2528-9705

Örgütsel Davranış Araştırmaları Dergisi
Journal Of Organizational Behavior Research
Cilt / Vol.: 3, Sayı / Is.: S2, Yıl/Year: 2018, Kod/ID:81S23

THE PRESENTATION OF SWOC STRATEGIES SOLUTIONS FOR AGRICULTURAL WATER MANAGEMENT UNDER CLIMATE CHANGES IN IRAN

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ABSTRACT

The same way that the agriculture area is of great importance in regard of its supply of the food worldwide and, on the other hand, climatic changes intensify the water crisis, there is a need for devising strategies to mitigate such problems. In Iran, the issue has become more tangible due to the regional dryness. The climate change, mostly caused by the global warming, is a global phenomenon and it is currently being observed in Iran as the increase in the climatic abnormalities and disorders in the form of severe and abrupt rainfalls and wind-blows as well as increase in the temperature and reduction in the mountainous snow reservoirs. Global warming is an important bioenvironmental problem and the human activities and the excessive use of the fossil fuels are amongst the primary reasons giving rise to its emergence that extremely adversely influence the agricultural productions. Considering the problems encountered in the water crisis management and the climatic changes that have not only influenced Iran but also the whole world, the present study tries investigating the agricultural water management conditions in Iran in respect to the climate change using SWOC strategy analysis so as to identify the strengths, weaknesses, opportunities and constraints extant in the water crisis management to eventually come up with strategies contributing to the improvement of water crisis management.

Keywords: *Climate Change, Water Management, SWOC*

Agriculture sector provides the villagers with a lot of job opportunities and supports the objectives pertinent to the food security satisfaction. However, agriculture needs water that is currently being turned into a scarce resource on a daily basis (Iglesias and Garrote, 2015). The climate change threat is a new and growing concern that has taken position on top of all the global challenges. The adjustment of the agriculture to the climate change is envisioned as a wider problem (Breton and Lim, 2005). There is observed an alarming change in the climatic variables like the global warming, temperature increase and diversification of the precipitation patterns (Parajapathy, 2015). The climate change has been added to the great many of the economical and social challenges with which the water management has been confronted in agriculture sector (Iglesias and Garrote, 2015).

Climate Change:

Climatic or weather change points to any sort of clear transformation of the patterns expected for the average water and weather status occurring in a long run to a certain region or the entire planet earth.

Due to the fact that the changes in the climate are usually considered for a long period of time, some scientists in the area of climatology do not think it appropriate to use the expression “climate change” to refer to the atmospheric abnormalities and believe that there is something

Geliş tarihi/Recieved: 01.10.2017 – Kabul tarihi/Accepted: 17.01.2018 – Yayın tarihi/Published: 21.08.2018

much of a "climatic fluctuation" nature occurring. However, a great many of them also are of the belief that the planet earth is getting hotter and hotter.

The climate change speaks of the long-term mean values' variations. The short-term changes are regarded as climatic fluctuations. But, it can be stated based on the studied carried out in a global level that Iran, as well, is a part of such a phenomenon as global warming and nobody can deny it. The world is changing and the climatic and weather statuses have been interpreted based on certain models and scenarios for the period of time up to 2100. Finding the reason behind the earth's climate change is more like the story of the "hen and the egg" and it has to be expressed that the sun is an important factor contributing to the change and pressure dispersion in the upper atmospheric levels. The winds are moved in such elevations and this is per se influential on the planet earth's climatic status. The reason behind the pattern changes of the winds in the upper levels of the earth's atmosphere, as well, is the temperature variations on the ground level. For example, if the temperature of the air above the oceans is increased or decreased, the wind patterns will also change. Therefore, the general conditions of the atmosphere are the major causes of the temperature changes and rainfall and the general atmospheric conditions, in such a systematic cycle, depends on the general conditions of earth. The climate is a regular system which is also, contrarily, called a "chaotic system" in which the smallest change in the conditions will be followed by the most severe reactions. The human activities on the earth surface have brought about such a condition and based on the researches performed by the international panel on the climate change (IPCC), the human activities are the major factor giving rise to the global warming.

