenue is collected from them. Water is made tax free.

1.1d) Current scenario of Uttar Pradesh Irrigation Department

Department of Irrigation of Uttar Pradesh is controlled by the state government. It is one of the oldest government run department in India. When it was formed initially, its main purpose was to channelize water from canals to different farms and maintain an equitable supply of water for irrigation purposes. But, with time, the functions performed by the department have also changed. Presently, the department not only provides water for irrigation, but also for power development. It also looks after flood control activities in their area. Collection of revenue from the farmers in lieu of using water is also done by the department. Since water is a scarce resource, as its supply is limited, the ever increasing demand of water because of increase in population has lead to more pressure over the department.

Figure 1 shows the organisational structure of the irrigation department of Uttar Pradesh. The head of the department, i.e., Secretary and Engineer in Chief is followed by Chief Engineer, Finance Controller. Chief Engineer is assigned a specific canal and is required to look after the whole canal irrespective of the area in which it flows. Chief Engineer is further assisted by Executive Engineer, Assistant Engineer and Junior Engineer [12]. Junior Engineer is allowed to sanction amount of 2 lacs. Assistant is entitled to sanction amount upto 40 lacs. Funds greater than 40 lacs have to be sanctioned by Executive Engineer. Finance controller has to look after the budget proposed by different departments and sanction them amount after it is being sanctioned by the state government.

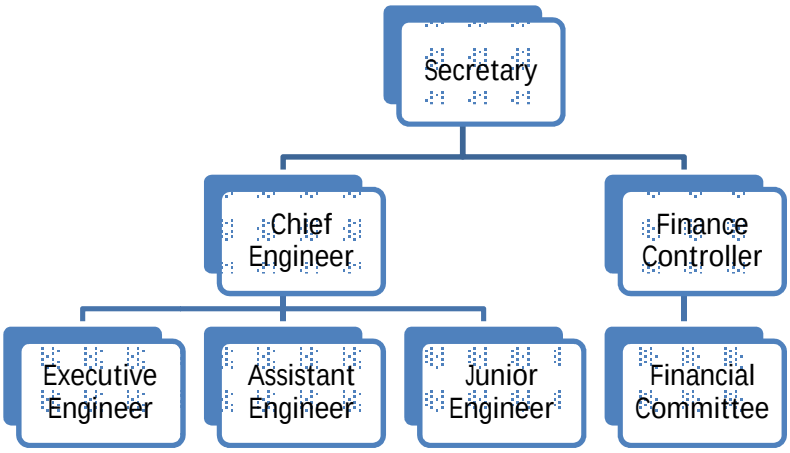


Figure 1 : Organizational Structure of U.P. Irrigation Department

Table 2 and Table 3(attached in the appendix) depicts the number of employees working in U.P. Irrigation Department. Considering the number of employees in U.P. Irrigation Department, it sums upto 75,428 employees. It has 21,315 employees in Group D employees which includes 6611 Civil Engineers and Technical Engineers, 2137 employees in group B and 1021 in group A. This total human resource handles canal system which is about 74,000 km in length, 29,000 tube wells owned by farmers who irrigate about 17 million hectares of area.

Classif1caton/ Categorization of Post	Total No of Approved Posts
Group 'A'	1021
Group 'B'	2137
Group 'C'	50955
Group 'D'	21315
Total	75428

Table 2: Employees working in UPID

Source: A perspective of Water Resources Development, Irrigation Department,U.P.,1984

1.2 Problems in the Irrigation System:

1.2a) Problems in Irrigation Practices

Tragedy Of Commons

Since most of the people engaged in agriculture rely on ground water for irrigation purposes, there emerges a problem of "Tragedy Of Commons". Tragedy of commons is an economic concept according to which each and every individual is bothered about his/her utility and is unaffected by the utility of the society as a whole. So, each and every farmer simply extracts as much water as needed (or even more) and does not care about the falling level of ground water, which is ultimately going to affect all of them. It is more serious in case of water markets.

Over- Irrigation/ Under- Irrigation

The water available to farmers is free of cost. Water which is such a scarce resource, is available for free to the farmers. It leads to the problem of "Over Irrigation" which makes the soil saline and hence it is difficult to grow crops, which ultimately leads to the decrease in production. It can also emerge because of lack of awareness among the farmers as to much water should be used. Because of over-exploitation of water resources by some farmers, some of the farmers which are at the tail end of distributary, are left with no water for cultivation purposes.

Distribution through Area owned

The approach followed in the Irrigation system is Area Distribution approach. Because of this approach, farmers, generally take water which is more than necessary and use water very inefficiently and hence leads to the wastage of water.

Minimal Role of Beneficiaries

Because the role of beneficiaries (i.e. farmers) is very minimal in this system, it often leads to inefficient allocation of resources.

Problems faced by WUAs

There are Water User Associations which are formed at outlet level, distributary level. There are a lot of problems which are faced by these WUAs which include lack of funds for maintenance, absence of water at the scheduled time. They also

fail to associate themselves with the department officials and feel completely alienated.

Less reliance on Rain Water

Rain Water harvesting is not practised extensively in the state of Uttar Pradesh as compared to other states such as Andhra Pradesh, Gujarat etc.

1.2b) Problems in Irrigation Department:

The following are the problems faced by U.P. Irrigation Department which is a big roadblock in efficient working of irrigation system in Uttar Pradesh

Huge workforce of UPID

Irrigation Department of U.P. has a huge workforce. Because of this huge workforce, it is very difficult to manage the workforce and also while introducing any technological change or new system of doing work, it requires huge training costs and upskilling of labour force will take a huge amount of time.

Delays in sanctisoning funds

Any sanction of fund/ order has to go a long way, through the consent of many officials which is a very time taking process. It is an up-down process, taking a lot of time.

Lack of transparency and accountability

There is a lack of transparency in the whole system. Lack of transparency of funds between the government and officials, lack of transparency between the people and the department. Since the duties are not clearly specified of each and every official, there is a lack of accountability among the officials.

Less penetration of I.T (Information Technology)

Since I.T. has not penetrated into the system, the work is still done by writing, typing documents. The problem through documentation is that it is very difficult to store the records. It takes a bit of time to go from one officer to the other.

Cost based hiring of contractors

The tenders and contracts given to different companies are on the basis of cost offered by them without taking into account the quality of material used by them, delays in work done by them and past experience with that firm.

1.3 Goals and Objectives

The goals of the project are to improve the irrigation practices prevalent in the state of Uttar Pradesh, so to reduce inefficiencies in the system and reduce the gap between Irrigation Potential Created by the department and Irrigation Potential Utilized by the farmers. This can actually be done by reducing the wastage of water by farmers and devising some mechanism so as to incentivise the farmers for judiciously using water. The complete growth of any system is possible by including beneficiaries in the system, which in this case can be done by enhancing and encouraging the concept of PIM (Participatory Irrigation Management).

It also focuses on increasing the efficiency, transparency and accountability in the Irrigation Department. ,to include the concept of Performance Measurement (PM) in the department so as to get an appropriate measurement of the work done by the employees and also give them incentive to work more efficiently. A proposition of an external body can also be considered for the same. The second main thing that the project focuses on is to devise mechanism which will take into consideration the quality of material used by the contractor, the delay in the completion of the project and also the past experiences with him

2. Methodology

2.1 Literature Search

The official website of U.P. Irrigation Department was scanned, studying the hierarchy of officers. Then, a book on history of irrigation was read, which helped in understanding the need for irrigation, the structure of irrigation in Uttar Pradesh, how it emerged from the colonial times. Srivastava and Kumar[2] in their report explains the current situation in Uttar Pradesh with special emphasis on the problems faced by the farmers and also the prevalence of Water markets.

J.B. Patel and T.M. Dholakia [8] in their report explains the success story of Panam district in Gujarat where Participatory Irrigation Management, lead to very mesmerizing results. .On studying the success stories of these areas, the advantages, merits and flaws of the irrigation system in Uttar Pradesh were compared.

A report submitted to Ministry of Water resources by Indian Institute of Management(IIM) [6], Lucknow specifies the difference between the Irrigation Potential Created and Irrigation Potential Utilized and also the reasons for this difference both on the part of government and of the farmers.

R.S. Sinha [7] in his report specifies the efficient methods of Rain Water Harvesting which could be adopted in area such as Uttar Pradesh.

Koshy Thomas[9] in his report talks about ways of improving the efficiency, transparency and accountability of the government department. Current situation of Participatory Irrigation Management(PIM) was also considered with the help of data collected from the Irrigation Department. The budget of U.P. Irrigation department was also studied so as to analyse the amount spent by the government.

Hamada and Samada[14] focuses on the importance of PIM in efficient working of irrigation system in the economy. It also discusses the problems which are faced by farmers and department in the implementation of PIM. It suggests some of the measures which can be implemented for smooth functioning of Water User Associations (WUAs).

2.2 Field Visits

A field visit to Meerut was conducted to meet Mr. Arvind Kumar Gupta, Chief Engineer, Upper Ganga Canal, Meerut. First goal was to understand the basic structure of irrigation system, how the water is distributed by Irrigation Department and how the scheduling of water is done, what for the revenues charged by the government. The structure of the canal system that included khatauli, upper daurala, lower daurala was also visited.

An interaction with two or three farmers to get a very crystal clear view of the picture at the very grass root level, was done. Also, the recent problem which emerged in khatauli district(which supplies water to different areas for various purposes) was studied. There was a leakage in the pipe due to which the water started seeping down.

Another field visit was done to Lucknow, Uttar Pradesh. It was done to study the financial structure of the system, how funds are allotted to different departments and the procedure of sanctioning the proposed budget by the state government. It also enlightened the possibility of devising different ways of increasing transparency and accountability in the department.

Interaction with the heads of three four WUAs was also done to analyze the economic and social problems faced by them for efficient and smooth functioning of these WUAs.

2.3 Surveys

No surveys were done specifically. But an informal conversation was done with two/three farmers and heads of WUAs. It was regarding how they irrigate their areas, what problems they face while irrigating the land, what are the subsidies given to them by the government, how they use water for irrigation. All of them used private tube wells installed in their fields and because electricity is not readily available in that area they use diesel and their tractor to run their tube wells and hence irrigate their fields. It is prevalent in those areas where government run canals are not present.

2.4Meetings and Interviews

First meeting with the mentor was held on 27th May 2013, which was an introductory meeting. The meeting focussed on introducing the irrigation system, its importance, the potential of the system and the current problems faced by the system. The scope was defined so as to devise certain mechanism which will speed up various tasks done in the department, increase the efficiency of the department and suggest various measures to increase the involvement of farmers and improve the prevailing measures of irrigation in Uttar Pradesh.

Date	Name	Designation	Institution	Topic of Discussion
04/06/13	Shri S P Verma	Junior Engineer	Upper Ganga Canal, Meerut	About the recent problem that emerged in khatauli district of Meerut.
04/06/13	Shri Sanjay Mataray	Assistant Engineer	Upper Ganga Canal, Meerut	How the distributaries are divided into minors, and showed how the remaining water is collected into drains and reservoirs.
04/06/13	Shri Pradeep Kumar Pawar	Junior Engineer	Upper Ganga Canal, Meerut	He explained how the scheduling of water is done according to the roaster, considering the cropping pattern.
04/06/13	Shri A.K .Gupta	Chief Engineer	Upper Ganga Canal,Meerut	He explained the basic structure of Irrigation system, Discussed the existing problems and also their possible solutions.

