

Impact of Governance on the Quality of Management of Water Resources Projects

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Summary :

The sector of water resources in our country is one of the most important strategic sectors which constitutes one of the major concerns of the State, especially in the light of the increasing demand for water, which requires the achievement of more vital projects to face the climate and natural conditions and achieve sustainable development, to boost the sector towards economic efficiency and social justice and to preserve the environment. The governance policy is the only way to ensure quality of these projects, thus, to reach the objectives and to give credibility to the research, we have designed a questionnaire distributed to a sample of 16 State engineers specialized in water field, whereby we came to the conclusion of the existence of an impact of governance on the quality of management of water resources projects, which calls on institutions of the water resources sector to adopt water governance policy to ensure the quality of its services and sustainability for future generations.

Keywords: governance, quality of management of water resources projects, water governance, society .

Introduction:

Water is a blessing that God has bestowed upon His servants to give life on earth, it is the basic support for any development efforts in line with the emergence of continuing and ever-growing modes of life and industrial patterns, thus resulting in large increase in consumption and demand for water, and intensification of competition for water between the hydraulic sector and drinking water sector, and given the scarcity of water and the diversity of its use, there is an urgent need to give water resources priority in the overall planning of the various countries in the world, by laying the foundations and frameworks for the management of water resources in an integrated and programmed way, aiming at achieving sustainable development that meets the needs of the present without compromising the right of future generations to get their water needs. In this context, water governance is the best option to overcome this problem.

In the light of the difficult challenges that Algeria knows, like many countries in the world that are seeking to change their way of managing water resources, emphasis should be put on water governance, which in practical terms, means setting policies, legislations and regulations concerning accounting, control, responsiveness and transparency.

We shall try through this topic to address the impact of governance on the quality of management of water resources projects through the presentation of some governance indicators in the sector of water resources and sensitize its institutions, namely the DRE (**D**irection des **R**essources en **E**au), the ONA (**O**ffice **N**ational de l'**A**ssainissement), the ADE (**A**lgérienne **D**es **E**aux) to adopt the method of water governance which will enable them to increase the volume of water supply and its value and to improve the way of using it with the involvement of all sectors concerned with the management of water resources projects.

This leads us to ask the following problematic question :

How governance has an impact on the quality of management of water resources projects ?

And based on the main problem we shall ask the following sub-questions :

- What is water governance?

- What is the reality of management of the sectors of water resources projects?
- Is there an impact of governance on the quality of management of water resources projects?

As an answer to these questions, we have developed the following hypotheses:

- The concept of water governance is a modern concept used in the development of water resources and its delivery to various levels of society.
- Water resources projects have experienced a significant development in terms of achievements, but it is difficult to control these projects.
 - H0: There are no statistically significant differences associated with the conceptual level (0.05) in the trends of sample elements answers about the existence of impact of governance on the quality of management of water resources projects.
 - H1: There are statistically significant differences associated with the conceptual level (0.05) in the trends of sample elements answers about the existence of impact of governance on the quality of management of water resources projects.

To test these hypotheses, we shall refer to some studies which have addressed the topic, then we shall expose the most important water resources projects in the province of Medea during recent years, and the extent of their development, and finally we shall assess and test a linear regression model of the relationship between governance as an independent variable and the quality of management of water resources projects as a dependent variable.

1- Previous studies:

Within the context of the relation of governance with the quality of management of water resources projects through involvement of the private sector in the field, we find a study (D. Gharbi Azzouz)¹ which emphasized the need of involving the private sector in the provision of water services and sanitation, and giving the opportunity to the sector to invest in water projects in order to achieve financial return to the State budget and reduce the burden placed upon it, to pay efficiently

¹ Azzouz Gharbi, Water Governance in Algeria, Search for the Role of the Private Sector, intervention within the Global Water Forum entitled Water Security (protective legislation and policies of management) 14 and 15 December, 2014, Faculty of Law, Guelma.

the sector and make it more responsive to the requirements of consumers who will benefit from the expertise of the private sector technologies.