Climate Change Signs in Iran:

The increase in the atmospheric abnormalities such as in the form of sudden rainfalls, the blowing of severe typhoons, drought and temperature increase is now being observed in some spots in Iran for several years. Snowfall in the country's southern and central cities after 50 years, severe cold and hail in blossoming season of the trees, heavy snowfall in Mazandaran and Gilan and some other cases are signs of disorder in the country's climatic conditions. Climate change is a global phenomenon that has also struck Iran. Abrupt and torrential rainfalls, heavy snowfalls, very cold weather, snowfalls in arid areas, reduction of rainfall in the humid and mountainous regions, the increase in the average temperature of some cities during the recent years are some examples of tangible climate change in Iran.

Study Background:

Expressing the idea that the changes in agriculture sector are necessary for mitigating the effect of the climatic changes and adjusting to them, providing for the growing changes in line with the supply of food and sustenance to the weak and small producers, Bryan et al (2012) deal with the investigation of the questions as to what strategies are required for better confrontation with such challenges? And, in which case a synergy could be created between these strategies? Their article deals with the investigation of such issues for weak and small producers in the agricultural regions of Kenya. The study results indicated that agricultural strategies aligned with the threefold strategy, i.e. increase in the farm and household flexibility, ranching and adjustment to the climate change, will be followed by the highest outputs. They emphasized that the policy-makers, executives and researchers are required to discard the cliché approaches and become more concentrated on adjusting to or reducing the climate change and increasing the

rural income using novel strategies and establishing synergistic relationships between the strategies so that they could be taken to their benefiting stage.

Iglesias and Garrote (2015) listed in an article the substantial risks in the entire Europe through reviewing 168 completely relevant articles that had been written during the past 15 years. Based on a very strong database, these researchers specified the interests and the efforts of a number of political and agricultural indices aiming at the development of the centralized adaptation plans and responding to the regional challenges. In these writers' minds, the option "adjustment of the present day technological perspectives" was the best choice that also stays focused on the future technological changes. These authors assert confidently that the technological changes shape new options for adjustment in the future. In addition, they also express that the vastest domain for taking measures parallel to improving the adjustment and accountability capacities in regard of the climate change is water demands. However, the actualization of such an issue needs reformation of the current policies exercised in the water domain as well as the sufficient instruction of the farmers and taking advantage of sustainable financial tools. In the end, these authors claim that the results of their study help the interested parties better cope with the adaptation challenges and offers indices for mitigating the vulnerability of the agriculture sector to the climate change. Parajapathy (2015) dealt in a study called "climate change and Indian agriculture: outcomes, solutions and adaptation" with the investigation of the effect of climatic variable changes on the wheat and rice productivity. The results of the study also were contributed to the India's agricultural database. The study was conducted for a period of time between 1971 and 2005. The results were indicative of the idea that the climate change does not have similar outcomes and the effects are different for various geographical districts. That is because the agricultural activities in India are largely dependent on the climate variables such as the monsoonal rains, temperature, and daily temperature increase and so on. Any change in these variables is predicted to be accompanied by a diverse array of effects on the productivity rates of agriculture, water resources, coastal ecosystem and biodiversity. Similarly, Goudarzi et al (2011) dealt in a research work with the investigation of the issues and constraints of agriculture water management from the perspective of Karaj agriculturists. They collected field data from a study sample volume consisted of 142 farmers from the aforesaid County. The rating of the water management issues and constraints by the farmers was suggestive of the idea that the reduction in water production of the surface water resources and the decline of the aquifers water level in regard of water exploitation, the permeability of the ditches, the corrosion of the channels' coatings and dripping of the pipes in regard of the water transmission and the absence of mechanized irrigation methods in regard of the water consumption on farm are the most important priorities. Based on the results obtained from the factor analysis, the issues and constraints of agriculture water management were classified in seven groups, including the quantitative and qualitative problems of water resources, economical challenges and so forth.

SWOC Method:

Figure (1) is in fact SWOC matrix. In order to improve the performance of the organization, the letter "C" (denoting challenge) has been used in lieu of the letter "T" (denoting threats). The matrix identifies the strong points, weak points, opportunities and challenges based on which strategies will be devised for the agriculture water management subject to the effect of the climatic conditions.

