The Intelligent Technologies of The Green Morocco Plan to Win the Trust of Haouz Farmers and the Efficient Management of Water Stress, With A View to Building Sustainable Development

Mimoun SIGHROUCHNI[1*], Aicha EL ALAOUI[2], Essaid TARBALOUTI[3]

*Correspondence *C
mimoun.sir.ms@gmail.com
[1]Faculty of Economics and Management Beni Mellal Sultan Moulay Slimane University Morocco
[2]Faculty of Economics and Management- Beni Mellal, Sultan Moulay Slimane University- Morocco
[3]FSJES, Marrakech Cadi Ayyad University– Morocco

Abstract

The context of structural water stress, has accelerated the implementation of the Green Morocco Plan, with the aim of intensifying agricultural production and reducing the water consumption of hydrovorous agriculture, by adopting technologies.

This paper aims to explore the beneficial effects of smart technologies on sustainable development, the management of scarce water and the trust of Haouz farmers.

This research relied on a qualitative approach, through a quiz addressed to farmers. The data was processed by SPSS-22 software.

Keywords: Smart technologies, Sustainable development, Trust farmers, Water stress.

Introduction

No one can ignore the benefits of saving water in terms of its protection and sustainability, to guarantee food sovereignty and boost economic performance. These visions are only achievable with rational, responsible and ethical use of this rare water. In this sense, the author (Chaouni M., 2023) expressed that Moroccan decision-makers see innovation as a solution to this scarcity. Optimism is growing by aiming for sustainable development, efficient management and attracting user confidence in these agricultural technologies.

In the era of climate change, resulting in worrying water stress in the regions of Morocco and particularly in the Haouz area, the subject of our study, which is manifested by a relatively desert climate and a population of farmers customarily attached to their peasant systems. However, this area is witnessing the encroachment of a multitude of golf courses housing concrete subdivisions on agricultural land, which was once fertile.

In addition, from the scarcity of work dealing with the tripartite interaction of the balance of sustainable development, the management of water stress and the confidence of farmers in innovative agricultural techniques, comes the aridity of the Haouz study area. The results obtained and shared with the scientific community constitute added value to academic research.

Coming out of structural adjustment programs and entering the climate change situation, Morocco has spent a decade without a clear strategy for the agricultural sector. It was only in 2008 that a strategy called « Green Morocco Plan » (GMP) was launched. The main objective of the latter is in the plural aimed at the sustainability of food sovereignty, the modernization and development of agriculture, the improvement of agricultural GMP, the efficient management of water stress and the construction of sustainable development[1].

This Green Morocco Plan aims for regionalized agriculture with positive impacts on daily life and poverty reduction, based on two pillars and cross-cutting actions.

The modernization of competitive agriculture with high added value, with easy access to local and foreign markets, constitutes the main backbone of pillar

(1) According to Brundtland's report, "sustainable development is a concept that strives to meet the needs of the present generation, without compromising those of future generations. "It settles once the balance is established between the economic, social and environmental aspects.

1, which is supported by the new aggregation and subsidy models adopted in this framework.

The authors (Ait Kadi M. & Benoit G., 2010) summarize pillar 2, in solidarity agriculture oriented towards the improvement of the most fragile[2] areas and reducing the poverty of its populations.

The economist (Arifi E-M., 2009), underlines that like all agricultural development programs, the "National Irrigation Water Saving Plan" (NIWSP) as a transversal measure, is based on a multitude of levers[3] for the valorization of the cubic meter of water and the guarantee of markets.

In a report, the (HCP., 2017) mentioned that the GMP relies on the innovation of large-scale hydraulic irrigation on 13% of the useful agricultural area (UAA), contributes with 35% to agricultural employment, 45% to the value added and 75% to exports.

The authors (Balaghi R., El Hairach T., & Khatri S., 2015) argue in their study "Maps of vulnerability of agriculture to climate change in Morocco," that the majority of forecasts announce that over the coming decades "signs of aridity would be detected everywhere in Morocco because of the rise in temperatures and the remarkable drop in precipitation."

