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accelerate the treatment and planning for sewage application. It is suggested that in the analysis of the cost-benefit of sewage treatment projects in and without the project, the price obtained in this study should be taken as the basis. As seen, in the case of without project, the cost is obtained 60 rials and in the state of with project the cost is obtained as 190 rials per cubic meter of sewage.

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be created based on the estimated results of the conditional logit model and the levels of environmental studied characteristics.

Table 5: Economic welfare due to two different scenarios of irrigation with wastewater

Scenario	Soil contamination	Water contamination	The amount of water	Unpleasant smell	The product contamination	Economic welfare (rial)
1	Current status	Current status	Current status	Current status	Current status	60
2	Like water	Like healthy water	Like healthy water	Like healthy water	Like healthy water	190

Source: research findings

Conclusions and suggestions

To determine the environmental effects of irrigation with wastewater, the selection method was used. For this purpose, five environmental impacts including soil contamination, water contamination, unpleasant smell, contamination of the product and available water content were considered. By using scientific methods, 9 sample sets were provided to sample individuals and the Logit econometric model was estimated. The results showed that with increasing ethical tendencies of farmers, their attention to the health of the product and therefore the health of consumers of agricultural products will increase. The economic well-being created for each cubic meter of untreated sewage is 60 rials and the economic well-being generated per one cubic meter of refined waste water is 190 rials. The results show that farmers have prioritized the amount of water in the first priority and the contamination of the product in their final priority. Based on the value obtained from the environmental impacts, the most important effect of wastewater from the viewpoint of farmers is the availability of some water for operating agricultural activities.

Accordingly, farmers are willing to use sewage in the event of its treatment and legal access to it. Therefore, it is recommended to

Table (4) - The willingness to pay for improving the various impacts of pollution of irrigation water (Rials / m3)

Attribute	The primary conditional logit model	The extensive conditional logit model
Soil Pollution	35	35
Water pollution	25	25
Available water quantity	36	36
Unpleasant smell of the environment	18	18
Existence of Heavy and Chemical Elements in Agricultural Products	13	17

Reference: Findings of the research

As can be seen in table (4), by entering the socio-economic variables in the model, the only significant variable at the level of one percentage is the variable of moralistic tendencies of farmers. Therefore, it can be seen that the existence of moralistic tendencies and the spread of morality among farmers can tend to pay farmers to reduce the contamination of agricultural products with heavy and chemical elements and thus increase the disease in the community.

Among the coefficients of the obtained model can be used to predict the welfare changes associated with different pollution scenarios due to the use of waste water (Viga and Lappiser, 2011). In Table (5), two different scenarios have been considered for the use of waste water as an irrigation water source. As shown in this table, the scenario one includes the use of untreated wastewater and the resulting contamination in the existing situation, and scenario 2 includes the use of wastewater after its treatment and bringing it to the quality level of the water of the canal and therefore the lack of the presence of environmental contaminants. As it can be observed, moving from scenario one to the scenario two will increase the economical welfare rates from 60 rials to 190 rials per cubic meter of wastewater, in other words, farmers are paid 190 rials per cubic meter of refined wastewater It is also worth more than the price of a healthy canal water, which is currently considered to be 130 rials. The two scenarios can be used to analyze irrigation projects with sewage and irrigation without sewage. Also, different scenarios can

According to the data of this table, the greatest factor is the specificity of the amount of available water and the property of the presence of heavy and chemical elements in agricultural products is in the last position. The characteristics of soil contamination, water pollution and unpleasant smell of environment are located in the second, third and fourth positions respectively. Therefore, it can be said that based on the desirability created for farmers through the use of sewage as an irrigation water source, water content is the most important factor that farmers pay attention to and pollution is the last component that farmers are considered in their decision. Currently, due to the lack of separation of contaminated products from healthy products, farmers are not concerned about the contamination of the product and hence the marketability of the product, therefore, the low priority is given to the presence of heavy and chemical elements in agricultural crops. Ensuring water availability is considered as one of the most important agricultural production inputs. Therefore, farmers have shown this feature the most attention, and the parameter of this feature is more than the estimated value. The width variable is positive from the source but does not have a significant effect on the willingness to pay indicating that the farmers are willing to change the conditions, but if the policy makers do not provide the program, farmers are satisfied with the continuation of the existing situation and contaminated water will be used.