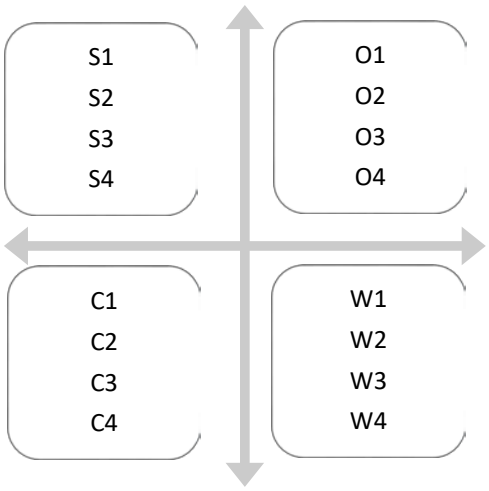

Figure 1: SWOC

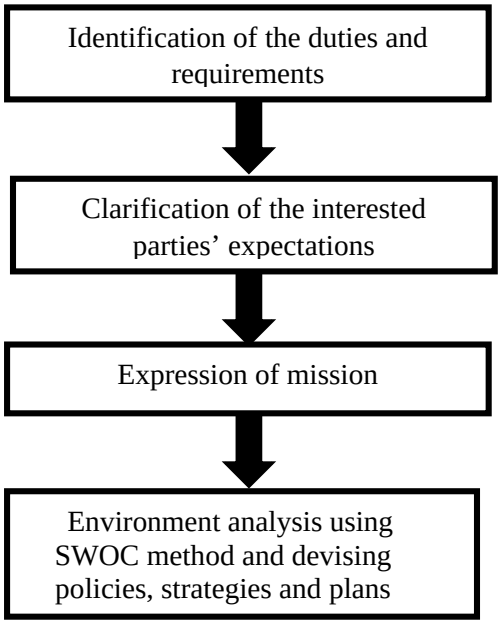

Table 1: study stages

Stage One: Identification of the Duties and Requirements:

Under such a condition that over 90% of the country's water is used by the agriculture sector, the commercial balance deficit of the sector reached to over 8 billion dollars in 2013 due to such reasons as the structural problems governing the sector, the population growth and consumption of foodstuff despite the extensive overexploitation of the country's ground water resources. Based on the results of the present study, Iran is currently being struck by the "severe water crisis" and according to the rather fixed nature of the water resources, population growth and lack of paying sufficient attention to water resources management, the intensification of the unfavorable water resources condition of the country and its adverse influence on the security and economical indices will be inevitable in case that appropriate policies are not adopted and the water resources, in both demand and supply parts, are left unmanaged in a timely manner.

Therefore, improvement of the water demand management, especially in the agriculture sector, through observing optimized-regional national cultivation patterns, paying a greater deal of attention to the "virtual water" index in the elaboration of production and trading of the agricultural products as well as water economic value considerations are amongst the requirements of facing the water crisis that have to be taken into account by the country's planners. Based on the abovementioned explanations, the essential duty and requirement as concluded by the current research paper is water crisis prevention.

Stage Two: Clarification of the Interested Parties' Expectations:

There is no doubt that the beneficiaries of such a strategic planning are Iranian farmers whose expectations have to be made clear in this stage. According to the necessary nature of water in agriculture economy, the farmers expect sustainable supply of water. The agriculture life and economy are completely dependent on water and the farmers' life and sustenance will be inflicted with problems in case any crisis occurs.

Stage Three: Expression of Mission

According to the issues posited up to now, the mission, in regard of the water crisis as concluded by the present study, is the offering of solutions for optimal management of water resources. In line with this, the Ministry of Power and Environment, has placed water crisis management atop of its essential priorities.