Nevertheless, the twelve regions of Morocco continue to record excessive water consumption, at the domestic, industrial and agricultural levels, despite the limit of this water resource in time and space.

From time immemorial, civilizations and developments have been built around the vital commodity of water. In Morocco as elsewhere, climate change combined with excessive human intervention has had a direct impact on the potential of water resources, making them increasingly scare in quantitative terms and deteriorating in qualitative terms.

Against this worrying backdrop, Moroccan decision-makers have opted to move towards sustainable agriculture by adopting the Green Morocco Plan, using intelligent technologies. The development of such agriculture, with a view

(2) Agrosystems with limited potential and that productive base is fragile, that is to say arid and semi-arid and mountainous areas, occupy 2/3 of the usable agricultural area (UAA), 70% of farms and a population neighboring rural agriculture 80%.

(3) Macroeconomic levers (exchange rates, interest rates, customs tariffs and taxes); financial levers (subsidies and other financial incentives for water pricing); regulatory levers (consumer crops, irrigation techniques, pumping authorizations); institutional levers (governance, democratization, promotion of public-private partnership).

to guaranteeing food sovereignty, reducing poverty and boosting economic growth by promoting the export of agricultural production, would not be effective and efficient without the preservation and economical use of these natural resources, which are essential to its existence and sustainability.

In fact, for such strategies to succeed, taking account of the effects of climate change and getting farmers to voluntarily sign up to these initiatives are among the necessary conditions for achieving the objectives of these innovative water-saving irrigation projects.

Taking into account what has just been put forward, the idea came to us to contribute modestly with a neutral and objective analytical study of to dualist tendencies: The first is that the State aiming to mitigate the effects of water scarcity by adopting collective conversion projects to localized irrigation using intelligent technologies in an arid area such as the Haouz ; The second is the strong attachment of these Haouz farmers to their traditional irrigation systems.

The importance of our research takes its originality from the difficulty of obtaining information from farmers, the latter always complain and are wary of sharing their opinions before building mutual trust. Certainly, the latter was established with these Haouz farmers, throughout a professional career of around four decades in a State administration. The fruit of this capital of trust encouraged us to address the problem entitled "TO what extent would these Green Morocco Plan agricultural technologies succeed in building sustainable development, mitigating the effects of water stress and winning the confidence of Haouz farmers?"

This article is divided into three sections:

A "Literature Review", including reading notes from books and articles consulted in relation to the subject, constitutes the first section; The "Research Methodology" constitutes the second section, which will be devoted to the sequence of steps followed by adopting a qualitative approach through a questionnaire sent to farmers and data analysis using SPSS-22 software; The third section "Analysis and Discussion of the Results" is dedicated to the main results obtained and their discussion, followed by a conclusion with recommendations for decision-makers and suggestions for future research.

1. Literature Review

The authors (Genevey R., Rajendra K., Pachauri R.K. & Tubina, L., 2013) argue that "the failure or success of this kind of modern water-saving irrigation technologies doesn't only rely on the art of engineering and scientific knowledge, but it's particularly influenced by, interactions with local societies, state strategies, socio-economic structures, environmental factors and others".

The institution of the World Bank, (Banque Mondiale, 1995) mentions that particular attention must be allocated to the adoption of the drip irrigation system and especially when an increase in production is the result of water savings, and this often occurs after adoption of modern irrigation techniques.

In their article entitled "the adaptation of agricultural technologies: what lessons can be learned from field experiments?" The authors (De Janvry A., Sadoulet E., Kyle E. & Dar M., 2015) raise the danger of using varieties with high added value by adopting agricultural technologies, as well as the observation of discontent of farmers and this through field experiments. They reiterate "that alongside good yields come the application of excessive doses of fertilizers, harming the environment and human health." On the social side, farmers using these agricultural technologies have expressed their annoyance about insurance, credit, outlets and strategies related to these innovations.