Among the most significant contracts entered into by the Algerian government with the private sector, we find the partnership with the French company Suez Environment in an amount of 120 million Euros. Works were launched at the beginning of 2002 and the company took charge of the management, operation and maintenance of water and sanitation facilities in Algiers to provide drinking water to residents of the city 24 hours a day. The Algerian Agency for the Development of Investment entered into contract in 2008, with two companies "ENIMA and AQUALIA" in an amount of 360 million Dollars to construct two seawater desalination plants in the province of Mostaganem and Boumerdes.

A study (Children of Hamoudah, 2014)² puts the emphasis on the fact that water resources policy is an integrated policy which requires the involvement of various local parties at different levels, because water belongs to scarce common natural resources which should be developed, and its preservation is a major challenge for States as it requires the adoption of models of governance for managing water and ensuring its stability.

A study entitled "Evaluation de la Gouvernance de l'Eau au Benin, 2009" (Evaluation of Water Governance in Benin)³, aimed through planning programs of water governance at convincing actors in the water sector, of the importance of a water national partnership, with documentation of water management at the national and local level, the creation of water users associations whose objective is to guarantee that their main mission is to promote safe drinking water governance and to strengthen the capacities of the various groups of users of water resources in well sites and waterholes, and to establish partnership with the European Union.

² Zoubida MOHSIN, Integrated management of water as a tool for sustainable local development, doctoral thesis in economic sciences, Algeria, University of Ouargla, Ouargla, 2013, p. 180.

³ Water governance in Benin (Analysis of the situation and priority actions - West African Water Partnership: GWP/AO.2009.

In another evaluation of water governance, we find a study entitled “Gouvernance mondiale de l'eau, 2008” (Global water governance)⁴. This evaluation is as part of the International Conference hosted by Japan in the February 22, 2008, entitled International Year of Sanitation – Improving access to safe water and sanitation, whereby it was stressed that it was necessary to resort to a participatory approach between the government and the private sector and the participation of all parties to address the issues related to water, and to keep away the government bureaucracy forms, to follow and control modern technology in the field of sanitation and access to potable water, as a response to the ever increasing competitive demands of water supplies.

The previous studies (first and second) have focused on the need to involve the private sector in the provision of water and sanitation as one of the most important principles of water governance. The third study has been focusing on the principle of planning various water programs, while the fourth study focused on the technical side using modern technology. In each of these studies we noted the absence the rest of principles of water governance, especially the social responsibility, so we have tried through our study to address the various principles which were not referred to by these studies, by explaining their impact on the quality of management of water resources projects.

2- Water governance and reasons for adopting this term

The expression water governance is relatively recent. This concept has emerged since the last decade of the twentieth century and its importance has increased since the adoption of the Second World Water Forum, which was held in the city of The Hague in 2000, where the gathered parties agreed that the problem of water in the world is a management problem, not just a problem of scarcity⁵, and throughout this forum it has been focused on this concept.

Water governance is defined as "comprising all organizations, social, economic and administrative institutions in addition to their

⁴ Global Water Governance ; International Year of Sanitation ; a platform of action in Africa and Asia. United Nations University, Tokyo, 22 February 2008, p. 04.

⁵ Safwat Abdel Dayem and Nancy Aouda, Water Governance, Report of the Arab States League, Chapter eleven, p. 172.

relationship to the development and management of water resources"⁶ while the Global Water Partnership defined water governance as "a range of political, social, economic and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels in society".

It has also been referred to as a group of organizations influencing the decision-making operation relating to the management of water and its development and preservation, as well as the water supply service, or simply determining who will get water, and when to get it. Governance is an integrated set of systems that controls decision-making for the development and management of water resources, and the governments, the civil society and the private sector participate in its formation⁷.

The most important causes of water governance shall be addressed including:

- **Increase in the demand for water:** The most important reasons for lack of water and the need for governance, is the rapid population growth and the requirements of development. Presently, societies exercise increasing pressure on water and other natural resources, and the current use is characterized by their reliance on non renewed groundwater as in the case of groundwater in the Algerian desert.

