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Investigating the Effect of Economic Infrastructure on the Value Added of the Agricultural Sector in Iran

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ABSTRACT

Basically, the agricultural sector is one of the important economic sectors of every country due to the provision of food and manufactured goods, and has a significant share of employment and Value added. The main issue in this regard is to examine the effects of economic infrastructure on value. The increase in the agricultural sector in different countries can have important feedback on the development process of countries. Therefore, the efforts of the authors of this article revolve around providing a reasoned answer to the question of what is the effect of economic infrastructure development on the Value added of Iran's agricultural sector from 1991-2019. The research method of the current article is that first, by using the AHP method and the opinion of experts, the importance coefficient of each of the infrastructure criteria was determined, and finally, by using the TOPSIS method, the economic infrastructure index of the sector was calculated during the mentioned period. The infrastructure of access to water resources was approved as the most important economic infrastructure in the growth of the Value added of the agricultural sector with 21 percent. Then, using VAR and VECM methods, the effect of economic infrastructure on the Value added of the agricultural sector was investigated. The results showed that the workforce, capital, economic infrastructure, and credits granted to the agricultural sector have a positive and significant effect on the Value added of the agricultural sector.

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1. Introduction

Undoubtedly, the provision of basic human needs has been the main factor of attention to the agricultural sector. In fact, other economic sectors have emerged gradually and according to the needs of the agricultural sector (Karemera et al., 2022). Saving in foreign exchange expenses regarding the reduction of import of agricultural products through the increase of domestic production, the strategic nature of some products of this sector, the generation of some required data, especially for the industry and service sectors, as well as a market for the output of other sectors are among the reasons for the importance of the agricultural sector in the national economy (Parvar et al., 2021). The main issue is that the agricultural sector as one of the economic sectors in order to advance development strategies and achieve vision goals in the field of many economic and social indicators including reducing poverty and creating employment can be very effective (Abbasi et al., 2021; Rezaeifar et al., 2022). The importance of examining this issue becomes more concrete when we know that this sector supplies about 13% of the GDP, 25% of the value of non-oil exports and 20% of employment, as well as providing nearly 93% of the food needs of the society and the production of raw materials for many industries are responsible for the other (Abdollahpour et al., 2021). Therefore, the important issue related to the agricultural sector is the category of economic growth and its factors, which is always one of the important issues in economic analysis (Yadegari Taheri et al., 2022). Another important point is the discussion of approaches to the sustainable economic development of agriculture and its effective components. In this regard, several studies have been conducted in the field of identifying factors affecting economic growth, among which physical capital, human capital and labor have been introduced as the most important factors (Arabmzar et al., 2018). Based on the examination of the experiences of different countries, many economic experts believe that the role and importance of physical capital has gradually decreased and other factors have also increased economic growth (Bartkowski et al., 2021). Therefore, sustainable economic growth and development of agriculture requires

optimal utilization of resources and production factors. In other words, production factors and resources should be used efficiently and optimally (Zarei & Mousavi, 2022). One of the influential components in competitiveness and consequently increasing economic growth is economic infrastructure, which has always been raised in this sector and various solutions have been formulated and followed up for it in the framework of development programs (Fattahi Ardakani & Sakhi, 2021). The necessity of reviewing the current article can also be scrutinized and analyzed from the point of view that direct investment on infrastructures will provide production facilities and stimulate economic activities and by reducing the costs of trade and Transfers improve competitiveness and provide job opportunities for people in society (HajAliakbari et al., 2020). On the other hand, the development of infrastructures and improvement in service delivery leads to the reduction of costs and the increase of access to various market agents (such as suppliers of institutions, labor force and demanders of goods), which, as a result, also leads to the development of the market. (Belali et al., 2019). Infrastructures help to increase productivity and realize the potential ability in production, and also directly and indirectly help to improve the financial security and quality of life of the people of the society, and the visibility of these consequences increases with the passage of time (Salami, 2016).

