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### Influencing factors on feasibility of hydroponics cultivation in regard to training and research viewpoint of experts

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#### ABSTRACT

*The purpose of this study was to determine effect of factors on feasibility of hydroponics cultivation regard to training and research. The research population consisted of 176 experts in Agricultural Ministry, which were selected using census method. The methodological approach of this study was descriptive-correlative. Validity of the instrument was established by a panel of experts consisting of senior faculty members and research committee advisors. Reliability analysis was conducted by using Cronbach alpha formula and result was 0.83. The results showed that 82.3, 13.7 and 4 percent of experts expressed that their feasibility of hydroponics cultivation regard to training and research were weak, moderate and good respectively. Also the results of the multiple regression analysis (stepwise method) revealed that political factors and social factors explained a variation of 26.7 percent of feasibility of hydroponics cultivation regard to training and research.*

**Keywords:** feasibility, training and research, hydroponics cultivation

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#### INTRODUCTION

Supplying food stuffs for growing population of the country and the need for achieving self-sufficiency in agriculture products and food protection demands the increasement of agriculture products in the country as much as possible [7]. In this respect, quantitative and qualitative restraint of soil and meter resources are considered as the original groundwork of agriculture products. An excessive percent of formable lands in Iran are encountered with problems of sodium, saltiness and bilge of soil. Considering these requirements, it is crucial to take new principles and provide more suitable situation in order to obtain nutritive needs for plants. During the past years, there have been special attentions paid to the production of agriculture products. In controlled environment (green house), especially soil-less plantation systems or hydroponics of all kinds of ornamental flowers, vegetables, fruits and medical plants [7]. Hydroponics plantation is an advanced form of agriculture which enables the option of exclusive supervision over the distribution and delivery of nutrition among the plants [2]. Based on most of researchers' views, the hydroponic groundwork should be easily drained; it must have suitable ventilation power and good ability and capacity to preserve water, and must be free of harmful elements and weeds and also can be provide-able in cheap prices [3]. Additionally, it is recommended to use groundwork with organic source instead of synthetic ones [1]. Hydroponics, in spite of need for adequate expertise and relatively high investment, in comparison with soil-based plantation has a lot of advantages such as high performance, the need for low labor force, simplicity of works,

free of need for following the plantation cycle , weed control, evenness of plants growth, minimal water dissipation, nonexistence of competition for reaching water and nutrition elements between the plants, the ability to supply nutrition elements relating to the needs of plants and lower exploitation of chemical materials, and finally the more healthier agriculture products[5]; [10];[16].

Paraskevopoulou & Grafiadellis [12] compared the soil-based plantation with soil-less plantation. In result, the performance of every plant in the soil-based mode was higher than soil-fewer modes, but because of high density in soil-less mode, the performance is higher in soil-less mode, per square meter.

Sanchea et al [14] in the study of feasibility of hydroponics in Ecuador concluded that simple hydroponic plantation can be an effective method for the production of constantly high-quality fruits and vegetables, through the germination and growth into nutritious water. This method is employed to reach higher qualities in fruits and vegetables, improvement of nourishment, food security in rural and suburb regions, and also the better social welfare conditions.

Verdonck & Demeyer [17] concluded that the ability to produce production without using pesticides is one of the advantages of hydroponic systems. These crops are free of toxin reminders and possess higher levels of health and quality.

Cantliffe et al [3] demonstrated that in hydroponic system it is possible to check and control pests and diseases precisely and consequently the terrigenous diseases will be decreased to the lowest level. Therefore, we can avoid high amounts of time and expenses in germiciding the soil and providing suitable conditions for the growth of plants.

Papadopoulos et al [11] evaluated the investment in hydroponic systems of summer crops and green house of vegetables and also ornamental plants in the west of Macedonia. Results showed that, with regard to early investment, this investment could be economical only with receiving subvention. Based on the result, the total net expenditures for early investment and annually variable investments for soil-based plantation system and hydroponic system during the programming horizon were 40100 and 133800 Rials per square meter, respectively. It is 3.33 times costlier than soil-based method. Considering the costly investment in hydroponic system, the soil-based plantation is economically justified. We should notice that agriculture land of this province are relatively appropriate and are free of salt or any other problems. In situations which the green house land is free of soil or poor, and also when the regions are very salty or polluted, we should manage to supply soil and prepare it based on the soil-based method. In this manner, the results of this study are not recommended for such conditions. Furthermore, because some of the expenditures in hydroponic system could be prorated into broader areas, the expenditures could possibly reduce per a square meter.

Porterfield & Banks [13] declared that one of the advantages of hydroponic system is the ability to gain economical performances in the land with no potency of plantation or in conditions which are not suitable for growth of some plants. Some of the advantages of soil-less systems are plantation beyond the farming season, optimal utilization of water and fertilizers and also maximal exploitation of the land.

Franklin et al [4] in their research over the possibility of farming the plants based on the hydroponic method stated that nearly 96 percent of fresh crops in Canada are imported. Turekto alone purchases more than 150 million tone lettuce every year, which 90 percent of them are imported, it is not economical at all. At these days, they generated advanced technologies of commercial hydroponic green houses and are able to challenge the imports and also reduce the high prices.