04/06/13	Shri Rajesh Shukla	Assistant Engineer	U.P. Irrigation Department	Structure of PIM in U.P. , how it is elected at outlet level, distributary level. Issues regarding the Participatory Irrigation Management (PIM)act. Also the effects of PIM and its further scope in the future of Irrigation.
06/06/13	Shashikanth Dalwi	Founder of Prajanay (NGO)	Pune, Maharashtra	Prajanay is a NGO which works for conservation of rain water. We discussed the possibility of rain water harvesting and its positive impact on the irrigation system.
27/07/13	Shri Ambuj Dwivedi	Executive Engineer, UPID	Lucknow, U.P.	Problems which are faced by the department in shifting all its work from paper work to an online portal.
27/07/13	Shri Dwivedi	Finance Controller, UPID	Lucknow, U.P.	Processes through which funds are allotted to different departments. Issues and problems which are encountered while allotting the funds and possible solutions which can be devised to solve these problems.
28/07/13	Ganesh Kumar Mishra	President, WUA	Rai Bareli, U.P.	Problems faced by the WUA and possible solutions which can be implemented.

Please refer Appendix A for details*

3. Participatory Irrigation Management (PIM)

For every economy to work efficiently, it is necessary that the beneficiaries are involved in the process. Separating them from the whole process and simply providing them the final output lead to various problems. One such method to incorporate the beneficiaries, i.e., the farmers in process of irrigation is Participatory Irrigation Management (PIM).

3.1 What is PIM?

PIM, also called as farmer's governance (Krishak Swaraj), is a mechanism in which farmers are given the authority to administer their area, considering water supply of that area, maintenance of irrigation facilities in their local areas. The idea is that the farmers at grass root level have better understanding of the problems faced by them. It also ensures better collection of revenue by the government. Water User Associations (WUAs) are formed for these purpose, which specifically looks after the maintenance of irrigation in that area.

3.2 Necessity of PIM

PIM is necessary because of the following problems faced in irrigation and participation of farmers can be one possible solution.

Collection of Revenue

The farmer's association is more successful in collecting revenue than the government. The reason being the association is working at the grass root level has better knowledge and means to collect revenue.

Lack of availability of water at tail end

Water is not available at the tail end farmers because of over exploitation of water by the farmers at the head. If an association is formed at the distributary level which will look after the distribution throughout the area, then this problem can be solved.

Solution to "Tragedy of Commons"

Under the problem of tragedy of commons, each and every farmer is worried about his/ her utility, which lead to over exploitation of ground water resources. But, if a committee, WUA is there to look after the utility of all the farmers collectively and is worried about the equitable distribution of water, the problem will be solved to a certain extent.

Judicious utilization of Water Resources

Since the population is constantly increasing, and so is the demand of water. So, it is the need of hour to use water as judiciously as possible. WUA at ground level tend to ensure the judicious utilization and minimise the wastage of water by the farmers.

Problem of fiscal availability

Because of limited availability of fiscal funds, it is necessary to revenue from the farmers so that at least the maintenance cost can be funded by the beneficiaries. Also, if the farmers have to pay for the water they use, they will use it more judiciously.

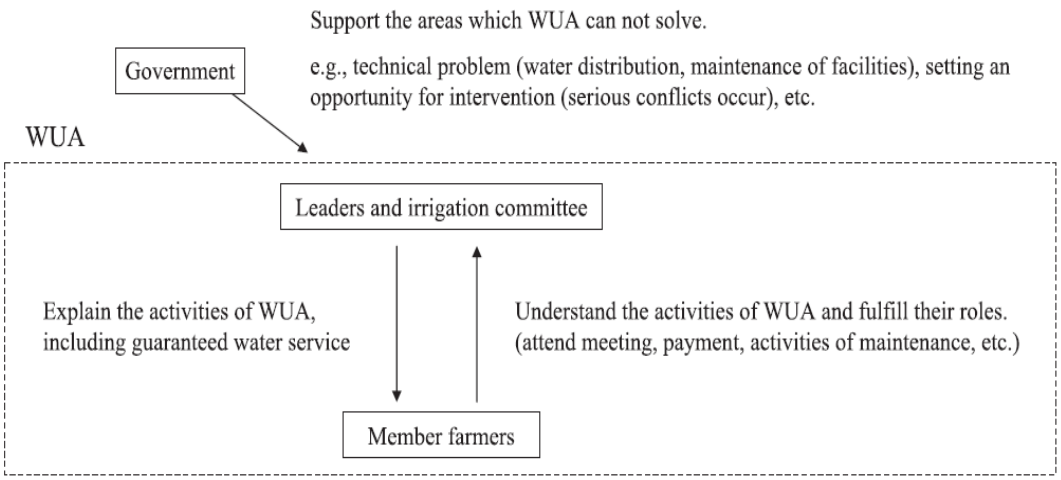
Need for increase in agricultural production

Since the population is increasing continuously, there is constant pressure on the farmers to increase the production, which can be done by ensuring constant supply of water, solving the problems that they face in their day to day life.

3.3 Prerequisites for implementation of PIM

For a sustainable model of PIM, there are few conditions which need to be satisfied. There should be trust between the government and the farmers. Availability of sufficient amount of water is the basic condition that has to be satisfied by the government in order to create an atmosphere of trust. The roles of the government and the farmers should be clearly mentioned. The farmers, if they are paying for water, should get water on time. There should be complete transparency in between the government and WUA, and also among the members of WUAs, especially related to funds. Also, the farmers are getting sufficient tangible benefits from the committee they have formed [14]. Figure 2 specifies the conditions clearly.

Figure 2: Depicting the prerequisites for the implementation of PIM [14]



3.4 SUCCESSFUL CASES OF PIM IMPLEMENTATION

PIM has been implemented in many areas across the world and also in many states in India including Maharashtra, Gujarat, Andhra Pradesh etc.

PIM IMPACT IN INTERNATIONAL CONTEXT

The following are the few instances of successful implementation of PIM across the globe. The origin of PIM goes back to the financial crisis in Mexico, Australia, New Zealand, Philippines. Countries like Australia and Philippines handed over the system of irrigation to a corporate industry, while Mexico started the concept of PIM and WUA.

Mexico in mid 1980s was suffering from financial crisis and was under a lot of debt. It was difficult for the government to run the irrigation system[15]. The government then gave the management of irrigation to different WUAs who then collected the funds themselves and used them for maintenance purposes.

Turkey is another case of rapid transfer of management to the farmers. But, in this case, the government transferred the whole of management to the farmers, but in return paid no fees to the government for using water, instead they were supported by financial and technical assistance from the government. So, it is the case of management transfer, but without a decrease in subsidy[15].

In the case of Nepal and Philippines (which followed PIM in 1975), whole of the organisational and management work was handed over to the farmers, who were then responsible for collection of funds and utilizing them for the maintenance works in their area. The involvement of beneficiaries filled them with a sense of responsibility and made them utilize water resources judiciously. The final result was the efficient utilization of resources, properly maintained canals and increase in productivity.[17]

PIM IMPACT IN INDIAN STATES

Table 4 illustrates the number of WUAs formed in different states. Accordig to the table, maximum number of associations being formed in Andhra Pradesh.

Considering the case of b, the government of Andhra Pradesh passed “Andhra Pradesh’s Management of Irrigation by farmers” in March, 1997.[15] After the implementation of PIM in Andhra Pradesh, it has been observed that the farmers have started taking the organisation and management works more seriously.WUAs participate more actively in maintenance works such as desilting work etc. Table 5 shows the percentage of WUAs involved in maintenace works.

Districts	% WUA members involved in maintaining micro level systems		
	Canal	Tank	Overall
Ananthapur	66.7	34.3	40.9
Nellore	68.8	52.5	57.1
Warangal	70.0	46.2	56.5
Total	68.9	44.6	52.1

Table 5:Percentage of WUAs involved in maintenance works[15]

Many people in that area have agreed that after the implementation of PIM, Water distribution has become more planned. Because of this, farmers are able to plan their activities before. Women also can plan and divide their time in household and agriculture. Disputes related to water distribution have also decreased a lot because of the intervention of WUAs.

The second instance of successful implementation of PIM in India is that Panam district in Gujarat.[8] Panam district in Gujarat was facing a lot of problems because of change in the cropping pattern over time, increase in wear and tear of the existing system of irrigation because of ageing effects. So, the government of Gujarat adopted a dual strategy. It started remedial canal works improving the condition of canal in Panam district, while at the same time, started spreading more and more awareness about PIM in that district. The government looked after the implementatiom of PIM by proper training sessions, awareness sessions and measuring the performance of WUAs.

Proper implementation of PIM in Panam district has lead to brotherhood among the farmers with a decrease in number of conflicts because of water distribution. It has also lead to efficient distribution of water among the farmers. Users themselves refrain other farmers from unauthorized utilization of water resources. This has lead to minimization of water wastage and has lead to increase in irrigated area. Few pictures have been attached to show the process of PIM in Gujarat and the final results.[8]

As a result of this, in rabi season, in 2010-11, district has recorded maximum irrigation of 16232 ha which is utilising 85% of the potential created (highest in 30 years).



Before the remedial works were started.[8]

The workshops which were conducted to spread awareness about PIM among the farmers.[8]







Current situation after the implementation of remedial works and PIM[8]

3.5 STRUCTURE OF PIM IN UTTAR PRADESH

AT THE OUTLET LEVEL

Outlet is the source from which farmers finally draw water for irrigation purposes. The whole of the village is divided into six parts. The division can vary from six to ten members. From each part of the village, a representative is elected. The six representatives elected thus form Water User Association (WUA) of that outlet. The function of this WUA is to ensure that water supply is available to all the farmers in that area, maintenance of existing irrigational facilities in that area. Figure 2 illustrates formation of WUA at the outlet level. At present, there are 441 WUAs at minor level from 8500 total minors.

AT THE MINOR LEVEL

Minor comprises of outlets .Generally, the minor is further divided into 3 parts: Head, Middle and Tail end. From the head and middle part of the minor, two representatives from the elected WUAs are re elected. Similarly, from the tail end, three representatives are re elected from the already elected WUAs. These six-seven people then form a separate WUA which is at the minor level. Its function is to look

after the availability of water at the outlet level, to provide funds to WUAs at the outlet level for maintenance purposes.

AT THE DISTRIBUTARY LEVEL

The same process is followed at the distributary level and further WUAs are formed.

3.6 Problems faced in implementation of PIM

There are a lot of problems which are faced in the implementation of PIM in Uttar Pradesh (as well as in India). Following are some of teh problems which are faced by the WUAs:

Uncertainity of Water

In the system, Roaster schedule is formed. Farmers among themselves then decide the schedule of water. But then a huge chaos is created when water is not available to the farmers. The local farmers then hold the elected persons responsible for it.

System deficiency

Most of the irrigations are now old and obsolete, does not work properly and requires huge maintenance, which cannot be solely done by WUAs

Non availability of funds

Funds for maintenance by the irrigation department are not received by the WUAs. Because of which, WUAs are unable to do the maintenance work. Sometimes the elected representatives are compelled to spend the amount from their own pockets.

Lack of communication between the government and WUA

There are generally no meetings, no walkthroughs between the officials of irrigation department and the elected members of WUAs. This makes the WUAs feel alienated and gradually will lead to the end of this concept.

Lack of technical knowledge

Since the people in the village do not have that much knowledge regarding some technical issues involved, they generally lack in solving the technical problems faced by them.

Lack of training sessions and awareness

Since PIM is such a new concept in India, there is very less awareness about the same among the farmers and also among the people who are employed currently in irrigation department.

Issues arising between WUAs and Gram Panchayats

Sometimes few disputes arise between the decisions taken by WUAs and Gram Panchayats.

4. Current NGO and Government Efforts

4.1 Current Government Efforts

The government initiated a few steps for the solution of the problems that the department of Irrigation is facing.

The importance of PIM in irrigation has already been discussed in the previous section.

In order to include beneficiaries into the system of irrigation, an ordinance of Participatory Irrigation Management (PIM) was passed in 2008. It basically emphasizes the participation of beneficiaries, i.e., farmers in the system of distribution of water, through the formation of WUAs which will look after the distribution to their individual members and also help in collection of revenues, which will somehow decrease the burden of expenditures on the government.

Considering all these factors, the Participatory Irrigation Management (PIM) act 2009 was passed by the government of Uttar Pradesh.