Stage Four: SWOC-Based Environment Analysis:

The present study makes use of SWOC method to codify policies, strategies and programs through an investigation of the study background and history and taking advantage of library research in regard of climate change and water management strategies. To gather the information, the researcher has referred to the up-to-date articles and credible scientific journals, from both inside and outside the country, as well as the various databases. The weather and climatic patterns identified in the prior researches have been extracted by doing so. In a next stage, the field studies have been carried out and the meteorology experts and agriculture specialists have been inquired about the threats and opportunities caused by the climate change. The data required for each stage were collected through holding sessions with the experts and interviewing them. The expert panel was composed of five specialists from agricultural jihad organization, five climatologists and five sophisticated farmers with good records. The weak points and strong points were determined as presented in table (2). The challenges and opportunities are summarized in table (3) and they were all analyzed as given in tables (4) and (5) following which the results and experts' ideas were utilized to devise general policies, strategies and plans. The final results have been tabulated as table (6).

Table 2: strong and weak points of the country's agriculture in regard of adaptation to the climate change outcomes

Strong points	Weak points
• Diversity in agricultural activities (farming and gardening, ranching and fishery) and relevant products • Empowerment of the country's specialists in various sectors of agriculture	• Low productivity (area under cultivation, production, economy, essential items and so forth) of the agriculture sector and the absence of an appropriate pattern in using the essential items based on the extant trends • Lack of ability and shortages of the institutional capacities in blending the

• Agricultural priorities from the perspective of the food security in the national program • The existence of high-level documents indicating the flexible production fitting the environmental conditions and regions' climates • The government's material and spiritual support of the solutions proposed for adaptation to the climate change • The existence of various farmer and exploiters' networks within non-governmental formats (parallel to creating higher capacities and empowerment in regard of taking climate change adaptive measures • The existence of a high research potential for the investigation of the climate change and offering of adaptability solutions for agriculture sector • Obligations in regard of making coordination parallel to the implementation of technical and infrastructural operations (simultaneous implementation of water supply plans and supplementary plans and equipping and renovation plans) • The existence of quantitative objectives and requirements for the enhancement of the irrigation output in the country's development programs (such as 25% in the Fourth Development Plan and at least 40% in the Fifth Development Plan) • The need for codifying and updating regional cultivation patterns through volume-based delivery of water in respect to the cultivation pattern and with the participation of the non-governmental sector and the environmental conditions • Expansion of combinatorial battle against the pests and biological fight and organic agriculture development; combined management of production and exertion of national qualitative standards on the agricultural products in line with incorporation of at least 25% of the production level till the end of the plan • Expanding the agriculture and production factor insurance coverage up to at least 50% of the productions till the end of the program	native knowledge (such as aqueduct) with novel knowledge in adaptation to the climate change • Weakness in studies and research coherence, instruction and research (basic and applied) in regard of climate change and adaptation to it in agriculture sector • The deficiency in the technologies required for the development of agriculture adaptable to climate change • Weakness in the promotional plans and promulgation and informing of the intervening parties of the climate change effects and methods of adapting thereto • The shortcomings of the regulations for the purpose of developing an agriculture adaptable to the climate change outcomes in national and local levels • Lack of structural and institutional coordination in the assigning of the duties related to adaptation in agriculture sector between the corresponding organs and ministries • The unjustifiability of the adaptability policies, programs and plans in respect to the costs and provisioning of the essential items like water and energy • The absence of the flexible infrastructures in line with the achievement of sustainability in agricultural production • The absence of an integrated economical-bioenvironmental account system and natural resources accounting system countrywide • Institutional and structural weaknesses in the development of an agriculture adaptable to the climate change effects under the extant conditions (the countrywide lack of declaring a cultivation pattern adaptable to the regional climate, the absence of an industrial agriculture infrastructure and the abundance of the traditional patterns) • Large amount of wastage in agriculture sector and absence of a comprehensive management therein • The absence of a codified program in recycling and the use of virtual and uncommon water in agriculture sector