- **Increased pollution:** When water is scarce and the demand is much more important than supply, another problem arises such as pollution which is becoming increasingly important. So from the standpoint of governance, pollution is considered as a result of the increasing demand, and one should think of using those pollutants and discuss them in the light of consumer needs and the urgent environmental requirements.

- **Increase of interdependence between water systems and their complexity:** as a result of the presence of water uses interdependence and complexity among different applications and systems, the challenges of effective governance are increased to reduce the high risk that threatens the existence of water and the demand for it, and changes its quality.

⁶ Azzouz Gharbi, Water Governance in Algeria, already mentioned reference, p. 04.

⁷ Wafa Lotfi, Water Governance, see the following site www.asharqalarabi.org.uk/markaz, date of consultation: 27/02/2016.

- **Climate change:** climate changes have mainly an impact on water resources through the frequent occurrence of catastrophic events such as floods, droughts, temporal and spatial changes in rainfall patterns, which threaten the lives and lives of individuals. Therefore, governance is required to take up the challenge of climate changes when planning water management⁸.

3- Water governance in Algeria :

Algeria has undertaken some reforms in the field of water resources. However these reforms are faced with barriers and important challenges, among others the confusion in responsibilities and lack of coordination between the concerned authorities, the existence of unqualified institutions, limited awareness and over-centralized decision. Add to this ineffective and unenforced laws and regulations. This situation resulted in accumulated deficit on the water resources sector. Water governance is, in fact, facing major challenges in terms of bureaucracy in the implementation of public participation and sustainable management of water resources⁹.

The sector of water resources in the province of Medea has known an important development in terms of achievement of various projects according to the needs of users (drinking, agriculture, industry ...). The province of Medea has also known the involvement of some engineering offices in the control of quality of the achieved projects and their conformity with the local and international standards.

Among the projects which carried out in the province of Medea, we find :

* 295 waterholes with a capacity of 110387 m³/day

* 80 wells with a capacity of 3288 m³/day

* 100 fountains with a capacity of 5480 m³/day

* Large dams are built (dam of Boughezoul, El Adrat and Beni Slimane for irrigation purposes).

4- Methodology of applied study

To reach the goals of the research, consisting in clarifying the impact of governance on the quality of management of water

⁸ Children of Hamoudah, Abdelatif Zoubida MOHSIN, Water Governance as an Approach for an Integrated Management of Water in Algeria, Journal of Algerian Institutions Performance, no. 05, 2014, p. 109.

⁹ United Nations Development Program, Water Governance in the Arab Region, Managing Scarcity and Securing the Future, 2014, p. 14

resources projects, the study dealt with a study population of two institutions : the “Direction des Ressources en Eau” and the “Algérienne des Eaux” in the province of Medea, in order to collect data on the status of water governance. Regular samples have been taken from the study population, composed of 16 individuals practicing the profession of state engineer, main engineers in water resources in the Directorate only, and to collect data of the study, the questionnaire method has been used, while for its presentation and its analysis, a program called "Statistical Package for the Social Sciences SPSS" has been used, whereby a multiple linear regression model has been drafted where the sub-variables of governance are considered as independent variables, while the total quality measuring indicators are considered as dependent variables.

4-1 Analysis of the questionnaire elements

The questionnaire consists of a first part on personal data of the respondents (age, sex, years of experience), and a second part consists of governance expressions (legal and legislative frameworks, control and participation, commitment, justice, social responsibility, conflicts and problems), and another consists of quality and efficiency measuring indicators of the projects. Answers are expressed by "yes" or "no" or "neutral."

Personal variables, especially experience, play a key role in the completion and follow-up of various water resources projects, which are reflected on the efficiency and effectiveness of their services.