Janatan [6] from research form of Lincoln University in his study about the supervision of environment through hydroponic system demonstrated that it will be easier and reachable to develop and grow the market and products through hydroponic system. The aim of this research project is the development of constant scientific and economical techniques for hydroponic producing of fruits, plants, vegetables and seasoning. Simple and optimal hydroponic methods are used in order to reduce the production expenditures, increasing the product performance, and more quality and advantage of products.

Khoshgoftar et al [7] concluded the traditional systems of farming production in farm have some problems like high consumption of essentials (like fertilizers and reparatory materials) and high level of consumed mater. In some regions like urban lands, suitable soil is not available for farming. Another serious problem is high cost for employing the manpower in farm and garden. So, hydroponic system enables optimal condition for plant growth, in order to acquire a production better than pen plantation in farm or garden.

The study of views of gardening expertise about the soil-less farming in Varamin Township determined that hydroponic plantation is a very good substitute for higher production if the condition is controlled. Furthermore, we should keep in mind that this method is very suitable because of pollution, the shortage of soil and other harmful factors in farming, provided that we should use chemical fertilizers in admissible rates. Shariatmadar [15] the main objective of this research is to study the afflictions factors in feasibility of hydroponics plantation regard to training and research, and exclusive objectives include: evaluating the condition of feasibility of hydroponics plantation regard to training and research, reviewing the relation and role of social, economical, educational and political factor in the feasibility of hydroponics plantation regard to training and research.

### MATERIALS AND METHODS

In relation to objective, this research is functional, since the results can be employed by programmer and policy makers. In order to reach precise and reliable data we used quantitative method. Because this research simply investigates existed conditions and defines them and there is no possibility to control or manipulate the variables, it is descriptive. Because the gathering of information about the views, beliefs, thoughts and behaviors or group characteristics of a society is statistical and also it is under recognition, so it is measuring. Furthermore, because it investigates and analyzes the relations between independent and dependent variables, it is correctional. Statistical society of this research involve all the gathering experts of minister of rural construction organization (N=176). In order to determine the authenticity we put multiple copies of the questionnaire at the disposal of masters and some of the experts of rural construction organization, and also established early exam for determining the validity of research equipments. We gave the questionnaire to 25 experts which were similar to statistical society in regional, economical, cultural and social conditions. After gaining the data concluded the Alfa kronbakh coefficient for all the variables with degree scale of 83% the independent variables were: social, economical, educational, factors and policy making and attitude toward the hydroponic plantation. Dependent variable was feasibility of hydroponics cultivation regard to training and research. In order to determine the social factor we measured 6 questions, 8 questions for economical factors, 9 questions for educational, 8 questions for policy making and 7 questions for attitudes toward hydroponic cultivation( none=0, very low=1, low=2, average=3, high=4, very high=5) . Consequently, the minimal score for social, economical, educational, policy making and attitude was zero and the maximal was 30, 40, 45, 40 and 35, respectively.

Table 1: Validity of research variables

Variables	Cronbach alpha
Social factors	0.83
Economical factors	0.88
Educational factors	0.87
Policy making factors	0.86
Attitude toward hydroponic cultivation	0.83
Feasibility of hydroponics cultivation regard to training and research	0.82

### RESULTS

#### Feasibility of hydroponics cultivation regard to training and research

The feasibility of hydroponics cultivation regard to training and research was measured by 8 questions including: 6 pieces spectrum of likret. Score giving to the mentioned spectrum was as follows: none=0, very low=1, low=2, average=3, high=4, very high=5. Then, the maximum score was 40, and the minimal was zero. Table 2 illustrates the mean, coefficient of variance (C.V) and the rank of every educational and study being required for hydroponic cultivation, from the viewpoint of experts. According to the table, managing seminars and conferences about hydroponic cultivation, establishing research stations of hydroponic plantation of green house products, and performing experimental studies in order to demonstrate the benefit of hydroponic technology are among the most important requirements for education and study of hydroponic cultivation. Table3 shows the feasibility of hydroponics cultivation regard to training and research. According to results, 82.3 percent of participants responded

that feasibility of hydroponics cultivation regard to training and research was appropriate, 13.7 answered that it was moderate and the last 4 percent answer was appropriate. The mean of feasibility of hydroponics cultivation regard to training and research was 13.1 and its measure standard deviation (SD) was 4.8.