The main objectives of this act are as follow[1]:

- To provide for empowering the water users' association to play their role as effective instruments of participatory irrigation management and for matters connected therewith or incidental thereto.
- Whereas the State Government has in its State Water Policy declared in 1999 resolved to adopt integrated water resources management through participatory approach;
- And whereas, water users' associations have to be given an effective role in equitable distribution of water and its efficient and optimum use, operation and maintenance of irrigation and drainage systems, promotion of conjunctive use of surface and ground water, command area development assessment and recovery of water charges and protection of environment and ecology.

The powers of Water User Associations (WUAs) are as follow[2]:

- To enter on any land, remove obstructions, close any channel, and do other things necessary for carrying out its functions;

[1] U.P. Irrigation Act 2009, chapter 1
[2] U.P. Irrigation Act, 2009, chapter 2

- To cut down and clear away any part of any standing crop, fence or bush if it is necessary to carry out its functions;
- To enter into any building or water-course for the purpose of inspecting or regulating the use of canal water, or for measuring the lands irrigated thereby and chargeable with a water rate and to do all things necessary for the proper regulation and management of such canals;
- To enter in case of any accident happening or being apprehended to a canal, water users' association upon any lands adjacent to such canal, and may execute all work which may be necessary for the purpose of preventing such accident;
- Provided that If a water users' association proposes to enter into any building or enclosed court or garden attached to a dwelling-house not supplied with canal water, it shall previously give the occupier of such building, court or garden at least seven day's notice in writing of its intention to do so.

4.2 NGO EFFORTS

There are no serious efforts done by NGO in this sector till now. But, there is actually a very strong need of NGO efforts.

Since the concept of PIM is new, it requires a lot of exposure and awareness among the people, of what exactly is it and how it works. The whole procedure has to be made clear in the minds of people so that they can have a clear picture of what exactly they are asked to do. The merits and benefits of this system have to be made clear to the farmers only then they are going to adopt this new method.

For this the government has hired an NGO SIRD, who looks after spreading awareness about this scheme by organising street plays, announcing it on radio channels, visiting different villages for informing people taking the examples from the areas in which it has already implemented.

Another NGO should be there who will just look after mobilizing the existing WUAs. They will look after the proper implementation of existing WUAs, whether funds are allotted to them on time, whether water is available to them on time and will also deal with the conflicts which sometimes arise between Gram Panchayats and WUAs.

5. Results and Discussions

5.1 Findings from the literature

Through the literature review that is done, the following are the main findings that are found:

More dependence on private tube wells than on canals

According to Srivastava and Kumar[2], Most of the population in the remote areas of Uttar Pradesh depends of the private tube wells installed in their farms. So, it is the additional cost of electricity/diesel that they have to incur along with the fixed cost of capital. Also, the farmers who are not able to afford private tube wells in their farms, they buy water from the ones who have it in their farms. This lead to Ground Water markets in their area. Although these ground water markets has lead to better realization of resources to both the buyers and sellers, but has various concerns relating to efficiency and equity. Only the rich farmers are now able to grow crops which have high water requirement. Also, this has lead to extensive extraction of ground water. The precipitation in the area has decreased and it does not lead to full replenishment of ground water. And if such a situation persists, then here will be crisis of even drinking water in future.

Also, in some of the areas in Uttar Pradesh, because of sudden replenishing of ground water because of monsoon rainfall, sudden cracks are also seen in the farms. Also, In Uttar Pradesh, share of canal irrigation has declined from 35.42 per cent during 1965-75 to 25.18 per cent during the period 1995-2003 while that of tube-well has increased significantly from 30.37 to 66.94 per cent. Similarly, in CPZ also, the share of canal has nearly halved from 51.96 per cent during 1965-75 to 30.12 per cent during latter period (1995-2003). This can be because of the reason that there are no restrictions in case of private tube wells. Furthermore, in case of government run canals, they are poorly maintained and do not provide water at the time of need to the farmers. Figure 3 shows the fall in the fall in usage of government canals and a subsequent increase in usage of tube wells.

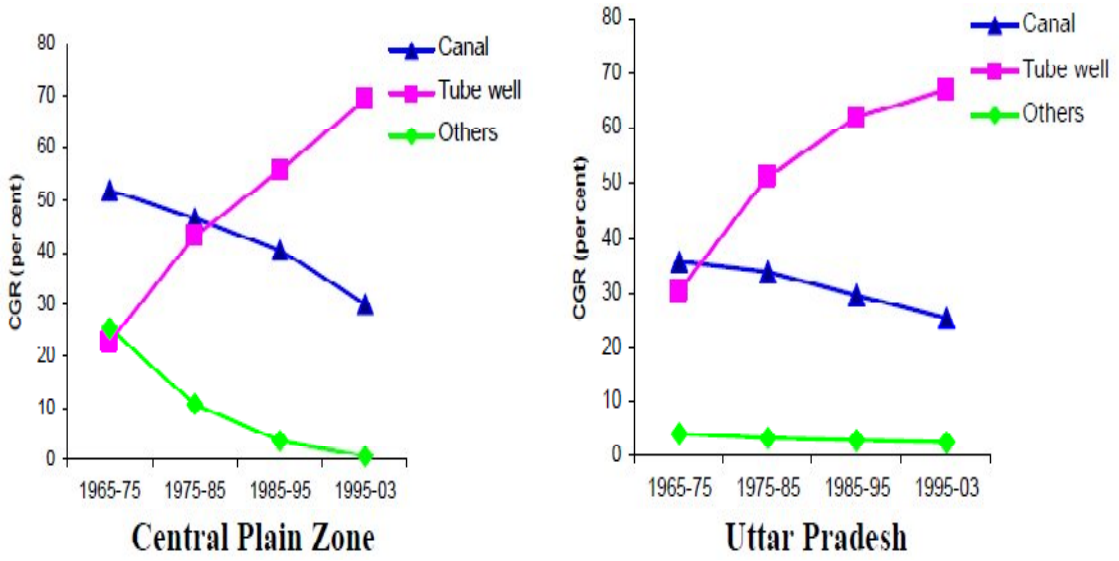


Figure 3: Change in utilization pattern of canals and tube wells [2]

Relationship between Expenditure and Potential Created

Also, according to the Department of Planning (Water and Related Statistics) Govt. of Uttar Pradesh, actual expenditure on irrigation development in the state has increased from Rs. 30.81 million during the first five year plan (FYP) to about Rs. 6888 million (capital + revenue expenditure) during tenth FYP, while irrigation potential created has increased from 28.83 thousand hectare to 93.10 thousand hectare only. In other words, during past five decades, the expenditure on irrigation has increased annually by compound growth rate of 11.43 percent while that of irrigation potential has increased by only 2.37 percent. Figure 4 shows the relationship between Expenditure and Irrigation Potential.

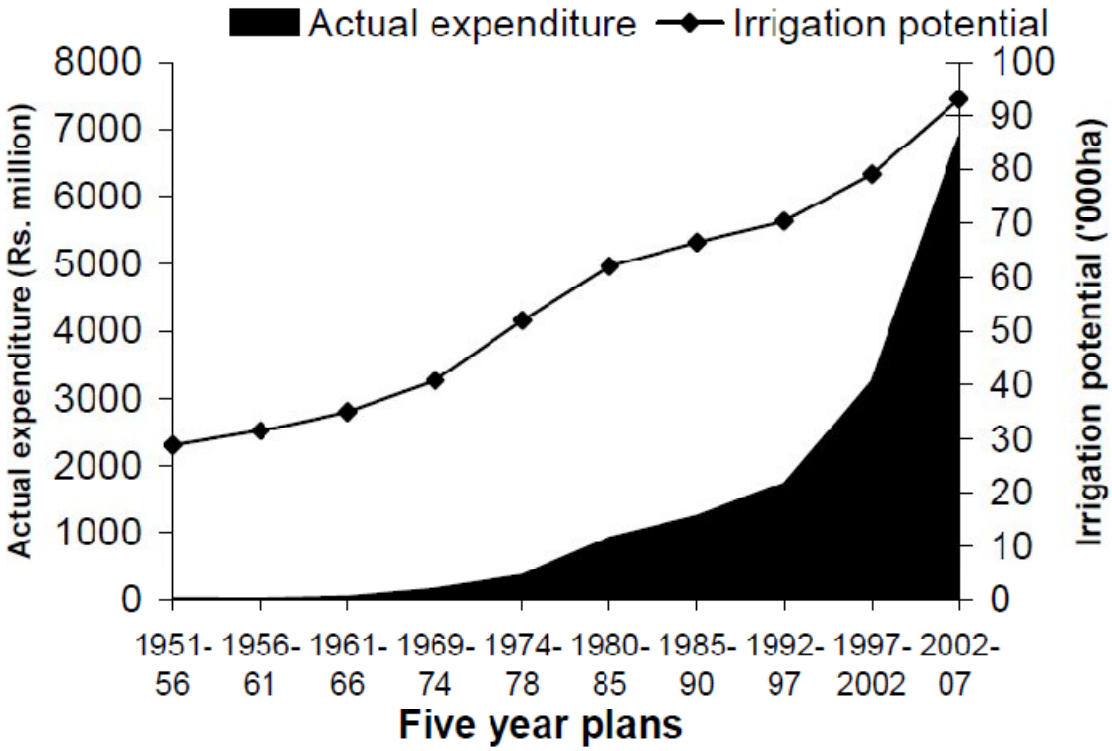


Figure 4: Relation between Irrigation Potential and Actual Expenditure [2]

DIFFERENCE BETWEEN IRRIGATION POTENTIAL CREATED AND UTILIZED

As per the report submitted by Indian Institute of Management[6], Lucknow, the difference between IPC(Irrigation Potential Created) and IPU(Irrigation Potential Utilized) is as high as 20%. That means about $1/5^{th}$ of the potential created by the government goes unutilized. This non utilization of resources can be attributed to various reasons. These include non adoption of high yielding seeds or lack of initiative to diversify the cropping pattern towards the commercial crops. On the part of government, it requires huge cost to built irrigation infrastructure. Underutilization on the part of government can be because of non utilization of high investment costs and not able to collect enough revenues so as to maintain the variable costs of the government. The major issue is that the gap between IPC and IPU is actually increasing over time. Table 6 shows the difference between IPC and IPU. Figure 4 shows the graph of IPC and IPU over time.

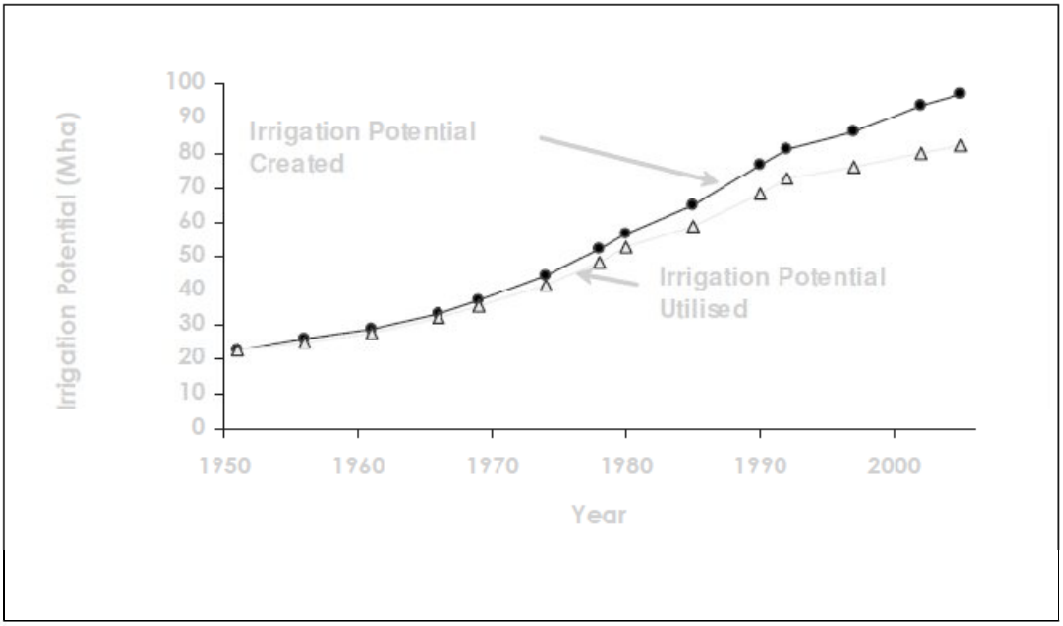
Table 6: Gap between Irrigation Potential Created and Utilized in different states.