This will be illustrated by the following table:

**Table 4-1 Personal and functional characteristics of members
of the sample n = 16.**

Personal and functional variables		Repetition	Percentage
Sex	Male	12	75%
	Female	06	25%
Total		16	100%
Age	30 & under	01	6.3%
	31-40	07	43.8%
	40 & above	08	50%
Total		16	100%
Experience	01 - 05 years	01	6.3%
	06 - 10 years	05	31.3%
	11 years & above	10	62.5%
Total		16	100%

- The previous table shows that the proportion of work in the field of management of projects is limited to the male category more than the female category because completion of projects require follow-up and presence on the site, therefore women's activity is limited to administrative work rather than on site work. The age factor had also a role in the acquisition of experience in the field and was reflected in the sincerity of the answers to the questionnaire.

4-2 Estimation of Cronbach Alpha coefficient to test the reliability of the tool is as follows:

Table (4-2) : Testing the reliability of the tool

Cronbach Alpha Coefficient	Number of elements
0.710	35

Source : SPSS program outputs

The previous table shows that the Cronbach Alpha coefficient reached 0.710 for 35 elements of the questionnaire components, and it is larger than 0.5 ratio, which is required for data collection tool to be sincere. The arithmetic means have also been calculated together with the standard deviations and the variable ranks of the study which were as follows :

Given that the scope of agreement was as follows [1-1.5] : yes, [1.5-2.5] : no, [2.5-3] : neutral.

4-3 Legal and legislative frameworks in the management of water resources projects in Medea

Water resources institutions are subjected to various laws and legislations that ensure the smooth operation of facilities (projects of dams, reservoirs, re-use of treated wastewaters). They reflect water policy and are expressed in the form of rules and mechanisms for their implementation. The following table shows the degree of application of the most important laws and legislations in institutions through arithmetic mean and standard deviation of these frameworks.

Table 4-3 : Arithmetic means, standard deviations and levels of legal and legislative frameworks

Section Texts	Repetition			Arithmetic mean	Standard deviation	Rank	Degree of approval
	Yes	No	Neutral				
- There are strict laws and rules designed to reduce pollution and waste of water resources	13	2	1	1.25	0.577	First	Yes
- Different future programs of the province have been accurately and clearly planned	7	7	2	1.69	0.704	Second	No
- Prevention of ground water and surface water exhaustion according to clear legal frameworks	10	3	3	1.56	0.814	First	yes
- Transparency in granting permits for drilling wells and digging waterholes	7	3	6	1.94	0.929	Second	No
- Fair application of regulatory and legal rules to institutions, for everyone	3	10	3	2	0.632	Second	No
Total	16			1.69	0.419		

Source : prepared by the student based on the SPSS program outputs

It appears from the above table that the section "there are strict laws and rules designed to reduce pollution and waste of water resources" ranked first with an arithmetic mean of 1.25 and a standard deviation of 0.577, while the second section "prevention of ground water and surface water exhaustion according to clear legal frameworks" ranked second with an arithmetic mean of 1.69 and a standard deviation of 0.704 ; and the last section "fair application of regulatory and legal rules to institutions for everyone" ranked last with an arithmetic mean of 2 and a standard deviation 0.632. The arithmetic mean as a whole reaches 1.69 and the standard deviation 0.419, therefore it can be said that institutions focus more in their legal applications on water resources projects than their concern with individuals, in management.

4-4 Control and participation in the management of water resources projects

Water resources management institutions endeavor to provide the quantities of water needed for the different categories of society

through their involvement in the various concerned sectors and opportunity given to the private sector to invest in the management of water projects with the necessity of a controlling operation of these various projects. The calculation of the arithmetic mean and standard deviation shows us the degree of application of the principles of control and participation in the management of sector projects.