**Table 2: Priority of related questions with feasibility of hydroponics cultivation regard to training and research (n=188)**

Items	M.	SD	C.V	Rank
Managing seminars and conferences about hydroponic cultivation	1.86	0.86	0.465	1
Establishing research stations of hydroponic cultivation for green house products	1.66	0.82	0.492	2
Performing experimental studies in order to show the benefit of hydroponic technology	1.56	0.79	0.506	3
Declaring and informing about hydroponic cultivation	1.54	0.79	0.516	4
Training the pioneer experts for hydroponic cultivation	1.57	0.82	0.526	5
Establishing constant connection between the department of modern technologies researches and the executive department of agriculture in hydroponic cultivation	1.72	0.93	0.540	6
Educating the experts of various majors relating the hydroponic cultivation	1.58	0.89	0.567	7
Performing field research projects about hydroponic cultivation	1.65	0.94	0.571	8

**Table 3: feasibility of hydroponics cultivation regard to training and research from the viewpoints of participants**

Situation	Frequency	Percentage	Cumulative percentage
Very bad(0-8)	10	6.5	6.5
Bad(9-16)	116	75.8	82.3
Moderate(17-24)	21	13.7	96
Good(25-32)	5	3.3	99.3
Very good(33-40)	1	0.7	100
Total	159	100	-

$M = 13.1$

$SD = 4.8$

#### Relation of social, economical, educational, policy making and attitudinal factors with feasibility of hydroponics cultivation regard to training and research

Fourth table showed intensity, relation orientation and a meaningful level of social, economical, educational, policy making and attitudinal factors with feasibility of hydroponics cultivation regard to training and research. As the table shows the above mentioned factors have 99 percent of meaningful and positive relation with feasibility of hydroponics cultivation regard to training and research.

**Table 4: The relation of social, economical, educational, educational, policy making and attitudinal factors with feasibility of hydroponics cultivation regard to training and research**

Variables	Pearson correlation coefficient	Significant level
Social factors	0.396**	0.000
Economical factors	0.392**	0.000
Educational factors	0.383**	0.000
policy making factors	0.442**	0.000
attitude toward hydroponic cultivation	0.293**	0.000

\* $p < 0.05$

\*\* $p < 0.01$

#### The role of social, educational, economical, policy making and attitudinal factors on feasibility of hydroponics cultivation regard to training and research

In order to predict the role of research variables on feasibility of hydroponics cultivation regard to training and research, we used step by step regression. Analyzing the regression enables the researcher to predict the variance of dependent variable through independent variables and determine the role of every independent variable in explanation of dependent variable. In step by step method, the strongest variables enter the equation one after another. This process goes on until the errors of meaning exam reaches to 5 errors. As you see in table 5, policy making and social factors enter the equation in steps one and two, respectively. This means that policy making factors have the highest influence on feasibility of hydroponics cultivation. This factor alone explained 21.5 percent of variance in dependent variable. Policy making and social factors communally explained 26.7 percent of variance in dependent variables, in step two.

Table 5: Analyzing the regression of feasibility of hydroponics cultivation regard to training and research

Steps	R	R Square	Adjusted R Square	F	sig
1	0.464	0.215 <sup>a</sup>	0.209	35.4	0.000
2	0.517	0.267 <sup>b</sup>	0.255	23.3	0.000

*a: policy making factors*

*b: policy making and social factors*

Table 6: The standardized and non- standardized coefficients of feasibility of hydroponics cultivation regard to training and research

Variables	B	Beta	t	Sig
policy making factors	0.28	0.31	3.4	0.001
Social factors	0.29	0.27	3	0.003
Constant	0.75	-	0.4	0.715

According to the amount of beta in table 6, we can write the regression equation as follows:

$$Y = 0.31X_1 + 0.27X_2$$

$X_1$  = policy making factors

$X_2$  = Social factors

### CONCLUSION

Results from analyzing the Pierson correlation showed that social, educational, economical, policy making and attitudinal factor have 99 percent of positive and meaningful relation with feasibility of hydroponics cultivation regard to training and research. Results show that the correlation level of social, economical, educational, policy making and attitudinal factors to ward hydroponic cultivation with feasibility of hydroponics was equal to 0.39, 0.39, 0.38, 0.44 and 0.29, respectively. According to Davis table these correlations were in average level. Furthermore, the results of step- by- step regression illustrated that policy making and social factors clarified 26.7 percent of variance in dependent variable, through two steps. Results of the researches performed by Latimer et al [8] and Mattson [9] showed the policy making factors are influential in the development of hydroponic cultivation. It is proved in our research. The researches and evaluations of Cantliffe et al [3], Papadopoulos et al [11], and Porterfield & Banks [13] indicate that social factors are effective in the development of hydroponic cultivation. This is proved in our research, too.

According the results from prioritizing the feasibility of education and study requirements for hydroponic cultivation we give these suggestions:

- Establishment of research stations of hydroponic cultivation for green house products.
- Establishment of seminars, conferences, gatherings, educational work station and... about hydroponic cultivation
- Perform the field research projects about hydroponic cultivation
- Education of pioneer experts for hydroponic cultivation
- Training the experts of various majors in relation to hydroponic cultivation
- Establishment of constant correlation between modern researches department and executive department of agriculture in hydroponic cultivation
- Information and declaration about hydroponic cultivation and performing experimental studies to show the benefits of hydroponic cultivation technology.

According to results of correlation analysis we suggest the propagation of achievements and advantages of hydroponic cultivation in environment control, reducing the earth pollution and controlling the level of stock consumption (seed, fertilizer, pesticide), in order to generate positive attitude among the authorities, programmers, experts and green house holders.

According to results of regression we suggest to create suitable job opportunities with extensive acceptance of hydroponic cultivation and coordination of experts in all phases of production, evaluation and propagation of results gained from researches and evaluations about hydroponic cultivation.

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