The author (Key N., 2018) studied "farm size and productivity growth in the corn belt in the United States" and concludes that innovation plays an essential role for productivity growth and maintaining sustainability, as well as the adoption of technologies and practices that save inputs, is a determining factor in efficiency by integrating users.

The author (Berkoff J., 1995) points out in a study that when countries commit to spending without taking the time to think, the subsidies granted to achieve socio-economic and environmental objectives fail to achieve their goals, tasks due to inadequate planning and decisions.

The author (Cena - Delgado F., 2007) reiterates in a paper that "Agriculture plays various roles and presents a multifunctional specificity (economic, social, food, health, environmental and territorial), giving it the concept multifunctionality, about which no one expresses reservations."

The authors (Balmaford A., Amano T., Bartlett H. & al., (25 more authors), 2018) note in the context of intensification, the consumption of nutritional inputs is significant within small farmers, releasing high emissions that are harmful to the environment. They deduce that "the success of innovations is

impacted by size of the operation, the age of the user (farmer) and the relationship of trust between the latter and the managing institution."

The experts of (FAO., 2024) deduce in their study[4] that the factors of water stress are multiple and all influence agricultural income, thus they add that "global warming has already contributed in two decades (1981-2002) to the reduction of cereal yields by 2% to 3%.

The author (Grigori L., 2014) cited in the work "Rurality and social change, sociological study," the works of the economist -Elinor Ostrom-[5], in which the latter demonstrated that the management of public goods of the environment is effective by rural people, if they take responsibility. Conversely, it demonstrated that the management of common resources is less effective within the State. Likewise, she focused on the degradation of natural resources and confirmed that this degradation is the result of fierce competition between individuals.

The authors (Khellaf A., Belahsen S., & Belahsen M., 2016) argue that "urban residents will benefit more from the dynamics of total economic growth because they derive their income from agricultural activities as well as non- agricultural activities. These results show that pillar 2 of the GMP, linked to the reduction of the poor population in rural areas, would be far from being achieved."

The economist and sociologist (Pascon P., 1983) reiterates the attachment of Haouz farmers to their customs and argues that "rural society in Haouz demonstrates expectant prudence and firm resistance to upheavals of which it does not see clearly the outcome and over whose participation doesn't preside."

In his book "Large hydraulic equipment and local societies in the Mediterranean…", the Professor (El Faiz M., 1993) highlighted that the Haouz of Marrakech was characterized by a close relationship between the hydraulic question and the large history, more than the other regions of Morocco, thanks to the presence in the same space of two to three generations of hydraulic equipment, which justifies the evolution of hydro-agricultural developments in this region over a long period.

(4) Report analyzing data collected from 24 southern countries around the world, on state policies aimed at inclusive transformation processes.

(5) American and first female Nobel Prize in economics, in 2009, (shared with the American Olivier Williamson). Political scientist and economist from Indiana University, her work mainly focuses on the theorizing of collective action and the management of common goods (water, air for example) and public goods. They are part of the institutional economy.

The economist (Akesbi N., 2011)[6] points out that half of the sectors of pillar 1 of the GMP are exported, moreover these crops consume water and use excessive quantities of inputs, all leads to the degradation of natural resources and environmental imbalance.

The economist (Eloi L., 2012) mentioned in field work, that by "starting from the search for the order of trust within social cooperation and economic exchange," he arrives at the determining role of the relationship of trust in economic exchange and deduces that "without it no economic exchange is possible."

2. Research Methodology

In the context of critical water stress, combined with the urgent need for agricultural intensification via appropriate technologies, in order to meet the needs of a rapidly expanding demographic and to improve the economic and social environment, places this contribution. Our methodological ambition is twofold, it attempts to evaluate the impact of these Green Morocco Plan (GMP) agricultural technologies on the dimensions of sustainable development and on the efficient exploitation of rare water, thus it highlights the confidence of these Haouz farmers into the components of this innovative irrigation water saving strategy.