	Gap between IPC & IPU as % of IPC		
State	MMI	MI	Total
Bihar	35.96	20.28	26.07
Chhattisgarh	20.83	31.32	24.43
Jharkhand	34.99	20.00	25.64
Madhya Pradesh	39.32	5.39	20.56
Orissa	3.98	10.14	6.76
Uttar Pradesh	20.59	20.00	20.16
Uttarakhand	33.89	20.00	25.02

Source: Ministry of Water Resources, Govt. of India

Note: MMI: Major and Medium Irrigation; MI: Minor Irrigation

Figure 5: Gap between Irrigation Potential Created and Utilized over Time



Source: Ministry of Water Resources, Govt. of India: 2007

Since from the above figure, it is clear that the gap between IPC and IPU is actually increasing from the past 25 years and serious efforts should be made, both on the part of government and that of the farmers, so as to decrease the gap by the increasing the utilized potential.

REGRESSION ANALYSIS BETWEEN POTENTIAL UTILIZED AND REVENUE COLLECTED

A regression analysis was done so to analyse the factors on which Utilised potential depend and to what extent they affect this variable. So, considering the utilised potential(Y) as dependent variable and Revenue(X1), Created Potential (X2) and Rainfall (X3) as three explanatory variables.
So, an equation of the following form was expected:

Y= aX1 + bX2 + cX3 +d

Where

Y = Utilised Potential

X1= Revenue Collected

a= Responsiveness of Utilised potential with respect to Revenue Collected

X2= Potential Created

b= Responsiveness of Utilised potential with respect to Potential Created

X3= Rainfall

c= Responsiveness of Utilised potential with respect to rainfall.

The following results were obtained:

With respect to revenue collected

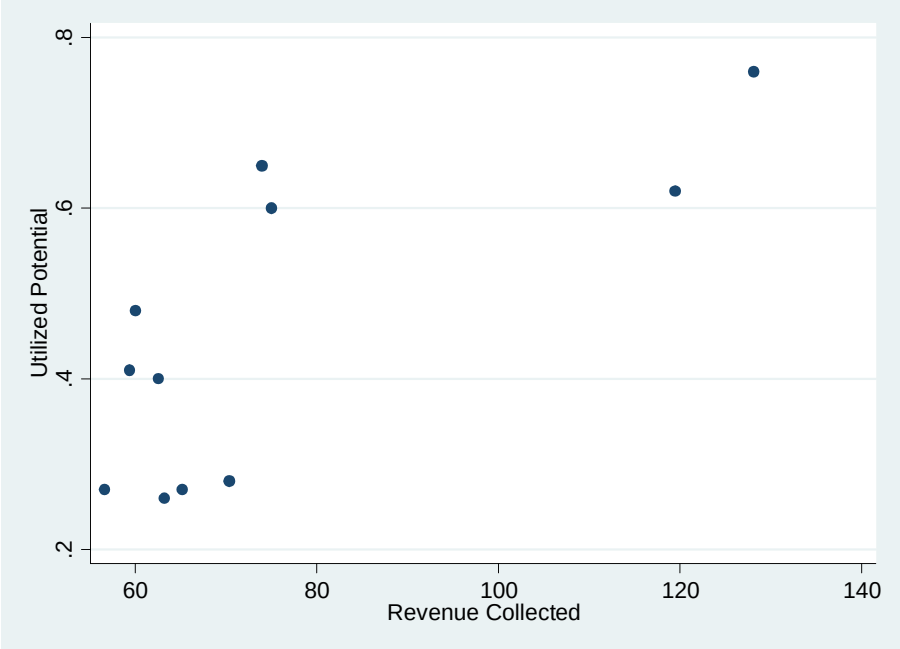


Figure 6: scatter plot of values between Utilized Potential and Revenue collected

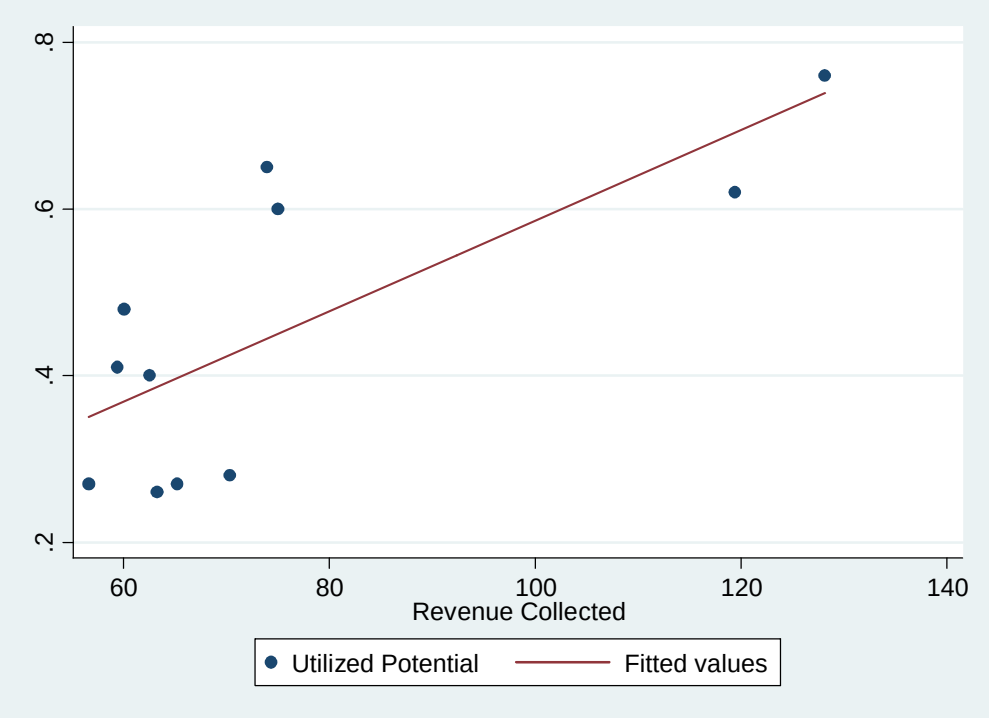


Figure 7: Regression analysis of Utilized Potential and Revenue collected

With respect to the potential created:

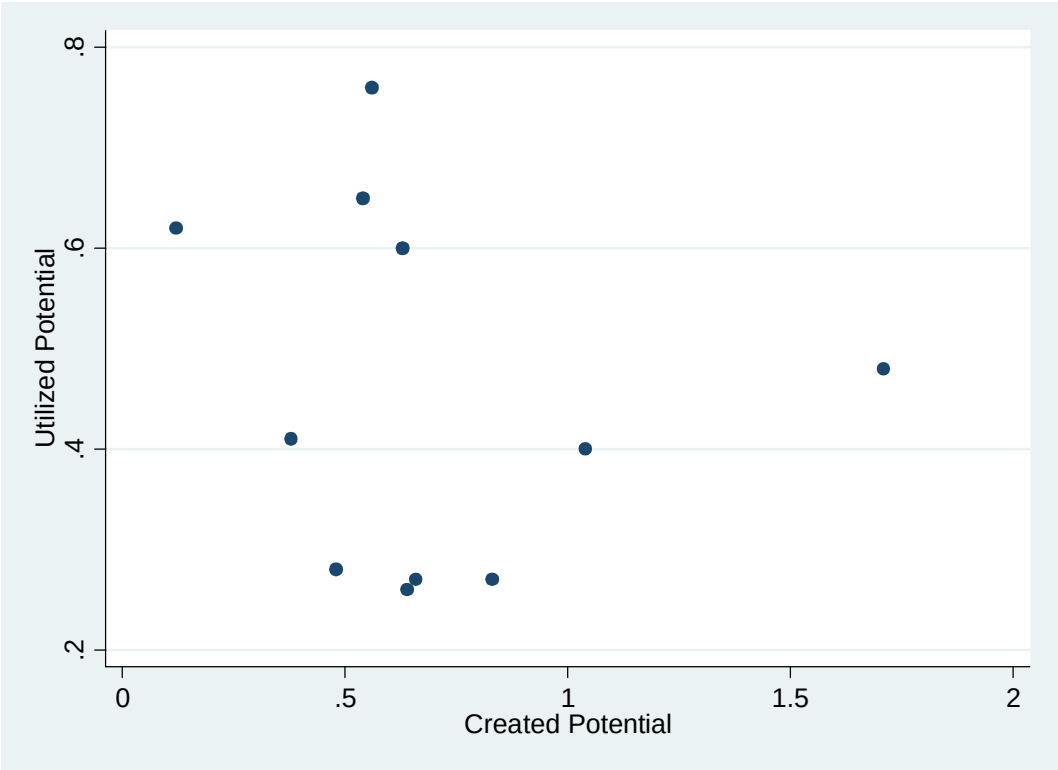


Figure 8: (Scatter plot) of values between utilized potential and created potential

With respect to rainfall:

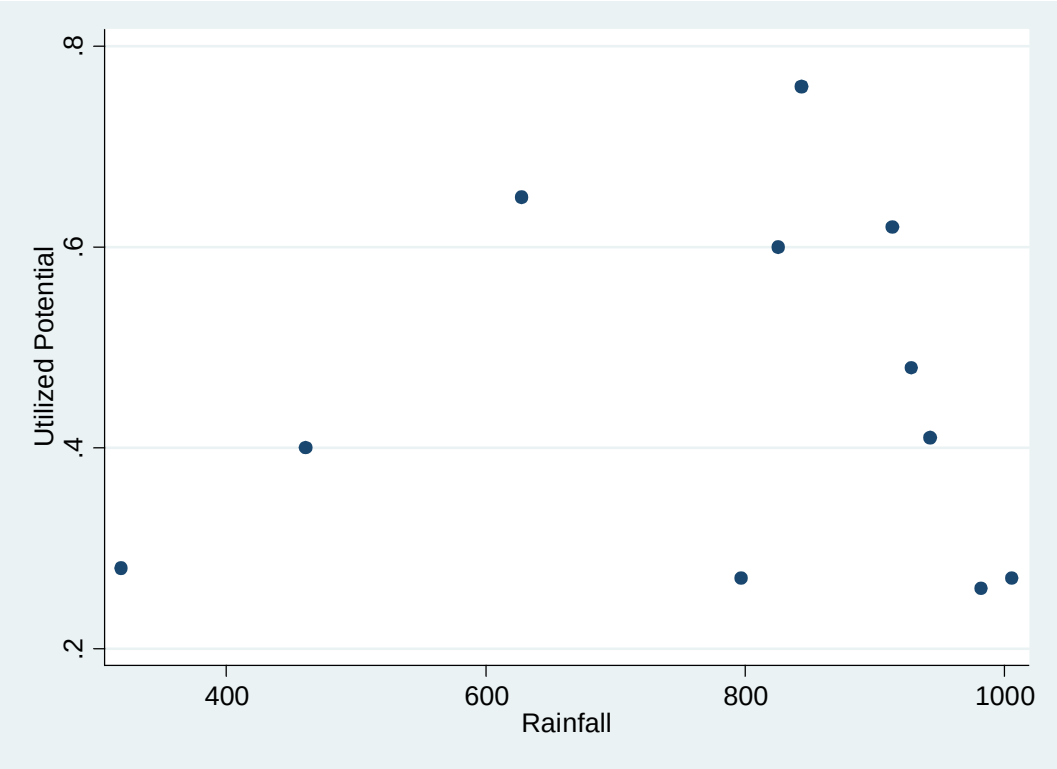


Figure 9: Scatterplot of the values between utilized potential and rainfall.