Table 4-4 : Arithmetic means, deviations and ranks of the control and participation level in projects

Section Texts	Repetition			Arithmetic mean	Standard deviation	Rank	Degree of approval
	Yes	No	Neutral				
- Participation of all concerned sectors in the management of water resources projects	05	11	/	1.31	0.479	First	Yes
- Promotion of participation of the private sector and investors in the sector	11	4	1	1.38	0.619	First	Yes
- Subjecting projects to follow-up before, during and after achievement	11	4	1	1.38	0.619	First	Yes
Total	16			1.35	0.412		

Source : prepared by the student based on the SPSS program outputs

It appears from the above table that institutions rely on the participation of the sectors involved in water resources projects management, with an arithmetic mean of 1.31 and a standard deviation of 0.479 among the sectors (Sonelgaz, housing, urbanism, environment, Office National de l'Assainissement, Algérienne des Eaux ...), while the arithmetic average for the participation of the private sector and subjecting projects to follow-up reached 1.38 with a standard deviation of 0.619 and this is one of the most important principles of application of water governance to the management of projects.

4-5 : Commitment and justice in the management of water resources

The commitment of institutions to deliver projects according to what was agreed, leads to the impact on citizens and increase of the level of their confidence in institutions. We shall mention as an example, the extension of the construction period of Beni Slimane dam in the field of agricultural irrigation which was programmed to be

completed before 2014, but which has not been completed to date while the residents of this region have been desperately waiting for this dam which they need so much, although institutions seek to achieve fairness and justice in the distribution of the financial envelopes according to the needs of the province. Table (04) shows the opinions of the sample about the degree of application of the principle of justice and commitment in the management of water resources projects by institutions.

Table 4-5 : Arithmetic means, standard deviations and ranks of the level of commitment and justice

Section Texts	Repetition			Arithmetic mean	Standard deviation	Rank	Degree of approval
	Yes	No	Neutral				
- Distribution of financial envelopes and number of projects according to the needs of the regions of the province (citizens, institutions, agricultural sector ...).	11	4	1	1.38	0.619	First	Yes
- Commitment to deliver the projects at the scheduled time fixed in the manual of specifications.	4	11	1	1.81	0.544	Second	No
- Necessity of applying international standards in the achievement of projects.	6	9	1	2.19	0.981	Second	No
Total	16			1.79	0.401		

Source : prepared by the student based on the SPSS program outputs

It appears from the above table that the Directorate is committed to fairness in the distribution of financial envelopes according to the needs of the province whether for citizens or other sectors, this gave an arithmetic mean of 1.38 and a standard deviation of 0.619, while the commitment to deliver projects on time and the necessity of applying international standards in the completion of projects remain rather weak.

4-6 Competence and experience in the control of achievements

Water resources institutions strive for training executives specialized in the scientific management of water distribution, including technology in the various activities of the services, investment in research and development in the field of water

technology in order to raise the level of water abundance and use of local and foreign expertise together. Table (06) shows us the competence and experience in the control of various projects of water resources in the province of Medea.

Table 4-6 : Arithmetic means, standard deviations and ranks with respect to competence and experience

Section Texts	Repetition			Arithmetic mean	Standard deviation	Rank	Degree of approval
	Yes	No	Neutral				
- Number of hydraulic facilities in the province sufficient to cover the needs of the citizens of the province.	2	13	1	1.94	0.443	Second	No
- Reaching of water in the quantity and quality required for its users.	/	15	1	2.06	0.250	Second	No
- Development of agricultural irrigation techniques inside the farms within the framework of the modernization of agriculture.	5	8	3	1.88	0.719	Second	No
- Local labor is qualified and experienced in the management of water resources projects.	6	5	5	1.94	0.854	Second	No
- Use of modern technology programs in the field of disposition of data bases and information.	3	13	/	1.81	0.403	Second	No
- Organization of training programs for executives according to the needs of institutions.	7	9	/	1.56	0.512	Second	No
- Use of foreign expertise in studies.	12	4	/	1.25	0.447	First	Yes

Source: prepared by the student based on the SPSS program outputs

We conclude from the table above that the Directorate relies on foreign expertise in the management of its projects in the field of studies, with an arithmetic average of 1.25 and a standard deviation of 0.447, while the rest of sections are almost similar in terms of arithmetic mean and standard deviation.