• Requiring the expansion of conversional-supplementary industries in the agriculture sector • The government's legal obligation to preserve water and soil and corroboration and restoring the aquifers, wind and water erosion controls and management of the other factors influenced by climate through employing watershed and aquifer management methods countrywide • Requiring the exertion of environmental sustainability indices • Requiring the government and enactment of the statutory provisions for preserving the balance between the essential items and production items in various agricultural subsectors • Apportionment of at least 25% of the resources from the national development fund to the development of the investment in agriculture by the non-governmental sector • Requirement to increase the quotient of the country's special products (the products having larger output to input ratios) in world market to 10% • Granting productivity rewards to farmers with higher productivity and those observing the bioenvironmental issues • (Paragraph 32 of the productivity law): through making direct payments to the producers having higher productivities and ascending trends of productivity indices improvement in regard of bioenvironmental issues as well as the high quality production matching the prescribed cultivation programs • The potential capacity in enhancing the productivity levels of essential items and production of healthier crops according to the capacities utilized in regard of soil and water and crop production • The existence of a series of guidelines for the determination of water economic value to the agriculture	• Inappropriate and disproportionate use of chemical, biological and organic fertilizers in the agricultural processes • Weakness in making use of and managing the social capital in agriculture sector and inability to compete with the other economy sectors for attracting capitals and financial resources • The lack of consistency between some of the supportive policies and agricultural products' pricing in line with agriculture sector's adaptation to climate change • The increase in production risks according to the movements towards single-crop cultivation and increase in the cultivation in the marginal lands

Table 3: opportunities and challenges in the country's agriculture in confrontation with climate change

Opportunities	Crises
• Climatic diversity and bioavailability of the agricultural sector's fauna and flora and ranching potentials in adaptation to the climate change • Potential ability in introducing new varieties adaptable to the climatic conditions in agriculture • The increase in the performance of some agricultural products (according to the increase in temperature, growth period and CO2) • The possibility for increasing the hardware and software capacities of the country for adaptation to climate change in agriculture sector • The sufficient provocation of the non-governmental formations involved in the move towards adaptive agriculture • The proper possibility for the solidification and playing a more accentuated role with the cooperation of the non-governmental formations for providing for a larger adaptation • The possibility to make use of technical aids and international advises in regard of adaptation • The possibility for updating the country's comprehensive plan in agriculture sector according to the biological capacities and climatic abilities • The possibility to make use of more efficient human workforce in the academic body and research institutions and implementation of adaptable agriculture patterns • The possibility for attracting private sector's capitals to adaptive agriculture according to the strategic nature of the food security • The proper possibility for the development of extraterritorial agriculture in a regional level and optimum use of virtual water • The possibility for using renewable energies in the development of adaptive agriculture • The possibility for completing the value chain of the agriculture sector via developing the convertible and supplementary industries	• The lack of a high certainty in simulating climate change for future periods and its effect on the agriculture sector • Temporal and spatial fluctuations in the climate change as well as the change in the intensity and the duration of the events somewhat influenced by the climate change • The increase in the frequency and breadth influenced by the dust storms and intensification of desertification and water and wind erosions as a result of climate change in a national and regional level • The reduction in the quantity and quality of plannable water resources for use in agriculture • The expansion of national saline and barren breadth according to the country's climatic pattern variations • The decline in (quantitative and qualitative) production in some products and essential agricultural items as a result of climate change • The increase in the pest population and plant diseases • Crisis in the sustainable supply of agricultural products required according to the vast climate change countrywide • The change in the age and demographic patterns of the rural population as the generating forces of the agriculture sector for self-sufficient production under the macro-level effects of climate change • The expansion in the migrations resulting from climate change from the villages to the cities and the consequent regional conflicts • The difficulty of gaining access to the required and relevant adaptive agriculture technologies in an international level • The indefinite status of the agricultural land ownership and the possibility for breaking the large segments of land to smaller parts • The disproportionateness of the nutritional patterns with the climatic conditions countrywide

• The appropriate potential of the alternative sustenance in rural regions (agricultural tourism and ecotourism)	