Equation obtained after regression:

$$Y= 0.0061864\ X1 + 0.0950509\ X2 - 0.0000233\ X3 - 0.0617433$$

Inferences drawn from the above regression:

The coefficient of effect on utilised potential with respect to revenue, i.e., value of a is coming out to be 0.0061864, which depicts positive relationship. This implies that if the revenue collected is increased by one unit, keeping all the other factors constant, then the utilised potential will increase by 0.0061864 units. It is justified economically also, because if the farmers have to pay for using water resources, they will tend to use it more efficiently and judiciously.

The coefficient of effect on utilised potential with respect to created potential ,i.e., value of b is coming out to be 0.0950509, which depicts strong positive relationship. This implies that if the potential created is increased by one unit, then the utilised potential of irrigation is also increased by 0.0950509 units. It is justified economically also because more the potential is created, the more it will be utilised.

The above results do not imply that the a per unit increase in explanatory variables will have the same increase in dependent variable as shown, because regression implies correlation and not causation. It can only be inferred that there is a positive correlation between Irrigation Potential Utilised and Revenue collected, Irrigation Potential created, while there is a negative relationship between IPU and Rainfall.

DEMAND SIDE/ SUPPLY SIDE PROBLEMS

The problem of water for irrigation can exist either because of supply side problems or because of demand side problems. Supply side problems can emerge either because of non availability of water or because of inefficient distribution of water, even if it is present. Demand side problems consist of the following factors: non adoption of schemes referred by the govt., unavailability of water(sufficient quantities at the time of need).

LACK OF TRANSPARENCY AND ACCOUNTABILITY

One of the problems that the irrigation department of Uttar Pradesh is facing is the lack of transparency, lack of accountability in the system. Since I.T. has not penetrated that extensively in the system as it should have, most of the work is done on paper. Since the transfer of written documents require a lot of time, the work is done comparatively slowly. A single document requires the consent of many officials.

MORE PREFERENCE OVER VOLUMETRIC APPROACH

Instead of distributing water on basis of area, the water should be distributed on the volumetric basis. This will reduce the wastage of water as only limited amount of water will be available to the farmers, so they will use it more efficiently and judiciously. Various problems such as water wastage, over irrigation will be solved. This is practised in many countries such as Nepal, New Zealand and many other countries. It has also lead to subsequent decrease in usage of water. Moreover, it also lead to an increase in revenue collected by the government because in case of

area approach, farmers pay according to the area owned by them while in case of volumetric approach, they pay according to the water utilized by them, so they become more cautious about each single drop used by them.

INCORPORATING MODIFIED BUDGET SYSTEM

For the solution of this problem, the case study of Malayasian Government comes into picture. According to research paper by Koshy Thomas, Malaysian Government incorporated Modified Budget system (MBS) so as to increase the accountability and efficiency of public sector. The MBS is based on fundamental management principles of Letting managers manage i.e. managers nearest to where outputs are produced should be given as much flexibility/authority as practicable to manage their resources, however this authority must be matched with requisite accountability at all levels of management.The MBS has 4 main features namely:-Expenditure Target; Program Agreements and Exceptions Reports; Cycle of Program Evaluations; and A More Generalized Approach to Expenditure Control.

PERFORMANCE MEASUREMENT

The MBS is followed by a system of measuring performance(PM), which can either be done by the higher officials or by any other external body. Performance measurement is necessary in every department so as to get the measurement of work done by eah and every employee. The advantages of PM are as follow: It will make their more quantitative in nature, it will be easier to compare. It will make the system more accountable and transparent. Certain sort of incentives can also be announced to make them work efficiently and reduce the problems prevalent in the system. It also helps in keeping the track of non working employees and hard working employee.

5.2 Finding from the fields and impact on the theoretical focus of the project

A field visit to Meerut matched with the theoretical concepts of Private tube wells. Two three farmers with whom the interaction was done said that they use private tube wells only. One more and important finding was that the water provided to the farmers is made tax free. They do not have to pay for the water they use, neither that of canals nor that of private tube wells. This was done with the intentions of increasing the production yield. Instead some of the farmers even got subsidy for installation of private tube wells.

As per the field visit to Lucknow, the following details were gathered:

Related to the financial structure of the department

Financial structure of irrigation department has two sections: 1) 94 section: This section includes funds for construction and maintenance. There are total 400 grants which needs proper treasury code, for e-transaction, which will be done if there is centralized server. Also the funds allotment is done like: 35% is the first installment (for first three months), 15% of the total budget proposed for the next three months and so on. The next installment is passed only after getting utilization certificate from the competent authority, which is generally the chief engineer.

The second section of financial structure of irrigation department is 95 section which actually deals with the salary of employees in the irrigation department. Since, it has to be divided among 101 divisions which then further divide it in their employees. This is completely computerized.

The revenue which was earlier collected from the farmers for using water provided by canal, is now exempted. Water is made tax free, and the amount lost is provided to the department is provided b government

Regarding the budget sanction and fund allotment

The budget which is proposed by the department often does not get completely sanctioned by the government of Uttar Pradesh. The amount is often less which is sanctioned and it leads to various projects left uncompleted. The installment which has to be paid to NABARD bank is often from the amount which is kept for maintenance purposes. This often leads to low funds for maintenance and further problems in irrigation.

According to finance controller of UPID, the problems in budgeting are the following: Sometimes the budget is proposed without any further investigation such as what are the prerequisites for the completion of this project, how much time it will take

and what exactly is the amount of funds needed for the completion of this project. There are problems when there are changes related to the structure of the project, i.e., a diversion in the original plan of completion of the project.

Regarding the structure of PIM in Uttar Pradesh

The structure of PIM in Uttar Pradesh, which is as follow: An outlet is divided into 6 parts. From each part, one representative is elected. So, accordingly a WUA (Water User Association) is formed comprising of 6 members. This happens in each outlet. Also, minor comprises of outlets. At minor level, divided into 3 level (head, middle, tail), WUA is also formed by electing 2 members (from WUA already formed at the outlet level) from head, middle and tail. Their function is to ensure the division of water to all the farmers, solve grievances among farmers and also, to propose a budget for irrigation works in their area. This goes up till the distributary level. The budget proposed by WUA, 70% of it is received initially and 30% after the completion of the project. They are expected to employee a technician and an accountant, so that it is easy for them to report their accounts on time and also, can deal with the technical issues related.

The current number of WUAs in UP is very less, which is 421 out of 8500 at minor level.

Problems associated with PIM in UP

There are a lot of problems associated with the implementation of PIM in U.P. Roaster system is formed, water is allocated to different areas at specific times, but surprisingly roaster system exists, but water in these canals don't exist at certain times, which causes a lot of commotion.

The budget allotted to WUAs is not received. They do not have money to do the basic maintenance work. The budget is allotted but is still not received. There is a lack of training sessions, lack of awareness among the farmers.There is a lack of communication between the association and concerned government authority.

5.3 Gap analysis

The costs incurred by the government of Uttar Pradesh are of two types:

1) Capital Cost(cost of building new infrastructure, or renovation of old existing structure)
2) Maintenance costs

For both these activities, Irrigation Department requires about 1931 crores. This fund is sponsored by

1) State Government : State government sponsors about 45.9% of the total funds
2) Central government: It sponsors about 7% of the total funds
3) From NABARD(National bank for agriculture and rural development): It sponsors about 46% of the total budget. The state government is supposed to pay each instalment roughly after 2 years.

The government has been able to provide irrigational facilities to farmers through a very systematic manner. But, because of the long hierarchical structure of the department, there are many loopholes for the problems to arise. There is lack of transparency, accountability in the system. There is no check over system to crosscheck the source of problems. If there is any delay in a work, it is hard to trace out the exact point. Because of large labour force, human resource is very difficult to manage.

Also, the PIM act of U.P government is implemented very well in the state. The government is trying to enhance the role of Water User Associations (WUAs).According to the act , the work of the irrigation department will be just to administer the work done by WUAs, which will be responsible for the functioning of the irrigation structure. These WUAs will be elected by the people and will be assisted by an engineer and an accountant. They are supposed to submit an annual budget to the Irrigation Department, which will then be sanctioned by the officials. It is done because the people at the grass root level have a better understanding of the problems they are facing. Along with that, they will ensure the efficient distribution of water resources among the farmers.

6. Recommendations, Scope and Strategies

6.1 Budget Proposal

a) to the State Government

REASON

The amount which is generally proposed by the irrigation department to the State Government is not sanctioned completely. Often, the budget allotted to the Irrigation Department is somewhat less as compared to what is proposed.

RECOMMENDATION

The budget which is proposed to the central government should include all the necessary details of each and every project.

STRATEGY OF IMPLEMENTATION

The budget proposed should include the plan of action, amount which will be needed giving specific details of the fixed cost and variable cost. The report should also include the previous works done by the department, including pictures and videos of the beneficiaries (if it is possible).

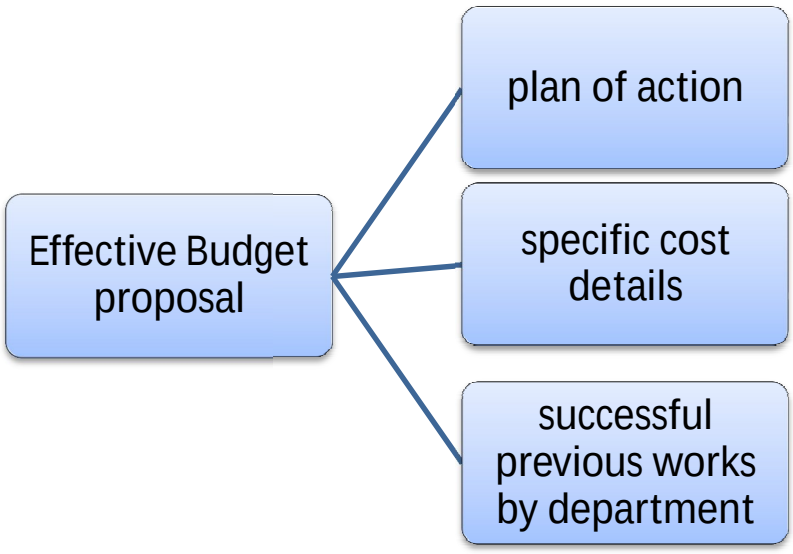


Figure 10: Recommendation for Effective Budget Proposal.

b) Ranking of Projects

REASON

Since the amount sanctioned by the state government is often less than what is asked for, It creates a chaos in the financial department of which project to implement and which not. Generally, the funds which are kept for maintenance purposes are used for accomplishment of projects and maintenance is left there only.

RECOMMENDATION

The budget at the time of proposal should include implementation ranking of projects which will given by the department to each and every project considering the amount involved, time taken to complete the project and the benefits which will be received after completion of the project. In each financial year, a separate percentage of funds should be kept for maintenance purposes, which should be used for maintenance purposes only.

STRATEGY

The financial department while proposing the budget to the state government should look into the projects of different department, and rank different projects according to benefits provided by the project, time taken for the completion of the project and the amount needed for the completion of the project. The amount which is then sanctioned by the state government should be allotted to different projects in accordance to their respective rankings.