5- Social responsibility in the quality of management of water resources projects

Achieving environmental sustainability and ecosystem is important to ensure the continuity of water supplies and sanitation services,

through equivalence between the economic and social value of various water resources projects. Table (07) shows the most prominent water awareness activities carried out by water resources institutions in the province.

Table 4-7 : Arithmetic means, standard deviations and ranks with respect to social responsibility

Section Texts	Repetition			Arithmetic mean	Standard deviation	Rank	Degree of approval
	Yes	No	Neutral				
- Organization of awareness programs by institutions about water borne diseases and how to know them and treat them.	7	9	/	1.56	0.512	Second	No
- Education of citizens not to swim in unguarded dams.	10	5	1	1.44	0.629	First	Yes
- Interest in protecting communities from floods and landslides that threaten their lives.	15	1	/	1.06	0.250	First	Yes
- Organization of seminars and exhibitions during the World Water Day.	15	1	/	1.06	0.250	First	Yes
Total	16			1.28	0.239		

Source: prepared by the student based on the SPSS program outputs

It appears from the above table that institutions give importance to the social responsibility aspect through its various programs towards society because water is not just a source of economic value, but has been given a social value, and this is what has been observed through the indicators set out in the table above with a general arithmetic mean of 1.28 and standard variation of 0.239.

6- Conflicts and problems facing institutions in the management of water resources projects

Water resource institutions are faced in their various achievements various obstacles thus limiting the quality of the management of their projects. However, every time they are trying to mitigate these problems by improving the management of water risks. Table (08) shows the various conflicts and problems facing the water resources sector in the province.

Table 4-8 : Arithmetic means, standard deviations and ranks of the conflicts and problems level

Section Texts	Repetition			Arithmetic mean	Standard deviation	Rank	Degree of approval
	Yes	No	Neutral				
- Institutions are facing obstacles in their achievements, with some sectors with which they treat, as for example, SONELGAZ.	13	1	2	1.31	0.704	First	Yes
- Ability of institutions to handle the problems whether with their employees within the institution or outside the institution.	8	7	1	1.56	0.629	Second	No
- Objections by citizens in some achievements adjacent to their residence.	14	2	/	1.13	0.342	First	Yes
- Fragility of the distribution network and the sanitation system.	11	1	4	1.56	0.892	Second	No
Total	16			1.39	0.387		

Source: prepared by the student based on the SPSS program output

We can note from these indicators that the institutions are faced with problems when they interact with other institutions, especially SONELGAZ, whether in terms of supplies or settlement of invoices, while facing objections of citizens residing near some of the projects and water reservoirs, thus with an arithmetic average of 1.13 and a standard deviation of 0.342, in addition to the problems suffered by citizens due to the fragility of the distribution and sanitation networks as a result of continuous road works and other wastes due to water leaks resulting from lack of maintenance, which registered an arithmetic mean of 1.56 and a standard deviation of 0.892.

5- Assessment and test of a sample of the quality of management of water resources projects – governance variables

After describing governance in the management of water resources, we shall deal with the assessment and test of a model.

5-1 Definition of the model

In this model, sub-variables of governance shall be considered as independent variables, while the quality of management of projects shall be considered as a dependent variable, to ensure that there is a

linear relationship between the model variables, so the multiple linear regression model shall be suitable for this relationship, and it takes the following formula :

$$\widehat{Q} = f(\widehat{G}_i) = f(\widehat{D}, \widehat{C}, \widehat{J}, \widehat{R}, \widehat{P}) = Q_0 + \alpha_1 \widehat{D} + \alpha_2 \widehat{C} + \alpha_3 \widehat{J} + \alpha_4 \widehat{R} + \alpha_5 \widehat{P}$$

Where:

$\widehat{Q}$: Estimated value of the quality of projects management ;

$\widehat{G}_i$: Governance ;

Q_0 : Level of quality of projects management in the absence of sub-variables of governance,

(ai): Marginal propensity of the form of governance, which means that whenever the governance ratio increases by 1% the level of the quality of management of water resources projects increases by a_i .