Table 4: IFE matrix

Internal factors		Weight (normal)	Score	Normal score	Explanations
Strong points	S1	0.010582	3.4667	0.036685	
	S2	0.010582	3.4	0.035979	
	S3	0.026455	3.4	0.089947	
	S4	0.037037	3.4667	0.128396	
	S5	0.037037	2.7333	0.101233	
	S6	0.031746	2.6	0.08254	
	S7	0.026455	2.8667	0.075839	
	S8	0.047619	2.7333	0.130157	
	S9	0.042328	3.4	0.143915	
	S10	0.026455	3.3333	0.088183	
	S11	0.031746	3.2	0.101587	
	S12	0.037037	4	0.148148	
	S13	0.042328	3.8	0.160847	
	S14	0.047619	3.6667	0.174605	
	S15	0.026455	3.9333	0.104056	
	S16	0.031746	2.7333	0.086771	
	S17	0.021164	3.4	0.071958	
	S18	0.010582	3.2667	0.034568	
	S19	0.005291	3.5333	0.018695	
	S20	0.026455	3.0667	0.08113	
	S21	0.042328	3.3333	0.141092	
	S22	0.005291	3.8667	0.020459	
Weak points	W1	0.010582	2.9333	0.03104	
	W2	0.015873	3.0667	0.048678	
	W3	0.026455	3.5333	0.093474	
	W4	0.021164	3.8	0.080423	
	W5	0.021164	3.8667	0.081835	
	W6	0.026455	3.6	0.095238	
	W7	0.031746	3.3333	0.105819	
	W8	0.026455	3.5333	0.093474	
	W9	0.021164	3.1333	0.066313	
	W10	0.037037	2.6667	0.098767	
	W11	0.005291	2.8	0.014815	
	W12	0.005291	3.4	0.017989	
	W13	0.010582	3.8667	0.040917	
	W14	0.010582	2.3333	0.024691	
	W15	0.021164	3	0.063492	
	W16	0.037037	3	0.111111	
	W17	0.021164	3.5333	0.074779	
	W18	0.026455	3.3333	0.088183	
Total		1	131.9332	3.287826	

Table 5: EFE matrix

External factors		Weight (normal)	Score	Normal score	Explanations
Opportunities	O1	0.026144	4.2667	0.111548	
	O2	0.013072	4.3333	0.056644	

	O3	0.039216	2.6667	0.104576	
	O4	0.052288	3.2667	0.170808	
	O5	0.039216	3.2667	0.128106	
	O6	0.019608	3.5333	0.06928	
	O7	0.026144	4	0.104575	
	O8	0.039216	3.8	0.14902	
	O9	0.058824	2.8667	0.168629	
	O10	0.052288	3.8	0.198693	
	O11	0.039216	4	0.156863	
	O12	0.045752	3.8	0.173856	
	O13	0.045752	3.6	0.164706	
	O14	0.03268	3.3333	0.108931	
	O15	0.006536	2.1333	0.013943	
	O16	0.013072	2.1333	0.027886	
Challenges	C1	0.039216	3.6667	0.143792	
	C2	0.052288	3.3333	0.17429	
	C3	0.052288	3.6667	0.191723	
	C4	0.019608	3.7333	0.073202	
	C5	0.03268	3.4	0.111111	
	C6	0.026144	4	0.104575	
	C7	0.03268	3.6667	0.119827	
	C8	0.039216	4.0667	0.159478	
	C9	0.013072	3.4667	0.045316	
	C10	0.026144	3.8	0.099346	
	C11	0.052288	4.2667	0.223095	
	C12	0.006536	3.2	0.020915	
	C13	0.058824	3.9333	0.231371	
Total		1	103.0001	3.606108	

Table 6: general agriculture sector policies in respect to future climate changes based on SWOC analysis

General policies	Strategies	Plans
Revision and development of the macro-level policy-making in agriculture sector with coherence and climate change adaptation approaches	Development of policy-making and decision-making processes	Preparation of coherent water-food-energy-climate plans
		Codification and establishment of management programs for the emergent biological and environmental phenomena resulting from climate change
		Programming, zoning and elaboration of agricultural systems based on climatic capacities
		Planning regarding the management of sustainable agricultural systems fitting the climate (using such methods as development of forests, arable land, combined multidisciplinary agricultural systems including concomitant farming, ranching and fishery development
	Development of the management plans in regard of the agricultural	Enforcement of rewarding and deterring policies for the farmers