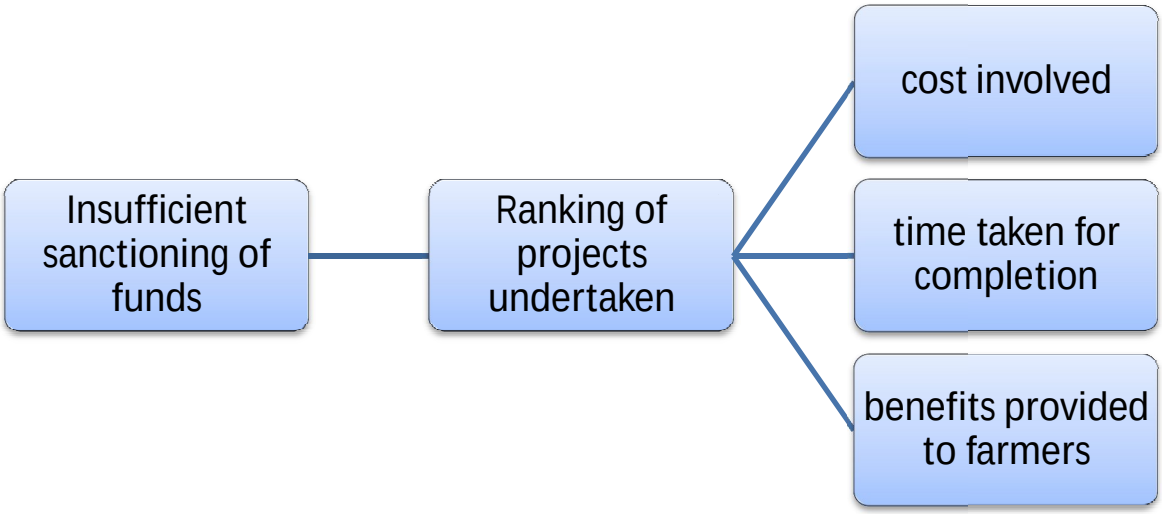


Figure 11: Recommendation for Ranking different projects

6.2 Sanction of funds by the department:

REASON

Departments often complain of lack of funds and because of this, they are unable to achieve the targets which are proposed by them.

RECOMMENDATION

The sanction of budget by the department would be based on the amount sanctioned, the ranking of each project in every department. It will also be based on the past works done by department including the delays in project completion.

STRATEGY OF IMPLEMENTATION

The initial amount given to the departments will be 40%. The rest of the amount to be sanctioned after 5 months will depend on the amount of work done by the department, which will be checked by the external body of officers. A report will be submitted by the external body which will be made available online and has to be countersigned by the head of villages in which the construction of the project is to be done. The details will include the cost incurred, comparison with other departments, monthly pictures of the work done by doing inspection of the fields. These reports will determine the budget which is to be sanctioned to the department in the next financial year.

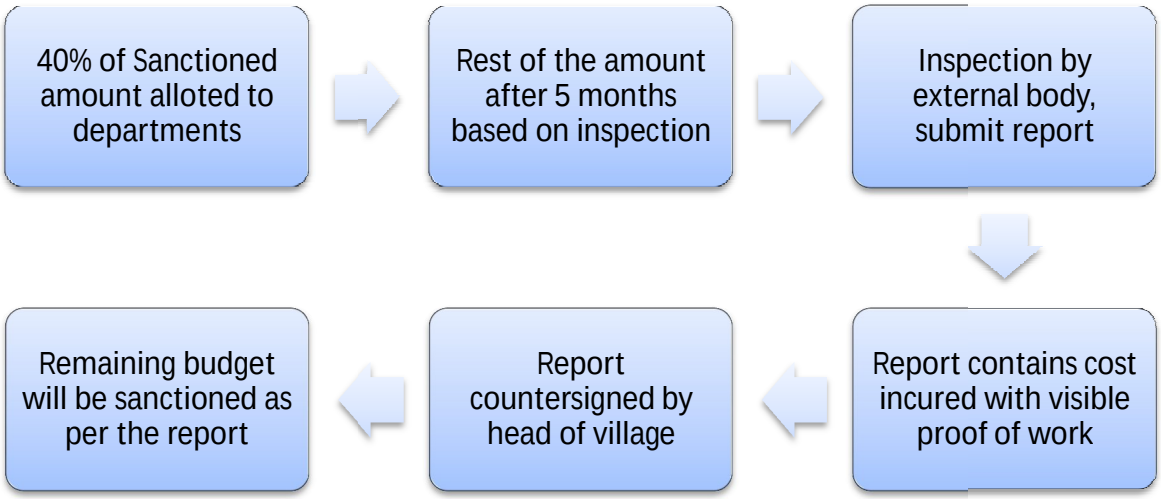


Figure 12: Recommendation for Sanctioning Funds to the department.

6.3 Inclusion of beneficiaries

Every economy in the world needs the help of beneficiaries for its smooth functioning. In the present scenario of irrigation in Uttar Pradesh, there are two possible ways through which the farmers can be involved in the system

REASON

Farmers generally know the ground reality of the situation and also, they can better explain the problems faced by them.

RECOMMENDATIONS

To include the problems and suggestions of the farmers, and finalising schemes on the basis of suggestions proposed.

STRATEGY OF IMPLEMENTATION

For this, special meetings of head of the village (Sarpanch Or President of Water User Associations) can be arranged with the Assistant Engineer followed by Junior Engineer. A member of external body should also be the part of the meeting and will be required to submit a final report to the higher authorities and recording videos for quality purposes .This meeting will be monthly or twice a month. A walk through once in six months is also proposed. The videos recorded can be uploaded online. This will make the beneficiaries more involved in the system and the ground reality can be realized.

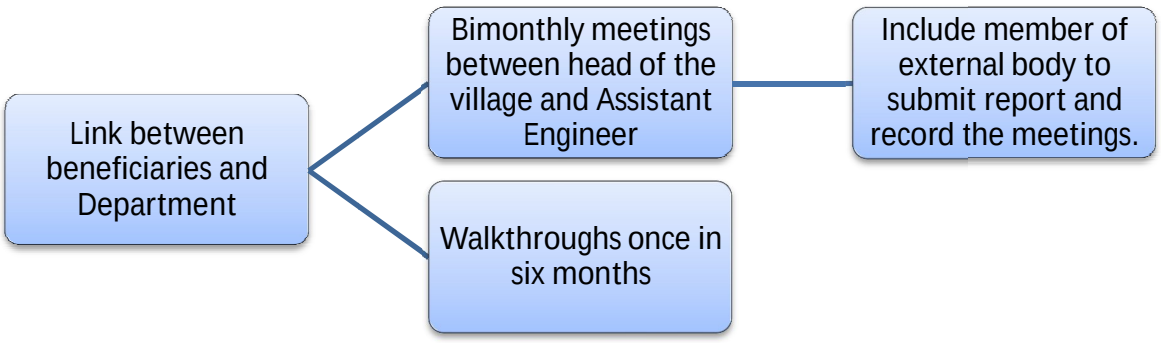


Figure 13: Recommendation for Inclusion of Beneficiaries.

6.4 Efficient Customer Care service

a) Extension to government run canals

REASONS

There is a customer care service about which very few farmers are now aware and it is only limited to private tube wells.

RECOMMENDATIONS

The extension of the service should be done from tube wells to government run canals also. The farmers should be made more and more aware about the service.

STRATEGY OF IMPLEMENTATION

The customer care call centre should be asked to start taking calls from the government run canals and maintain a data base for their complaints. More awareness about the service should be spread either through public announcements or radio.

b) Increasing the efficiency

REASONS

Currently, the concerned officer is just simply informed about the problem in his area. There is no time limit set as to till when he has to clear the complaint.

RECOMMENDATIONS AND STRATEGY OF IMPLEMEMTATION

It should be made sure the complaint is transferred to the concerned department within 24hrs of the complaint is made, the concerned official visits max within 2 days when the complaint is transferred to them and is solved within 7 days of the complaint is made.

c) Increasing the transparency

REASONS

Currently, the data of the complaints is kept with the customer care centre and is not displayed to the common public.

RECOMMENDATION

The customer care service should be made more transparent, with an easy access to common people.

STRATEGY OF IMPLEMENTATION

The data base of all the complaints should be, made available online with their status as to which state it has reached now. The voice recording of each and every call should be made available online or on the customer care number along with the date so that the more transparency can be incorporated in the system. The person who has made the complaint should be constantly updated through SMS giving information about the status of his complaint.

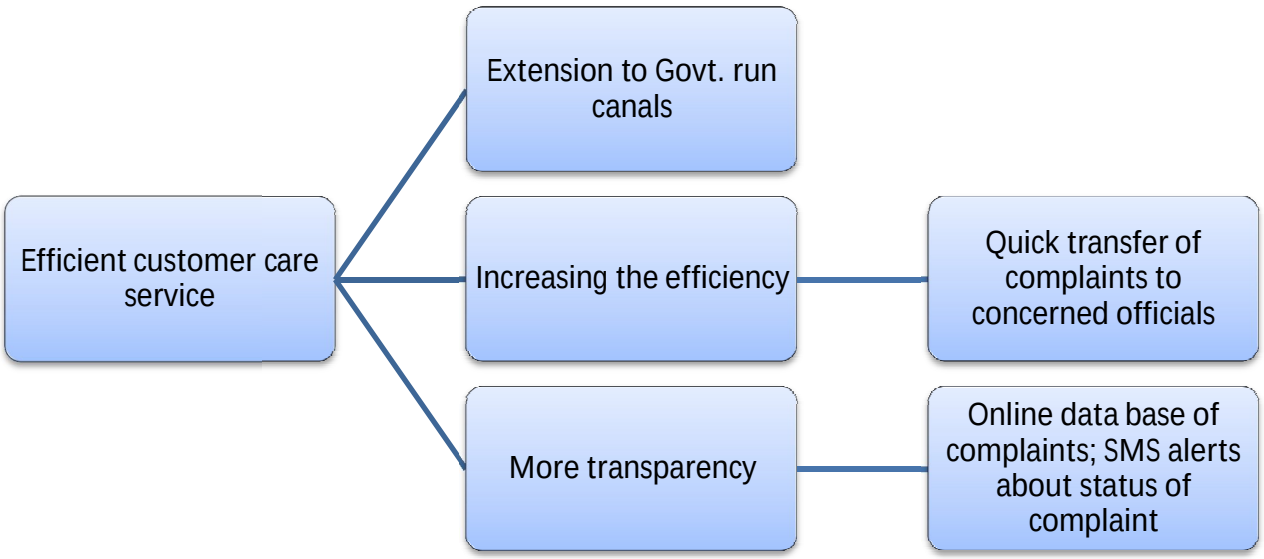


Figure 14: Recommendation for Efficient Customer Care Service.

6.5 External Body For Monitoring:

REASONS

Presently, the work done by the department is monitored by the Chief Engineer. But it is not efficient, since there is a lot of delay in the work done and generally the work is done only on documents while in reality it is not there.

RECOMMENDATIONS

The main recommendation of this report includes the formation of an external body for monitoring the work done by the different departments under the Irrigation Department. It will be a completely autonomous body which will function independently.

STRATEGY OF IMPLEMENTATION

Its function will include the following:

- Checking the financial progress of different departments, submitting a monthly report of every department, including the progress made by them on different projects undertaken by them. Its function will also include giving a utilization certificate to each and every project and then to the whole department. The utilization certificate has to counter signed by the head of the village or area in which the project is implemented. After this utilization certificate only, rest of the funds would be allotted to the department. The report submitted should be made available online. The reports will then determine the amount sanctioned to the department next year.

- The external body will also be responsible for measuring the performance of different employees of the department. The final outcome of the project will solely be the responsibility of the head of department and accordingly, incentivizing or penalizing the departments will be done. Each and every department will be rated by the body depending on factors such as delays in the project, quality of the final outcome, number of solved complaints in the area.

- A separate section in the external body should be made which will look after the proper implementation of PIM in Uttar Pradesh, which will deal with spreading awareness about PIM. It will also monitor the amount received by the WUAs and their utilization done by them.

- There should be a grievance-redressal mechanism for providing timely and ensured solution to the problems faced by WUAs from the department and also faced by department from WUAs.

- Similar scheme of Performance Measurement can also be applied to the different WUAs, which will be further incentivized on doing good work. This is already being done in the department but should be practiced on a larger scale.