Due to the impossibility of directly interpreting of the coefficients in these patterns, the final rates of substitution between non-market characteristics and monetary characteristics are calculated. The results of this calculation can be interpreted as average ratios of the willingness to make a final payment for the change in any feature or implied prices for each attribute. These results are presented in Table (4). According to the data presented in this table, implicitly calculated prices for all of the features are shown, which means that the improvement of each attribute will increase the average desirable value of the quality of the sewage. According to Table 4, the most important feature of farmers' viewpoints is the amount of water available. Farmers gave this property a value of 36 rials per cubic meter of water. Then, the soil contamination value of 35 rials per cubic meter of water is in the second priority according to the views of the farmers.

presence or absence of an option does not affect the probability ratio associated with other selection options. In the absence of this assumption, other relevant models should be used. To test the IIA hypothesis, Hausman and Mac Faden (1984) extended tests were used. Table 2 presents the results of the Hausman and Mac Faden tests for the IIA hypothesis.

Table (2) The Hausman test result for the IIA hypothesis

Removed Option	Computational Statistics	Probability
Option A	43.2	0.99
Option B	31.4	0.50
Option C 99/6/77	77.6	0.99

Reference: Findings of the research

Based on the results of table (2), in the predicted logit model, the hypothesis IIA is accepted at one percent level for all three options. This suggests that the IIA hypothesis is in place and estimating this pattern as a conditional logit model is possible. Accordingly, the results of the Logit model are presented in Table (3).

Table (3) - Results of Widget Extended Conditional Logit Conditional Model

The variable name	the estimated coefficient	The value of Z statistic
Soil Pollution	0.6257	7.08*
Water Pollution	0.4371	8.86*
Available water quantity 16.693636 *	0.6336	9.16*
Unpleasant smell of environment 39.69%	0.3167	4.39*
The presence of heavy and chemical elements in agricultural products 22.13%	0.2299	3.24*
Percentage increase in water prices 02.228-0.94-11- *	0.0228-	11.94*-
Revenue	0.0002	1.01***
Extent of the land	0.0204	0.57
Ethics	0.1212	2.19*
Family dependence on agriculture 93/1/00 **	0.0065	1.93**
Width from origin	0.4000	1.04***
Pseudo R2 = 12.4% LR chi2 = 367.53 Significant level = 0.00		

Source: Research findings *, **, *: Significant levels of 1.5 and 10% respectively**

and then the options for each selection set, were explained and asked the person to choose an option from each selection set according to their desirability.

Results and discussion

In this study, a preliminary set of works obtained by studies was considered. These works were then reviewed and revised in interviews with analysts, researchers and scholars. In addition, to evaluate the key attributes and understand the respondents' understanding and their response to their characteristics and levels, they include a group of target groups including a group of well-known regional farmers, employees of the Agricultural Jihad Department, engineers of consulting companies and Technical and Research Institute of Agricultural Research was used. Afterwards, the effects of irrigation with wastewater were considered as: A. Soil contamination. B. Water Pollution. C. The amount of water. D. Unpleasant smell of the environment. E. The presence of chemical elements and heavy elements in agricultural products. F. The price of refined wastewater. The questionnaire presented 9 sets of selections, each selection set consisting of three options A, B, and C, showing the option C of the status quo. A selection set is shown as an example in Table (1).

Table (1)

sample of the selection set used in the experimental selection process

Features	Option A.	Option B.
Soil contamination	**Non-contamination**	**Non-contamination**
Highly contaminated	**Highly contaminated**	**Water pollution**
The amount of water available	**High**	**Low**
The unpleasant smell of the environment	**The unpleasant smell**	**The unpleasant smell**
The presence of heavy metals and chemicals in the product	**The absence of elements and materials**	**The presence of elements and materials**
Waste price (% of the price of safe water in the channel)	**25% of the price of safe water of canals**	**50% of the price of safe water of canals**
Which option is best in your view? Option A☐ Option B☐ Option C☐		

In order to achieve the objective of the research, a Logit model was used. One of the major necessities of this requirement is that selections must be subordinate to the independence of the non-relevant options within a selection set. Based on this feature, the

normal. The logarithm of truth function can be written as follows (McFaden, 1974):

$$\ln L = \sum_{i=1}^{N} \sum_{j=1}^{m} \left(y_{ij} \ln \left[\frac{\exp(V_{ij})}{\sum_{j \in S_m} \exp(V_{ij})} \right] \right) \qquad (7)$$

In which y_{ij} is a dual variable (zero and one) and N is shown the number of respondents. An important assumption in the estimation of the conditional logit model is the assumption of the independence of irrelevant alternatives (IIA). This hypothesis states that, if one option is present or not, the probability ratio does not affect the other options of the selection set. To investigate the existence of this property, Hausman and McFadden (1984) developed a test that if the independence property of the unrelated options is rejected by this test then the estimates obtained from the conditional polynomial logit model will be obstructed and should other models be used in this field.