To do this, the approach used is qualitative, based on semi-directive interviews via a questionnaire intended for a population of farmers in the Marrakech-Safi region, composed of 113 individuals in the province of Marrakech and 118 users in the province of El Kelaa Sraghna. The data collected is processed using SPSS-22 software.

In order to materialize the study of the main problem, already put forward at the end of the introduction, and with a view to facilitating the analyses methodically, we propose four hypotheses that we consider compatible for analysis and verification.

H1: Fragility of the farmer's economic balance.

The divergence between modern irrigation techniques and traditional local customs is likely to limit the evolution of the climate of trust between these farmers and the manager. In this situation, the economic balance is fragile and it's very likely difficult to achieve it.

(6) At the level of its chapter "the Green Morocco Plan, a critical analysis," of the collective work -Questions of the Moroccan economy 2011-

H2: Social autonomy of farmers at risk.

It's very likely that the excess of technicality within the collective conversion project from gravity to drip irrigation can limit the margin of social autonomy of farmers in the field of irrigation, giving that the majority of them are part of the first generation, a reality which requires the intervention of their children or other agents in the daily exploitation of water, especially since the new process requires certain technical skills, which will undoubtedly be detrimental to the role of the head of the family and degrade their social autonomy.

H3: Agricultural technologies can be the origin of environmental imbalance.

It's very likely that climate change and agricultural intensification by using massive inputs via agricultural technologies, can contribute to the quantitative and qualitative degradation of soil and water.

H4: The strong attachment of Haouz farmers to their customs can be a multiplier of the lack of confidence in this agricultural technology.

It's very likely that farmers in Haouz are reluctant to modernize and introduce agricultural technologies, due to their belief in traditional systems, customarily based on the fact that irrigation is only accomplished if water is flowing on the surface before their eyes in sufficient quantity.

Our principle of analysis is at the heart of the dimensions of socio-economic and environmental balance and the evaluation of farmer' confidence in GMP smart technologies.

Sharing results obtained with the scientific community constitute added value to academic Research.

3. Analysis and Discussions of the Results.

We often say «Money is the sinews of war," which is why we prioritized analyzing "expenses and the degree of confidence in state subsidies," using tests of Chi-square:

*"Are you effectively ensuring resources for agricultural expenditure after the implementation of drip irrigation?" (59) is taken as the independent variable (X), moreover "the degree of confidence in state subsidies and aid" (22) is chosen as the dependent variable (Y). After analysis by Chi- square test of the two variables (X and Y), reading cross table N°1 (below), allowed us to argue that the favorable answer (Yes) gives the pending variable a very strong impact on the dependent variable due to the fact of evaluating the "degree of confidence in state subsidies and aid," given that it increased the number of those have confidence in state

subsidies by the way from a theoretical workforce of 33 to a workforce of 41, this is completely normal because the farmers who answered "YES," have the means to pay and in addition this position will strengthen their economic decisions towards the State and their families, for the aforementioned reasons, they trust these subsidies and state aid.

Furthermore, the independent variable "Yes" reduced the theoretical number 112 of those who don't trust the number 104, knowing that the reason lies in the fact that they don't have the financial resources to pay these expenses on the one hand and this choice will negatively influence their economic decision towards the State and their families on the other hand, it's for the aforementioned reasons that don't have confidence in State subsidies.

These results are statistically significant because (Chi-square = 6,062; df=1; P=0,014*). Hypothesis H1 is verified and consolidated by the advances of the author (Berkoff J., 1995) who noted that when countries commit to spending without taking the time to think, the subsidies granted to achieve the objectives socio-economic and environmental, fail to accomplish their tasks because of inadequate planning and decisions.