Q_0 Level of quality of management of water resources projects in the absence of characterization of management of water resources projects with a level required by governance;

$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5$.: Marginal propensity of governance independent sub-variables, which means that whenever the specifications of these variables meet the requirements of governance by one feature, the quality level increases by α_i .

5-2 : Estimation and test of the model :

The following table summarizes the results of the estimation and test of the study model parameters:

Table no. 5-1 : Estimation and test of the study model

	Operation value	Value of impact on quality	Rate of impact on quality	Test T	Determination coefficient R ²	Test F
Q_0	1.258	1.258	6.62%	0.022	0.732	0.013
a1	-0.484	-0.651	-3.42%	0.013		
a2	0.749	0.991	5.21%	0.001		
a3	0.356	0.459	2.42%	0.032		
a4	0.067	0.051	0.26%	0.049		
a5	-0.227	-0.281	-1.47%	0.024		

Source : SPSS program outputs

From the above table the model can be formulated as follows :

$$\begin{aligned} \bar{Q} &= f(\bar{G}_i) \\ \bar{Q} &= f(\bar{G}_i) = 1.258 - 0.484\bar{D} + 0.749\bar{C} + 0.356\bar{J} + 0.067\bar{R} \\ &\quad - 0.227\bar{P} \end{aligned}$$

Primary value of the quality of management of water resources projects Q_0 is equal to 1.258, this in case of absence of sub-variables of governance in institutions managing water resources according to the requirements of governance, from a total of 19 points, i.e. an increase of 6.62%, therefore the ratio of the remaining from 100% i.e. 93.38% represents the percentage of impact of governance variables.

* $a_1 = (-0.651)$, that is to say that whenever the degree of rigor is increased in the application of laws and regulations, and laws are not applied equally, which is consistent with the requirements of governance (such as the protection of groundwater and surface water in accordance with legal frameworks, or applying laws equally with employees), assuming other governance sub-variables to be constant, this led to the decline in the quality of management of water resources projects, by -0.651 of the total of 19 points, i.e. a percentage of - 3.42% of the total percentage of the quality of management of water resources projects.

* $a_2 = 0.479$, that is to say that whenever the level of follow-up of projects and involvement of all parties (stakeholders) increases according to the requirements of governance, assuming other governance sub-variables to be constant, the quality management of the sector projects increases by 0.749 of the total of 19 points, i.e. a percentage of 5.21% of the total percentage of the quality of management of water resources projects.

* $a_3 = 0.356$, that is to say that whenever the level of justice and commitment increases in various projects according to the requirements of governance, assuming other governance sub-variables to be constant (such as an obligation to deliver projects on scheduled and agreed time), the quality of management of the sector projects increases by 0.356 of the total of 19 points, i.e. a percentage of 2.42% of the total percentage of the quality of management of water resources projects.

* $a_4 = 0.067$, that is to say that whenever social value was there was given to water in addition to the economic value, according to the requirements of governance, assuming other governance sub-variables to be constant (such as concern with the protection of communities from floods and education of citizens not to swim in dams), the quality of management of projects water resources increases by 0.067 of the total of 19 points, i.e. 0.26% of the total percentage of the quality of management of water resources projects.

* $a_5 = 0.0227$, that is to say that whenever there is a decrease of the ability of the institutions to resolve conflicts and problems relating to various projects according to the requirements of governance, assuming other governance sub-variables to be constant (such as inability to address problems related to its employees inside and outside the institution) the quality of management of the sector projects decreases by -0.0227 of the total of 19 points, i.e. a percentage of -1.47% of the total percentage of the quality of management of water resources projects.

- Test (t- test): From the above table we conclude that all sub-variables of governance (legal and legislative frameworks, supervision and participation in the management of water resources, commitment and justice, social responsibility, conflicts and problems), were conceptual from a statistical point of view according to test (t), i.e. these variables are considered as variables explaining the reality of quality of management of water resources projects, so there is a direct correlation between governance variables on the one hand, and the quality of management of water resources projects, on the other hand.