In the test method, choosing the sample size is more affected by the number of scenarios and the number of options in each scenario (Adamovyz et al., 1998). In 1998, Urimi proposed the following relation to determine the minimum sample size in the selection test.

$$N = 500 \times \frac{N_{lev}}{N_{alt}.N_{rep}} \qquad (8)$$

In this equation, N_{lev} has the highest number of levels per feature, N_{alt} is the number of choices in each set, and N_{rep} is the number of questions each respondent needs to answer (Johnson et al., 1990). In the present study, five features with three different levels and one feature with six different levels are considered. On the other hand, 9 options are presented in each questionnaire. On the basis of this, using the equation (8), the sample size in the test method is 92. But in order to increase the accuracy of the study, 150 farmers who used sewage for irrigation of their crops were randomly involved in completing the empirical selection of test questionnaire. For each person, verbally and plainly, their qualifications and levels,

In addition to the value theory of Lancaster, the empirical selection method also uses the theory of random utility function. In this framework, the indirect utility function for the respondent i can be presented as the following equation (Hanley et al., 2006):

$$U_{ij} = V_{ij}\left(X_{ij}\right) + \varepsilon_{ij} = \beta X_{ij} + \varepsilon_{ij} \qquad (3)$$

In which U_{ij} represents the individual's indirect utility, V_{ij} is the definite component, ε_{ij} is the random component, X_{ij} the individual characteristics and the effective choice option, i is the responder's number, and j shows the number of the option. If there is a selection in the test set, each selection set is: $S_m = \{A_{1m},...,A_{km}\}$ that A_i is a vector of properties, and it is possible to select the option from the S_m set as follows:

$$\begin{aligned} P(j|S_m) &= P\{V_j(A_{jm}, y - p_j c_j) + \varepsilon_j \succ V_i(A_{im}, y - p_i c_i) + \varepsilon_i \ ; \forall i \in S_m \\ &= P\{V_j(...) + \varepsilon_j - V_i(...) \succ + \varepsilon_i \ ; \forall i \in S_m\} \end{aligned} \qquad (4)$$

This probability can be chosen as a Joint Cumulative Density Function for the error statement (Ben Akiva and Lerman, 1985; Hanley et al., 2001):

$$P(j|S_m) = CDF_{\varepsilon|S_m}\{V_j + \varepsilon_j - V_1, V_j + \varepsilon_j - V_2, ..., V_j + \varepsilon_j - I \qquad (5)$$

To estimate the above function, the Multinomial Logit model (MNL) is used. The Multinomial Logit model of a polynomial assumes that the random component (ε) is uniform and independent and has a Gombel distribution (Extreme Value Distribution), hence the choice of equation (5) is written as follows:

$$P(j|S_m, \beta) = \frac{\exp(\mu V_j)}{\sum_{i \in S_m} \exp(\mu V_i)} \qquad (6)$$

In which μ is the parameter of scale and inversely proportional to the standard deviation of the error distribution, and often becomes a

particular option is determined by the utility of each of the features of that option. Selection modelling approach values environmental commodities based on their characteristics and using the probabilistic pattern of choice between different categories of features. If one of these attributes is price or cost, the final utility estimates can be transformed into willing to pay (WTP) estimates for changes in feature levels, whereby welfare estimates can be made for feature variations (VIGA and Alpiser, 2011; Levvi et al., 2000; Yu et al., 2008). The experimental selection method is based on the Lancaster's Value Theory (LVT) and the Random Utility Theory (RUT). Lancaster states that the utility of a commodity derives from the characteristics and traits of that commodity, and not merely from the consumption of that commodity. For this purpose, it is assumed that each consumer is facing the maximization problem (Hanman, 1984, and 1999):

$$\begin{aligned} & Max_{c,x} U\left[c_1(A_1),...,c_N(A_N);z\right] \\ & s.t. \qquad i.y = \sum_{i=1}^{N} p_i c_i(A_I) + z \\ & \qquad\quad ii.c_i c_j = 0 \quad ,\forall i \neq j \\ & \qquad\quad iii.z \geq 0, c_i(A_i) \geq 0 \quad for\ at\ least\ on \end{aligned} \tag{1}$$

In the above statement, $U[..]$ is a quasi-concave utility function, $c_i(A_i)$ is a combination of i product with a vector of A_i attributes. p_i is the price of each compound, z is a basket of ordinary goods for which the price is considered and y is the income. The first limitation indicates the budget constraint, and the second constraint indicates the number of choices to be made and indicates that only an option should be selected in the empirical selection method. Using the above relations, the conditional utility function of the j option can be written as follows:

$$U_j = V_j\left[c_j(A_j), p_j, y, z\right] = V_j\left(A_j, y - p_j c_j\right. \tag{2}$$