*"Effectively make family decisions after the implementation of drip irrigation" (45) is taken as an independent variable (X), moreover "What is the degree of confidence in state subsidies and aid?" (22) is chosen as the dependent variable (Y). After analysis by Chi-square test of the two variables the fact that the "degree of confidence in state subsidies and aid" has recorded a change, the impact lies in the increase in the number of those who have confidence in state subsidies from a theoretical workforce of 56, this is completely normal because the farmers who answered "Yes" have the means to continue to meet the needs of their farms and in addition this position will strengthen their decision negotiations and consolidates their positions towards the state and their families, for the aforementioned reasons, they have confidence in these subsidies.

On the other hand, the independent variable "Yes" reduced the theoretical number 165 (of those who don't have confidence in these subsidies) to number 157, knowing that the reason lies in the fact that they don't have financial resources to meet the needs of their farms one the one hand and this situation will negatively influence their negotiating position towards the State and their families on the other hand, hence their social autonomy is in danger, it's for reasons mentioned above that they don't trust state subsidies and aid. Taking into consideration, these results are statistically significant due to the fact that (Chi- square = 10,284; df = 1; P = 0,001*). Our hypothesis H2 is verified. The expected results go in parallel with the deduction of the authors (De Janvry A.,

Sadoulet E., Kyle E. & Dar M., 2015), at the social level, that farmers using these agricultural technologies expressed their annoyance about insurance, credit, opportunities and strategies related to these innovations.

*"Effectively make family decisions after the installation of drip irrigation" (45) is taken as an independent variable (X), moreover "What's the degree of confidence in the installed technology?" (23) is chosen as the dependent variable (Y). After analysis by Chi-square test of the two variables X and Y, reading the content of cross-table N°1 (below), allows us to note that the favorable answer (Yes) gives the independent variable a very strong influence on the dependent variable due to the fact that the "degree of confidence in the installed technology," has recorded a change, the impact lies in the increase in the number of those who have confidence in this technology from a theoretical number of 71 to a number 78, this is completely normal because the farmers who answered "Yes", have the means to continue to meet the needs of their farms and in addition this position will strengthen their negotiating decisions and consolidate their positions towards the State and their families, for completely normal because the farmers who answered "Yes", have the means to continue to meet the needs of their farms and in addition this position will strengthen their negotiating decisions and consolidate their positions towards the State and their families, for the aforementioned reasons, they have confidence in the installed technology.

On the other hand, the independent variable "Yes" reduced the theoretical number 120 (of those who don't have confidence in the installed technology) to number 113, knowing that the reason lies in the fact that they don't have financial resources to meet the input needs of their farms on the one hand and this situation will negatively influence their posion on the market and within their families on the other hand, it's for the aforementioned reasons that they don't have confidence in this installed technology. Taking into consideration, these results are statistically significant due to the fact that (Chi-square = 4,910; df = 1; P = 0,027*). The authors (Balmaford A., Amano T., Bartlett H. & al., (25 more authors), 2018) consolidate this by arguine that in the context of intensification, the consumption of nutritional inputs is significant within small farms, releasing high emissions that are harmful to the environment.

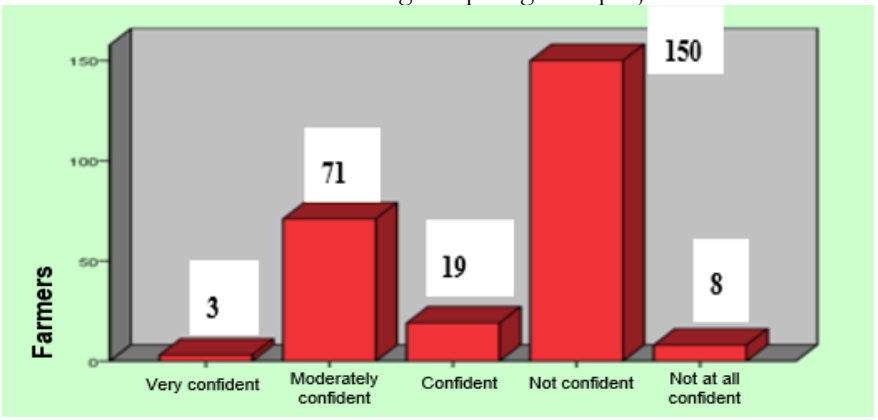
In relation to the aspect of confidence in respect for the environment through these innovation projects, reading figure N°1 allows us to note that only 3 farmers responded "very confident", 71 farmers declared "moderately confident" and 19 individus announced"confident". Furthermore, 150 farmers said "not confident" and 8 farmers said "not at all confident."