	inputs and products based on adaptation and higher productivity	in regard of the productivity and optimum use of agricultural inputs with giving the priority to the vulnerable regions
		Correction of pricing methods and guaranteeing the purchase of the crops according to such factors as water, energy and environment
		Changing the production and productivity patterns of agriculture (foodstuff and associated industries) according to the relative advantages and water and energy efficiency
Technical, economical, social and cultural empowerment in consistency with the climate change outcomes	Enhancing the economic, social and cultural abilities	Codification of instruction plans, comprehensive promotion and informing of the agricultural producers regarding the various aspects of climate change and methods of adapting thereto
		Creation of income stabilization fund and development of agriculture insurance
		Allocation of subsidy for the establishment and enforcement of technologies for farmers' adaptation to the effect of future climate changes
		Designing, codification and implementation of an appropriate pricing policy for enhancing the productivity and solidification of adaptation process
		Institutionalization of the use of people capacities and syndicate formations in the actualization of the planned objectives of adaptation to the climate change in agriculture sector (and water and energy)
		Planning and preparing operational programs for the promulgation of alternative rural incomes with the objective of preserving and enhancing the natural competencies
		The promotion of the food consumption pattern in proportion to the agriculture power and the climate change effects in the country
	Revision and development of the technical, instructional and research programs aiming at the development of adaptability to the	Preparation of a comprehensive plan for the agricultural research necessities and programming and enforcement in sector-side scale

	climate change in agriculture sector	for the actualization of the expected results in line with adaptation to the climate change outcomes
		Codification of educational programs in the universities regarding the basic knowledge in respect to climate change, sustainable development and food security with social and economic considerations
		Making plans for the blending of the native and modern agricultural knowledge in line with sustainable development and modern technologies for the productivity enhancement
		Codification of plans and enhancement of technical power and expertise in various agriculture sectors regarding the climate change and approaches consistent therewith
International interventions	Planning for the purpose of extraterritorial development of agriculture and product exchange	Development of the extraterritorial agricultural plans with emphasis on the further virtual water import
		The development of the barter transactions of agricultural products for the satisfaction of the country's needs in regional trade with an emphasis on the prohibiting export and the exit of the products needing a lot of water

CONCLUSION AND SUGGESTIONS:

- According to the water crisis that has currently struck the country and the effects of climate change and such problems as the weakness in the researches and coherence of them, the problems pertaining to the instruction and research (basic and applied) in regard of the climate change effects and adaptation thereto in agriculture sector, the low output and high risk of capital in agriculture sector and the inability of the agriculture to compete with the other economy sectors for attracting capitals and financial resources, the shortfalls in the required technologies for the development of a sort of agriculture adaptable to the climate change and other problems of the same kind and considering the severe water crisis in the country, it can be concluded, based on such auspicious situations as the potential capacities in enhancement of the productivity level for the consumption of essential items and the production of healthier products based on the capacities exploited in the water and soil sectors as well as the yielding of the products, that there is a need for the codification and implementation of strategies; the researcher,

in consideration of the high-level documents indicating flexible way of production in respect to the environmental and regional climatic conditions, suggests the use of renewable energies in the development of adaptive agriculture, the use of human excreta in various regions considering the fact the large volume of such human wastes, the use of the treated gray water for producing agricultural crops in a limited level and the possibility to increase the country's hardware and software capacities parallel to adaptation to the climate change in agriculture sector.

- The adoption of such strategies as the revision and development of the technical, instructional and research plans with the objective of developing the competencies in line with adaptation to climate change in the agricultural sector and making plans for the purpose of extraterritorial development of agriculture and product exchange and paying attention to the concept of virtual water and codification of strategies aiming at the prevention of cropping the products that need a large volume of water like watermelon and also the government's encouragement of such plans as green roof that has been exercised in Shiraz by the municipality in line with the use of treated grey water and the practicing of other plans of the same type that can pave the way for the better management of the climate change on the condition that the codified strategies can be implemented and enlisted in the agenda in a committed manner.
- In the end, the strategies are codified for the management of the agriculture water based on the weak and strong points and the challenges and opportunities determined in SWOC strategy analysis in regard of the climatic conditions. These strategies have been outlined in table (5). The use of these strategies is useful for coping with the problems raised in regard of the water crisis and they can be hopefully applied for water crisis management and compared with the similar strategies employed globally with a glance at the climate change that has currently become a major challenge in Iran.

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