- The determination coefficient R^2 was 0.732, which means that the independent sub-variables (explanatory) of governance (laws and legislation, participation and supervision, commitment to justice, social responsibility, conflicts and problems of the institution) have been able to explain 72.2 % of variables in the quality of management of water resources projects and the remaining 27.8 % was attributed to other random factors.

- Test (F - test): error accompanying statistic F amounted to 0.013 which is less than the value 0.05, which confirms the total acceptance of the model and the high explanatory power of the multiple linear regression model from the statistical point of view, and hence the

acceptance of the alternative hypothesis (H1) which provides for the existence of the impact of the governance variable (independent) on the quality of management of water resources projects (continued).

Conclusion:

Through this study, we have tried to grasp the extent to which the Directorate of Water Resources applies the principles of water governance in achieving the quality of management of its projects from planning to completion, because sustainable management of water is intended to achieve the triple goals : economic efficiency, social justice, and preservation of the environment¹⁰. Therefore, the Algerian State should have reconsidered the way of managing its water resources, considering the problems encountered to meet the growing needs for domestic and industrial use, especially as the country suffers from a shortage of rainfalls.

A comprehensive strategy and vision should be adopted in order to manage the water sector efficiently, to provide high quality service and to ensure sustainability for future generations. This can be achieved through the application of quality in the management of water resources projects, according to water governance mechanisms (transparency, justice and commitment, social responsibility, supervision, participation and control in various projects), and in this regard we provide the following recommendations:

- Offering opportunities to strengthen the role of the private sector and its participation to achieve the principles of water governance.
- Modernizing and developing water challenges and the level of sanitation.
- Rehabilitating and repairing networks and wells.
- Adopting modern tools of management, improving directorates, study of resources and environmental challenges to reduce waste of water which is not addressed.
- Improving customer service by conducting a census of customers and counters, and modernizing the services, activating the invoicing

¹⁰ Mohamed Hamza BENGRIINA, "Problems of Water Use in Algeria, Taking into Account the Ecological Factor", Doctoral Thesis, Institute of National Economy, G.V.P, Khanov, Moscow, 1991, p. 06.

system with exact and accurate assessment of the quantity of water being distributed and consumed.

- Modernizing the water resources sector by activating the electronic payment for customers to pay their dues.

- Sensitizing workers of the importance of water governance, especially as we have noticed through the field study that a lot of workers have no idea as to the concept of water governance and its importance.

Annexes to the study (spss outputs)

Statistics of reliability

Cronbach Alpha	Number of elements
,710	35

Summary of Models

Mo del	R	R-two	R-two adjust ed	Error standard of estimation	Change in statistics					Durbin-Watson
					Variati on of R-two	Variation of F	ddl1	dd l2	Sig. Variati on of F	
1	,850 ^a	,722	,584	,201	,722	5,207	5	10	,013	1,954

a. Predicted Values : (constant), S, B, C, F, A

b. Dependent Variable : D

Coefficients^a

Model	Non standardiz ed coefficient s		Standard ized Coefficie nts s	T	Si g.	95,0% % intervals of reliability for B	Correlations			Colinearity statistics	
	A	Error stand ard					Simple Corrélation	Part ial	Part	Toleran ce	VI F
(Consta nte)	1,258	,464		2,708	,022	,223	2,292				
A	,484	,160	-,651	3,033	,013	-,839	,128	-,141	-,692	,505	1,661
B	,749	,164	,991	4,582	,001	,385	1,114	,658	,823	,763	1,686
C	,356	,159	,459	2,242	,032	,002	,711	-,004	,578	,373	1,511
F	,067	,240	,051	,278	,049	-,467	,600	,284	,088	,046	1,220
S	,227	,167	-,281	1,360	,024	-,598	,145	,122	-,395	,227	1,543

a. Variable dépendante : D

Descriptive statistics

	Average	Standard deviation	N
D	1,86	,312	16
A	1,69	,419	16
B	1,35	,412	16
C	1,79	,401	16
F	1,28	,239	16
S	1,39	,387	16

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