Table N° (1): Impact of the change in farmer's decisions and contributions on the degree of confidence in various components of the project (Chi-square test) *P<0,05

Indicator	Group	n= theoretical	n= calculated	Total (Yes)	2χ	Value of P
Farmer who makes family decisions (Yes)	Farmer trusts state subsidies	48	56	213	10. 284	0. 001*
	Farmer doesn't trust state subsidies	165	157			
Farmer who decides for agricultural expenses (Yes)	Farmer trusts state subsidies	43	54	191	14. 088	. 000*
	Farmer doesn't trust state subsidies	147	137			
Farmer who decides for family expenses (Yes)	Farmer trusts installed technology	71	78	191	4. 910	0. 027*
	Farmer doesn't trust installed technology	120	113			
Farmer who provides resources for family expenses (Yes)	Farmer trusts state subsidies	33	41	145	6. 062	0. 014*
	Farmer doesn't trust state subsidies	112	104			

Source: Authors

Figure N°(1): Repairing the degree of confidence of farmers in respecting the environment through drip irrigation projects.



Source: Authors

These results are in the same direction as the deduction of the economist (Akesbi N., 2011), that half of the sectors of pillar 1 of the GMP are subject to export, moreover these crops consume water and use excessive quantities of imputs, all of which leads to the degradation of natural resources and the imbalance of the environment.

Following all these results, hypothesis H3 is verified.

Regarding the bivariate analysis in table N°2 (below), for our case, monthly expenses represent the first continuous quantitative variable which reflects the direct economic involvement of farmers in the project, it's divided into two averages in direct relation with two modalities of reponse to the question formulated by "Do you trust the State?" (16). The group which answered "Yes, we trust the State" is made up of 79 respondents, with an average monthly expenditure around 4177,22 MAD, on the other hand those who answered "NO, we will not trust the State" are 172 farmers with an average monthly expenditure not exceeding 3451,16 MAD. These two means are statistically significant (T test = 3,97; df = 249; P = 0,000*), approving the hypothesis H4. These results are in harmony with the progress of the economist and sociologist (Pascon P., 1983), who reiterates the attachment of Haouz farmers to their customs, noting that "rural society in Haouz demonstrates expectant prudence and a firm resistance to upheavals of which it doesn't clearly see the outcome and over whose participation it doesn't preside."

Table N° (2): Comparison of the farmer's confidence rate in the State, state subsidies, installed technology and the production capacity of his plot, depending on monthly expenses. (T- Test) *P<0,05

Indicator	Group	n=	Moyenne	T-Test	Value of P
Monthly expenses	Farmer trusts the State	79	4177. 22	3. 977	. 000*
	Farmer does not trust the State	172	3451. 16		
Monthly expenses	Farmer trusts state subsidies	57	4133. 33	2. 655	0. 008*
	Farmer does not trust state subsidies	194	3546. 39		
Monthly expenses	Farmer trusts installed technology	93	4201. 08	4. 702	. 000*
	Farmer does not trust installed technology	158	3372. 78		

Source: Authors

Conclusion

The harmful effects of climate change, coupled with hydrovorous agriculture practicing high value-added crops that consume water and inputs, have worsened the degradation of water and soil resources. This critical situation accelerated the decision of the Moroccan public authorities to implement the strategy (2008-2020) of the Green Morocco Plan (GMP) and the National Irrigation Water Saving Plan (NIWSP) as a transversal measure. These strategies and actions aimed at intensifying agricultural production, promoting exports, improving the Gross Agricultural Internal Product (GAIP) and the efficient exploitation of this rare vital resource which water through cutting smart technologies.