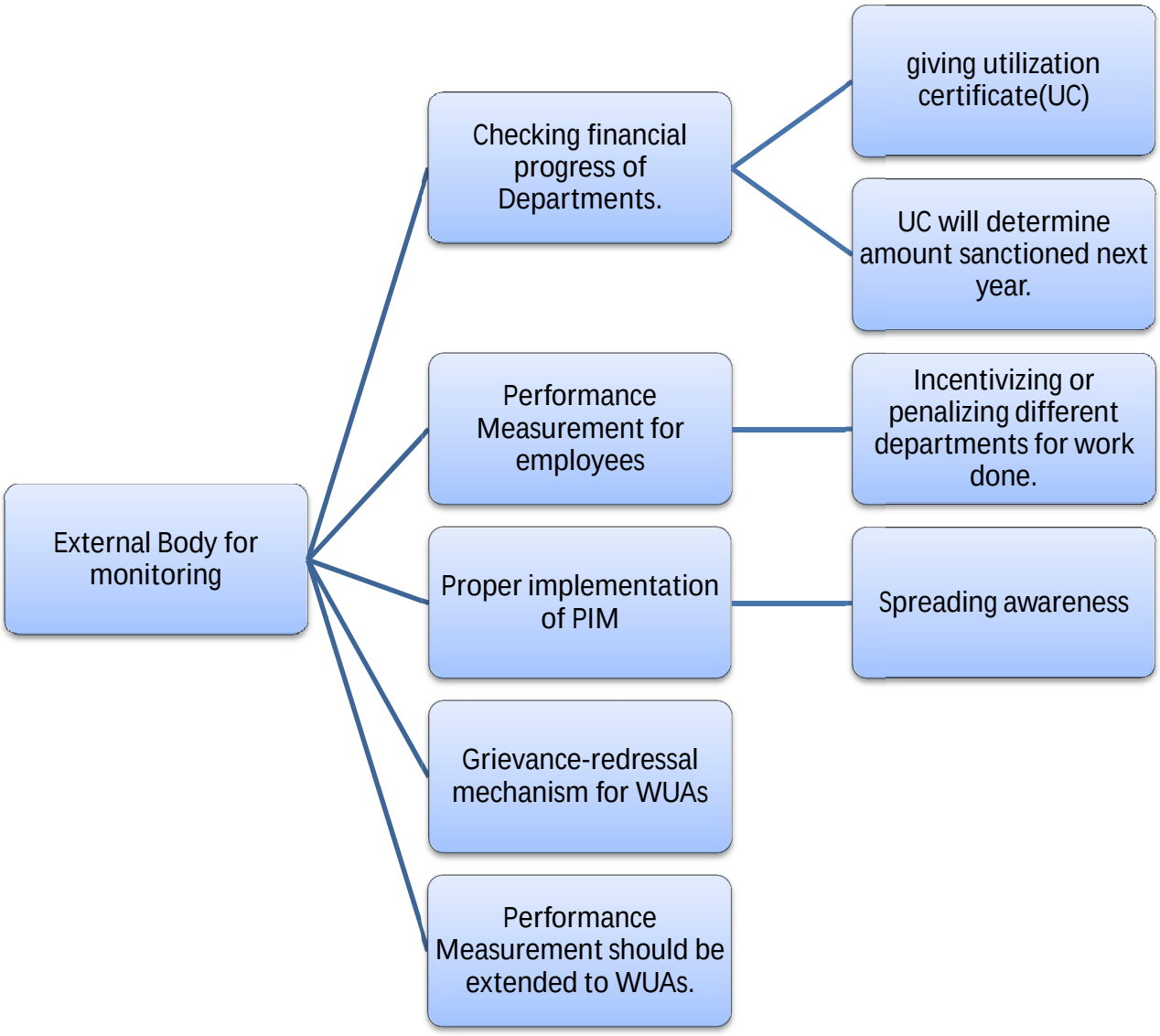


Figure 15: Recommendation for External Body for Monitoring.

6.6 IMPROVEMENTS IN PIM

a) Lack of funds

REASONS

Most of WUAs complain about lack of funds and their helplessness to proceed further with the problems encountered.

RECOMMENDATIONS

This can be done by commercializing WUAs.

STRATEGY OF IMPLEMENTATION

The plan is as follow: Since for every WUA of a minor, there are approximately 100 farmers and all of them use fertilizer, pesticides and seeds of different companies. If they could ensure a model, after checking the quality, that all the farmers of that specific area will buy fertilizers from company X (say). In return, the firm can give a certain fixed amount of cash to the Water User Associations (WUAs) because it is also helping them increase their production. So, it can be extended to pesticides, seeds and so.

b) Less amount of water

REASONS

WUAs complain of lack of water as per the roaster system. But, the water is also limited and a scarce resource.

RECOMMENDATION

Instead of relying more on water provided by the Irrigation Department, the farmers should be more focussed on utilizing the potential of rain water.

STRATEGY OF IMPLEMENTATION

A committee of people, Rain Water Harvesting Committee at the distributary level can be formed, which will ensure rain water conservation at outlet level. A community water harvesting can be done, which will be used at the time of lack of supply of water and will also increase the level of ground water recharge.

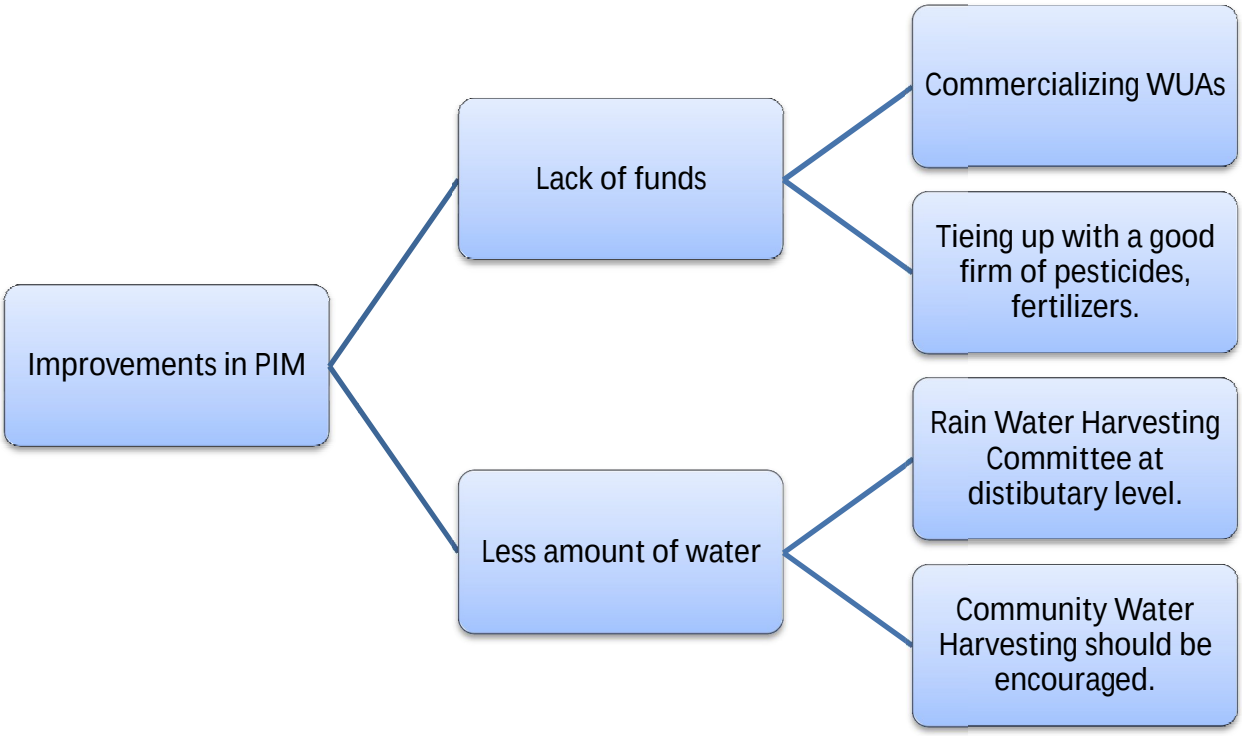


Figure 16: Recommendation for Improvements in PIM

6.6 Taxing the farmers

REASONS

The water which is available to the farmers is tax free.

RECOMMENDATION

As shown in section 4, with the help of regression analysis, there is a strong positive relationship between the utilised potential and the revenue which is collected. So, if the department can collect revenue from the farmers, the utilised potential of irrigation will increase. Also, when the farmer has to pay for something, he will use it more judiciously.

6.7 Water Conservation

REASONS

Farmers complain of lack of water for irrigation. Also, since water is a scarce resource and is limited in quantity. There is an increase in pressure of utilising water because of constant increase in population.

RECOMMENDATIONS AND STRATEGY OF IMPLEMENTATION

- Community based rain water harvesting schemes should be encouraged under which rain water is collected by the whole community and is used by the one whose chance is missed under the roaster schedule. The proper implementation of this system will be the responsibility of the community.
- Metering of water is also encouraged. The community head or WUAs will be responsible for proper metering of all water resources used by the community.

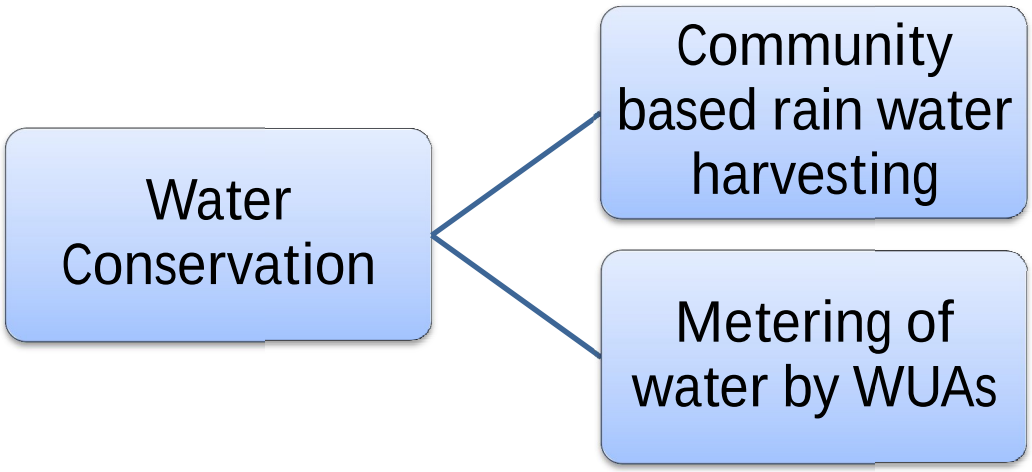


Figure 17: Recommendation for Water Conservation.

7. Conclusion

It was once said by Jawahar Lal Nehru that no economy in the world can grow completely without the growth of agricultural productivity. Uttar Pradesh is said to be blessed with the most alluvial soil and ample water resources. But, there are certain problems which are faced by the farmers and the employees of UPID in realising the full output.

As mentioned in the report, the gap between IPU and IPC goes upto the level of 20%. This gap can be attributed to many factors such as old and obsolete structure of irrigation, more reliance of farmers on private run tube wells, lack of mutual trust among the farmers and the UPID, Lack of penetration of I.T. in the sector, absence of transparency and accountability in the department.

But these problems can to a certain extent be countered by the presence of an external body for monitoring, who will monitor all the work (financial and physical) done by the department officials, accordingly with devise a mechanism of Performance Measurement, to incentivise the hard working employees and penalising the non working employees.

The future of irrigation in India is in increasing the participation of beneficiaries in the system, which can be increased by expanding the concept of Participatory Irrigation Management in the system. The idea is to give over the work of management to the farmers who are having better knowledge of the problems faced by them. They ensure better collection of revenues.

The department of Uttar Pradesh has initiated PIM in Uttar Pradesh, with the help of formation of WUAs. But it is still very few in number,i.e., 441 out of 8500.

The state of Uttar Pradesh has to still go a long way for the efficient implementation of PIM.

8. References

1. Prof. Narayan Sharma and Prof Rajpal singh, History of Irrigation In Uttar Pradesh(2011)

2. S.K. Srivastav and Ranjit Singh, Irrigation Development and Groundwater Extraction in Uttar Pradesh state: Emerging Issues of Distribution and Sustainability.