With these brief introductions, the current article is a research on the effect of economic infrastructure on the growth of the agricultural sector. While investigating this issue in a period of 28 years (from 1991 to 2019), the main goal is to provide a reasoned answer to the question: the effect of economic infrastructure development on the Value added of Iran's agricultural sector during 1991- 2019?

2. Materials and methods

1.2. Model specification

Most of the growth models that have been used for developing countries have their roots in the neoclassical model of Solow, which is due to the greater adaptation of this model to the realities of the third world. In this

study, Solow's growth model has been selected and used to study the effects of factors other than labor and capital on economic growth. The total production function in this model is as follows:

$$Y = Af(K, L, Z) \tag{1}$$

In this model, Y includes product level, K includes physical capital stock, L labor force, and Z includes other factors affecting economic growth. Variable A measures the productivity factor, which is assumed to grow at an exogenous rate. It is also assumed that the partial derivative of Y is positive for each variable of the model. Hence, by differentiating the production function and calculating the production growth rate, we will have:

$$\frac{dY}{Y} = \left(A\frac{\delta Y}{\delta K} \right)\frac{dK}{\mathrm{Y}} + \left(A\frac{\delta Y}{\delta L}.\frac{L}{Y} \right)\frac{d\mathrm{L}}{\mathrm{L}} + \left(A\frac{\delta Y}{\delta Z}.\frac{Z}{Y} \right)\frac{dZ}{Z} + \frac{dA}{\mathrm{A}} \tag{2}$$

To estimate it, the following equation can be written:

$$\frac{dY}{Y_{(-1)}} = \alpha_{0+}\alpha_1 \frac{K}{Y_{(-1)}} + \alpha_2 \frac{dL}{Y_{(-1)}} + \alpha_3 \frac{dZ}{Z_{(-1)}} \tag{3}$$

$$\alpha_{0=} \frac{dA}{A}, \alpha_{1=} A\frac{\delta Y}{\delta K}, \alpha_{2=} A\frac{\delta Y}{\delta L}.\frac{L}{Y}, \alpha_{3=} A\frac{\delta Y}{\delta Z}.\frac{Z}{Y}$$

α0 represents the rate of technical progress, which is assumed to be constant here. α1 is the final productivity of capital, α2 is the elasticity of the product with respect to the labor force, and α3 is the elasticity of the product with respect to other factors affecting growth: the sign (-1) next to the variables is also related to the amount of that variable with a gap of one year. In this study, we also examine the effect of insurance variables by replacing Z (other growth factors other than labor and capital). According to the above model and what was said in the previous sections, the general shape of the model that was chosen for this study can be expressed as follows:

$$VA = f(L, K, EIN, CRE) \tag{4}$$

Cobb-Douglas production function is used to estimate the above model.

Due to the non-linearity of the Cobb-Douglas function, the above function is estimated linearly-logarithmically based on the following model.

$$VA = L^{\alpha_1} K^{\alpha_2} EIN^{\alpha_3} CRE^{\alpha_4} \quad (5)$$

VA is the Value added of the agricultural sector, L is the logarithm of the labor force employed in the agricultural sector, K is the logarithm of the capital balance of the agricultural sector, EIN is the economic infrastructure index, and CRE is the logarithm of credits granted to the agricultural sector.

2.2. Calculation of economic infrastructure index

The economic infrastructure index was calculated from the hourly hierarchical analysis process and Hwang and Yun's TOPSIS method in the time series of 1991-2019. In the hierarchical method, 10 questionnaires were designed and completed with the consensus of academic experts regarding the impact of economic infrastructure on the Value added of agriculture. This questionnaire includes four main criteria as follows:

- *Transportation;* including the sub-criteria of the length of rural asphalt roads, road transportation of products, length of railway lines and rail transportation of products;
- *Energy;* including the sub-criteria of the number of reservoir dams, the volume of reservoirs of dams and electrified villages;
- *Information technology*; including the sub-criteria of rural areas with telephone connection, computer access and the number of rural information and communication technology (ICT) offices. The results of the aforementioned information were analyzed in the form of a pair matrix, criteria and sub-criteria in Super Decisions software, and the inconsistency rate below 0.1 was obtained, and the weight of criteria and sub-criteria was calculated with this software. Economic infrastructures were prioritized by the product of the weight of the criteria in the relevant sub-criteria, which

is called the importance coefficient of the economic infrastructure sub-criteria. Then the statistics and information of the sub-criteria related to the economic infrastructure were extracted from the statistics center. Finally, statistics and information are entered in the form of a decision-making matrix using the TOPSIS method, where each element in the decision-making matrix is for R_{ij}. Using equation (1), N_{ij}, which expresses the elements of the dimensionless matrix, was obtained:

$$N_{ij} = \frac{R_{ij}}{\sqrt{R^2_{ij}}}$$

$$V = N_{ij} * W_{n\times n} \quad (7)$$

$W_{n\times n}$ is the diagonal matrix of the importance coefficient of the economic infrastructure sub-criterion. Then it was calculated using equation (2) v which is the weighted bi-dimensional matrix. Finally, the economic infrastructure index was calculated from the sum of economic infrastructure criteria in the time series of 1991-2019.

3. Findings and Discussion

1.3. Hierarchical method

Prioritization of criteria

A questionnaire aimed at the growth of agricultural value-added based on the impact of economic infrastructure on the growth of agricultural value-added was completed with the consensus of academic experts. Then, the prioritization of economic infrastructure criteria was expressed using Super Decisions software based on the objective of the impact of economic infrastructure on the value-added growth of the agricultural sector with an inconsistency rate of 0.03. Considering that this rate is less than 0.1. The results can be verified.

Table 1. The results of paired comparisons of economic infrastructure based on the goal of agricultural value-added growth

The growth of Value added in agriculture	The relative weight of infrastructure based on the goal	Priority
Transportation	0.392	1
Energy	0.487	2
Information Technology	0.120	3

Source: research calculations

Based on the results obtained from the pairwise comparisons of infrastructures, the relative weight of energy infrastructure is prioritized compared to other infrastructures. The results of most of the studies that have been carried out in the field of infrastructures confirm the impact of energy on the economic growth of the agricultural sector. In the following, the results of the paired comparisons of transportation, energy and technology sub-criterion based on the questionnaire for the development of transportation, energy and technology infrastructures with compatibility rates less than 0.1 are presented.

Table 2. The results of the paired comparisons of the sub-criteria based on the transport infrastructure criterion

Transportation infrastructure	The relative weight of the sub-criteria based on the transport infrastructure criterion	Priority
The length of rural roads	0.345	1
Road transportation of products	0.311	2
The length of the railway lines	0.167	3
Rail transportation of products	0.176	4

Source: research calculations

According to the obtained results, the length of rural roads is more important that the actions of the government in the field of rural road expansion have strengthened the quantitative indicators of development in

the rural area to some extent. Also, road transportation has a higher priority than rail transportation, which can be due to the limitations of the rail network and their wear and tear, as well as the cost of rail transportation compared to road transportation.

Table 3. The results of paired comparisons of sub-criteria based on energy infrastructure criteria

Energy infrastructure	Relative weight of sub-criteria based on energy infrastructure criterion	Priority
The number of reservoir dams	0.305	1
The volume of reservoirs of dams	0.32	2
Villages with electricity	0.262	3

Source: research calculations

According to the obtained results, the volume of reservoirs of dams is more important. In Iran, water is especially important for farmers in dry areas. And with the creation of dams and water reservoirs in the region, it will be possible to move towards more production and higher income for farmers.