Introduction:-

Due to water scarcity, the use of waste water as a valuable source of irrigation water is raised and over time, its importance will be increased, but its unplanned application can cause very adverse economic and environmental impacts. Many of them will not be compensated at least in the short term. Irrigation is part of the agricultural land of the southern province of Tehran with water polluted by the effluent and the runoff of the local public and private wastewater treatment plants in Tehran. Approximately three quarters of the surface water reaches south of Tehran province is the result of water consumption in Tehran and a volume of 182.3 million cubic meters per year is used for surface runoff by the agricultural lands of the southern province of Tehran. (Yekom Engineering Consulting Co., 2010). Only 28.1% of Tehran's urban population is covered by sewage collection systems. This suggests that a large amount of uncontaminated wastewater comes into natural resource and environmental resources. (Water and Wastewater Company of Tehran Province, 2011)

Considering the expansion of the use of this unconventional water source, the present study seeks to investigate its environmental impacts using the experimental selection method (CEM). By studying and polluting the effects of irrigation water pollution, the benefits and disadvantages of using untreated wastewater for irrigation can be focused the attention of the authorities to the need to provide the potential sources of irrigation water and urban wastewater treatment and taking into account the environmental considerations in the design of sewage treatment projects. In this regard, we can study Avoile and Carlson (2004), Beerle et al (2009), Beerle et al. (2010) and Scott et al. (2000). Using the chosen test method, the environmental effects of wastewater treatment have been studied.

Research Methodology

The main purpose of the empirical method is to estimate the structure of preferences of individuals by emphasizing the relative importance of the characteristics of the goods, and in order to achieve this goal, a set of goods (options) explained by their characteristics are presented. The utility that a person obtains from a

الملخص"-

سنويا، يتم استغلال حجم ١٨٢.٣ مليون متر مكعب من النفايات السائلة الملوثة بالنفايات السائلة من محافظة طهران من قبل الأراضي الزراعية في جنوب محافظة طهران، واستخدمت طريقة الاختيار التجريبي للتعبير النقدي عن الآثار البيئية للري المتدفق مع النفايات السائلة. لهذا الغرض، تم النظر في خمسة تأثيرات بيئية بما في ذلك تلوث التربة، وتلوث المياه، والروائح الكريهة، وتلوث المنتج وكمية المياه المتاحة. وأهم ميزة من وجهة نظر المزارعين هي كمية المياه المتاحة، وقد أعطى المزارعون هذه الميزة بقيمة ٣٦ ريالا لكل متر مكعب من الماء، ثم تلوث التربة بقيمة ٣٥ ريالا لكل متر مكعب من المياه هو الأولوية الثانية من وجهة نظر المزارعين. أظهرت النتائج أن المزارعين على استعداد لتغيير الوضع الحالي، ولكن إذا لم يقدم أصحاب القرار في أمور المزارعين خطة شاملة، فسيكون المزارعون راضين عن استمرار الوضع الحالي وسيستفيدون من المياه الملوثة. من ناحية أخرى، مع زيادة الميول الأخلاقية للمزارعين، فإن اهتمامهم بصحة المنتج وبالتالي صحة المستهلكين للمنتجات الزراعية سيزداد. ويرغب المزارعون في دفع ١٩٠ ريالا للمتر المكعب من النفايات السائلة المعالجة، وهو ما يتجاوز سعر قناة المياه الآمنة التي تبلغ حاليا ١٣٠ ريالا.

الكلمات المفتاحية: مياه الصرف الصحي، طريقة الإختيار التجريبي، جنوب محافظة طهران.

Abstract:-

An annual volume of 182.3 million cubic meters of surface runoff contaminated with Tehran's effluent is being utilized by the agricultural land of southern Tehran province. The experimental method was used to express the monetary effects of irrigation-water. For this purpose, five environmental impacts including soil contamination, water contamination, unpleasant smell, contamination of the product and available water content were considered. The most important feature from the viewpoint of farmers is the amount of water available. Farmers have evaluated the worth of this property as 36 rials per cubic meter of water.

Then, the soil contamination value of 35 rials per cubic meter of water was the second priority from the viewpoint of farmers. The results showed that farmers are willing to change the conditions, but if they do not provide a program for farmers, they will be satisfied with the current situation and will benefit from contaminated water. On the other hand, with increasing ethical tendencies of farmers, their attention to the health of the product and therefore the health of consumers of agricultural products will increase. Farmers are willing to pay 190 rials per cubic meter of refined waste, which is also more than the cost of a healthy water channel, which is currently 130 rials.

Key words: Wastewater, Experimental selection method, south of Tehran province.

Environmental assessment of water recycling in agriculture: a Choice Experiment Method

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التقييم البيئي لإعادة تدوير المياه في الزراعة

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