3. UTTAR PRADESH (INDIA) IN PERSPECTIVE OF IRRIGATION & WATER RESOURCES MANAGEMENT, The Development of Eco Efficient Water Infrastructure for Socio-Economic Development in Asia and the Pacific, 10-12 nov.2008

4. Ranjit Singh, Major and Minor Irrigation works, comparison on costs and benefits, The Economic Weekly,16th December, 1961

5. Niranjan Pant, Key Issues in Participatory Irrigation Management(PIM in India)

6. Study on Issues related to gap between Irrigation Potential created and Irrigation Potential Utilized: Report submitted to Ministry of water resources, Government Of India by: IIM, Lucknow

7. R.S. Sinha, Policy Initiatives for rain water harvesting in Uttar Pradesh: Gaps and Challenges

8. J.B. Patel and T.M. Dholakia, Success story of Panam District in the field of Participatory Irrigation Management.

9. Koshy Thomas, Introduction to Monetary Budget System in Malaysia

10. Assesment of Training Needs and plan of training action: Report submitted to UPID by : IIM, Lucknow

11. http://irrigation.up.nic.in/

12. Uttar Pradesh : State Profile, Report by PHD bureau

13. Yusuf karbhari and Har sani mohammad, Impact of MBS on PM in Malaysian Central Government Organisation

14. Hamada and Samad, Participatory Irrigation Management in India

15. Badatya and Mohapatra, Impact of Participatory Irrigation Management in Andhra Pradesh.

16. M.A.S. Mandal, Imperfect Institutional Innovation for Irrigation management in Bangladesh, 7th May1987

17. U.P. Participatory Irrigation Management Act 2009
www.ielrc.org/content/e0902

18. Review of irrigation project planning and implementation process

19. Sharing Best Practices in Rural Development, Report submitted to socio-Economic research unit, Planning Commission, Government Of India, by Research and development initiatives.

20. Ranjit Gupta, Major and Minor Irrigational Works

21. Traditional water system and Minor Irrigation scheme: Version 2 CE IIT Kharagpur

22. K. Palanisami, Karthikiyan and venkatesapalanichamy, Indian Water Management

23. Tushar Shah, Hassan, Khattak, Partha sarthi Banerjee: Is irrigation Water Free? A reality check in Indo Gangetic Plain

24. Niranjan Pant, Key Issues in Participatory Management

25. Abu bakar, Zakiah Saleh, Muslim Harsani Mohammad: Enhancing Malaysian Public Sector transparency and accountability

26. Sanjay S. Phodnis, Kulsreshtha, Meenal Phordnis, Participatory Approach for socially and environmentally sustainable modernisation of Existing irrigation and drainage schemes in India.

27. J.H. Alberts, Public Tube well irrigation in U.P. , India

28. C. Morales, Caren Joy Mongcopa: Best Practices in Irrigation and Drainage activities

29. Kulkari, Sinha, Belsare, Tejawat : PIM in India: Achievements, Threats and Opportunities

30. Dr. Gulab Singh Narwal, Improving Performance of Irrigation Project through PIM- A Case Of Sunder Distributary System

31. Richard Mugran, Transparency and Public Sector Performance

32. Ali M. Al-Khouri, An innovative approach for E- Government Transformation

Appendix A

Meetings and Interviews

Date: 27th May 2013

Person met : Shri S.P. Goyal

Time: 10:30 a.m.

Duration of Discussion: 90 min

Discussion [Please use bullets]:

- First, I made an introductory call to sir. He asked me to come at 10:30 to U.P sadan, which is in Chankyapuri, Delhi.
- On reaching there, he first discussed the basic need for irrigation. How irrigation was started in India, referring to the British empire in some late 1800s.
- Then after that he came to discuss about the irrigation system in India, prevalent now, specifically in Uttar Pradesh. He told us how this system exist ,i.e., it starts from a dam, den goes into canal,which further goes to distributaries and then into minors.
- He also told us that this system is not able to reach to a large amount of population of farmers and so most of the farmers rely on private tubewells.
- Also, till the last year, there was a tax which was to be paid by the farmers, for using water but now, that is from this year water is made tax free.
- Problem of transparency in the whole hierarchy of officers.
- He has asked us to devise a mechanism through which we can increase the transparency between the public and government, various mechanisms of

increasing the efficiency of the irrigation system, taking the help of information technology.

Date : 4th June 2013

Person Met: Shri Arvind Kumar Gupta

Timings: from 10:00 a.m. to 3:30 p.m.

Place of visit: Meerut

Description:

- First goal was to understand the basic structure of irrigation system, how the water is distributed by Irrigation Department and how the scheduling of water is done, what for the revenues charged by the government. Second goal was to meet the local farmers and understand the actual mode of irrigation practiced by the farmers
- He explained regarding the distribution of water in UGC(Upper Ganga Canal), how this water is distributed in various distibutaries, branch, minor. He explained the recent problem which emerged in 'khatauli' escape and how it was tackled. Actually in khatauli escape which provided water to many areas including Delhi, water started seeping down, so there was water could not be provided to those area. This problem was then solved by layers of sand, which stopped the seeping of water.
- He helped in visiting to the Khatauli escape, Upper daurala and Lower daurala (Distributaries), minors in jitpur and Khanudala.

Date: 28th June 2013

Person: Shri Dwivedi, Financial Controller, UPID

Timings: 2:00 p.m. to 4:00 p.m.

Place: Lucknow

Description:

- Financial structure of irrigation department has two sections: 1) 94 section: This section includes funds for construction and maintenance. There are total 400 grants which needs proper treasury code, for e-transaction, which will be done if there is centralized server. Also the funds allotment is done like: 35% is the first installment(for first three months), 15% of the total budget proposed for the next three months and so on. The next installment is passed only after getting utilization certificate from the competent authority, which is generally the chief engineer.

- The second section of financial structure of irrigation department is 95 section which actually deals with the salary of employees in the irrigation department. Since, it has to be divided among 101 divisions which then further divide it in their employees. This is completely computerized.
- The revenue which was earlier collected from the farmers for using water provided by canal, is now exempted. Water is made tax free, and the amount lost is provided to the department is provided b government
- The budget which is proposed by the department often does not get completely sanctioned by the government of Uttar Pradesh. The amount is often less which is sanctioned and it leads to various projects left uncompleted. The installment which has to be paid to NABARD bank is often from the amount which is kept for maintenance purposes. This often leads to low funds for maintenance and further problems in irrigation.
- According to him, the problems in budgeting are the following: Sometimes the budget is proposed without any further investigation such as what are the prerequisites for the completion of this project, how much time it will take and what exactly is the amount of funds needed for the completion of this project.
- There are further more problems which are related to Roaster System. Scheme is made by the department, but the main problem is that water is not available on time for the farmers. There is also a tragedy of commons, in which the water available is not available for the farmers at the tail end.

- There are problems when there are changes related to the structure of the project, i.e., a diversion in the original plan of completion of the project.

- The budget which is proposed by the department is completely not sanctioned by the government, which results in various problems in fund allotment for various activities.
- The monitoring of various projects is done by the chief engineer of the department, which includes studying the budget proposed and how the budget is used for various purposes.
- Less fund available for maintenance works, because of installments required to be paid to NABARD and less funds sanctioned by the state government.

Date: 29th July 2013

Timings: 2:00 p.m. to 4:00 p.m.

Person met: Shri Rajesh Shukla, Shri Ganesh Kumar Mishra

Place: Lucknow

Description:

- The main objective of this field visit was to study the structure of PIM (Participatory Irrigation Management) in Uttar Pradesh and its progress in the past 2-3 years, to study the problems associated with the implementation of PIM in Uttar Pradesh, to analyze the problems faced by the formed Water User Association(WUAs).

- Analyzed the structure of PIM in Uttar Pradesh, which is as follow: An outlet is divided into 6 parts. From each part, one representative is elected. So, accordingly a WUA (Water User Association) is formed comprising of 6 members. This happens in each outlet. Also, minor comprises of outlets. At minor level, divided into 3 level (head, middle, tail), WUA is also formed by electing 2 members (from WUA already formed at the outlet level) from head, middle and tail. Their function is to ensure the division of water to all the farmers, solve grievances among farmers and also, to propose a budget for irrigation works in their area. This goes up till the distributary level. The budget proposed by WUA, 70% of it is received initially and 30% after the completion of the project. They are expected to employee a technician and an

accountant, so that it is easy for them to report their accounts on time and also, can deal with the technical issues related.

- The current number of WUAs in UP is very less, which is 421 out of 8500 at minor level.
- There are a lot of problems associated with the implementation of PIM in U.P. Roaster system is formed, water is allocated to different areas at specific times, but surprisingly roaster system exists, but water in these canals don't exist at certain times, which causes a lot of commotion.
- The budget allotted to WUAs is not received . They donot have money to do the basic maintenance work. The budget is allotted but is still not received. There is a lack of training sessions, lack of awareness among the farmers.
- There is a lack of communication between the association and concerned government authority.

Appendix B

Table 3.1: Sanctioned strength of various levels of staff in UPID
(Source: ISR Report, SMEC India, May 2006)

Sr. No.		Classification/ Categorization of Post	Total No of Approved Posts
1		2	3
Group A	1	Engineer in Chief & Head of Department	1
	2	Engineer in Chief (Design& Planning)	1
	3	Engineer in Chief (Mechanical)	1
	4	Chief Engineer Level-I (Civil)	8
	5	Chief Engineer Level-1 (Mechanical)	1
	6	Chief Engineer Level-2 (Civil)	26
	7	Chief Engineer Level-2 (Mechanical)	6
	8	Superintending Engineer (Civil)	137
	9	Superintending Engineer (Mechanical)	42
		Total	223
	10	Executive Engineer (Civil)	591
	11	Executive Engineer (Mechanical)	207
		Total Group A	1021
Group B	12	Assistant Engineer (Civil)	1588
	13	Assistant Engineer (Mechanical)	549
		Total Group B	2137
Group C	14	Junior Engineer (Civil)	4685
	15	Junior Engineer (Mechanical)	1926
		Revenue cadre	
	16	Deputy Revenue Officer	137
	17	Ziledar	600
	18	Seench Paryavekshak	2389
	19	Seench Pal	6361
	20	Head Munshi	103
	21	Munshi	695
		Drawing cadre	
	22	Head Architect cum Draftsman	164
	23	Head Architect	6
	24	Architect & Draftsman	14
	25	Draftsman	933
		E-in-C cadre	
	26	Senior Administrative Officer	1
	27	Personal Asst.	5
	28	Administrative Officer	41
	29	Senior Assistant	157
	30	Head Clerk	144
	31	Lower Division Clerk	171
	32	Personal Assistant Level-1	9
	33	Personal Assistant Level-2	27

Table 3: Sanctioned strength of various levels of staff in UPID

Sl. No.	Name of State	Number of WUAs formed	Area covered ('000 ha)
1.	Andhra Pradesh	10790	4800.00
2.	Arunachal Pradesh	2	1.47
3.	Assam	37	24.09
4.	Bihar	37	105.80
5.	Chattisgarh	945	N.A.
6.	Goa	42	5.00
7.	Gujarat	576	96.68
8.	Haryana	2800	200.00
9.	Himachal Pradesh	875	35.00
10.	J&K	1	1.00
11.	Karnataka	2279	1052.41
12.	Kerala	3930	148.48
13.	Madhya Pradesh	1470	1501.45
14.	Maharashtra	1299	444.00
15.	Manipur	62	49.27
16.	Meghalaya	99	N.A.
17.	Nagaland	25	N.A.
18.	Orissa	11020	907.00
19.	Punjab	957	116.95
20.	Rajasthan	506	219.65
21.	Tamil Nadu	7725	474.28
22.	Uttar Pradesh	24	10.55
23.	West Bengal	10000	37.00
	Total	55501	*10,230.08 say, 10.23 M ha*

Table 4: No. Of WUAs in different states of India.

“The highest measure of democracy is neither the ‘extent of freedom’ nor the ‘extent of equality’ but rather the highest measure of participation.”
- A.D. Benoist

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