In short, according to the various results presented and discussed previously, some of which are:

- (Khi-deux= 6.062, ddl =1, P= 0.014), Hypothesis H1 (Fragility of the farmer's economic balance) verified;
- (Khi-deux= 10.284; ddl = 1; P= 0.001), Approved hypothesis H2 (Social autonomy of farmers in danger);
- (Khi-deux=4.910; ddl=1; P=0.027), Hypothesis H3 (Agricultural technology can be the origin of environmental imbalance) verified;
- (Test T= 3.97; ddl =249, P=0.000), Hypothesis H4 (The strong attachment of Haouz farmers to their customs can be a multiplier of the lack of confidence in this agricultural technology) verified.

In brief three main conclusions were reached: a) these advanced technologies haven't succeeded in winning the confidence of Haouz farmers; b) the efficient management of water stress remains to be desired; c) sustainable development isn't maintained.

These results go in parallel with the advances of the authors (Genevey R., Rajendra K., Pachauri R.K. & Tubina, L., 2013), who pointed out that "the failure or success of this type of modern water-saving irrigation technologies doesn't only rely on the art of engineering and scientific knowledge, but it's particularly influenced with local societies, state strategies, socio-economic structures, environmental factors and others."

Likewise, the Professor (El Faiz M., 1993) raised that the Haouz of Marrakech was characterized by a close relationship between the hydraulic question and the great history, more than the other regions of Morocco, thanks

to the presence in the same space of two to three generations of hydraulic equipment.

Based on the results of the fieldwork carried out through the analysis of the survey data, our position as a neutral and objective analyst allows us to state that these farmers, who are free beneficiaries of these water-saving irrigation projects using intelligent technologies, are partly responsible for the lack of water control by refusing to adapt to the new watering technique and to adopt the hourly durations calculated for each crop according to the daily weather conditions. However, this new innovative system couldn't be mastered without the intervention and technical assistance of the National Office of Agricultural Advisers (NOAA) on a permanent basis for at least two to three crop years, something that wasn't done due to a lack of human resources at this office.

This observation highlights the need for decision-makers to rethink the participative integration of these users of these projects, to voluntarily change their positions and adhere to the objectives put forward, and to ensure that the sustainability of this water is everyone's business in order to achieve sustainable development.

The situation leads us to propose some recommendations for decision-makers to rethink:

- Establish rigorous monitoring of irrigation water consumption for each irrigation sector, and the amount allocated to each farmer should only be based on the needs of standing crops and not on the overall area (planted and naked);
- Ensure that water resources are used as efficiently as possible and encourage farmers to grow water-efficient crops that are resistant to climate change;
- Revising the scale for invoicing the cubic meter of irrigation water, by bringing the unit prices of this water closer to the real cost prices; -Finally, it's necessary to adopt consumption bands for this irrigation water following the example of what's practiced when marketing domestic drinking water, in order to penalize wasters.

Certainly, building such trust is possible, by trying to instill among farmers the concept that "water is a common good and not a private good" and it's limited in time and space, as well as its consumption should be rational and responsible to guarantee its sustainability for the present and the future

generation, so that this good practice is an act of patriotism before being an economic act.

We insist on mutual trust between the farmers and the water managers of these agricultural projects. Occasionally, we take the liberty of suggesting interesting and relevant avenues for future research. In Addition to the young age of these projects to convert the gravity-fed system to localized irrigation, as fertile ground for numerous studies, is the absence of previous studies dealing with the interactions between the advent of this new localized irrigation system and its perception by farmers in the Moroccan context in arid regions such as Haouz. For a very long time, more than two generations, farmers in Haouz have clung to their farming customs and rejected any modernization of their irrigation system.

- "Why are these farmers in the Haouz region so resistant to the modernization of their traditional irrigation system? Are they right or wrong?"
- "In What context are Moroccan decision-makers continuing to mobilize colossal funds for agriculture in arid zones surround by dams that are almost dry?"

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