Table 4. The results of paired comparisons of sub-criteria based on information technology infrastructure criteria

Energy infrastructure	Relative weight of sub-criteria based on energy infrastructure criterion	Priority
Telephone communication	0.373	1
Access to a computer	0.259	2
Information and communication technology offices	0.367	3

Source: research calculations

According to the results, telephone communication has a higher priority, after the direct communication of farmers through transport services within and outside the province in the last decade, indirect telephone communication

has been the most common factor in the matter of information transfer. Also, the use of computers and information and communication technology offices is expanding due to the increase in the education of farmers. Finally, according to the results of prioritizing the criteria and their respective sub-criteria, the weight of each of the criteria and sub-criteria was determined. From the product of the economic infrastructure of transportation, energy, and information technology in their respective sub-criteria, the importance coefficient of the criteria was calculated. The results are presented in the table below. The results indicate that the volume of reservoirs of dams has the highest coefficient of importance with 21% and access to subsidies with the coefficient of 1.3% has the lowest coefficient of importance.

Table 5. The results of the importance coefficient of each of the infrastructure criteria

Infrastructure standards	**The coefficient of importance of infrastructure criteria**
The volume of reservoirs of dams	21
The number of reservoir dams	14.8
The length of rural roads	13.5
Villages with electricity	12.7
Road transportation of products	12.2
The length of the railway lines	6.5
Rail transportation of products	4.7
Telephone communication	4.5
Information and communication technology offices	4.4
Access to a computer	3.1

Source: research calculations

By comparing the results obtained from the hierarchical analysis (AHP) with the real world, access to water resources is confirmed as the most important economic infrastructure in the growth of the Value added of the agricultural sector. Therefore, increasing the volume of dams and the number of dams to contain water and make it available to farmers should be prioritized. Finally, by

using the TOPSIS method and collecting economic infrastructure information through statistical calendars and the sum of all criteria, the economic infrastructure composite index was calculated for each year.

2.3. Time series econometric models

In order to investigate the effect of economic infrastructure on the Value added of the agricultural sector, two time series econometric models have been used: 1- Vector autoregression model (VAR), 2- Vector error correction model (VECM) In the VAR model, the interrelationships between different intervals of the variables are checked and if the desired model has co-accumulation, it is estimated through the vector error correction model, which results in long-term relationships and co-accumulation vectors.

3.3. Vector autoregressive model (VAR)

In the estimation of econometric models whose data is in the form of time series, the reliability or unreliability of the variables must be determined first, and according to the results of this stage, the final decision is made about how to estimate. For this purpose, the generalized Dickey-Fuller (ADF) test was used. The results of the generalized Dickey-Fuller test for model variables are reported in Table 6.

Table 6. The results of the stationarity test of the variables

Variable	Value added	Labor force	Fund	Economic infrastructure	Credits
Statistics on the level	-1.278 (0.625)	-0.894 (0.775)	-1.561 (0.488)	-3.037 (0.044)	-0.068 (0.853)
Statistics in the difference	-6.561 (0.000)	-9.910 (0.000)	-5.650 0.000)	- -	-6.357 (0.000)
Reliability status	I(1)	I(1)	I(0)	I(0)	I(1)

Note: Numbers in parentheses are confidence coefficients

Source: research calculations

According to the results of the test, the Value added variable of the agricultural sector, labor, capital and credits are stationary in the first order difference, and the combined variable of economic infrastructure is at a stable level. In order to estimate the autoregressive vectors, the first interval was chosen as the optimal interval. The results are reported in Table 7.

Table 7. Optimal interval in the estimation of Autoregressive Vectors

Lag	AIC	SC	HQ
0	-0.363	-0.123	-0.291
1	-6.342	-4.902	-5.913
2	-7.343	-4.703	-6.558

Source: research calculations

The vector autoregression model for the variables of the present study based on the first optimal interval will be as follows.

Table 8. The estimation results of the Autoregression model (VAR)

Variable	V(-1)	L(-1)	K(-1)	EIN(-1)	CRE(-1)	C
Value added	0.157	1.149	-0.024	0.003	0.132	-2.871
T-Stat	0.810	0.907	-1.239	0.414	2.579	-0.228
R^2=94			F=69.066			

Source: research calculations

According to table 8. The Value added of the agricultural sector is directly affected by the values of its previous period, as well as the labor force, economic infrastructure and credits, and has an indirect relationship with the capital balance of the agricultural sector. Usually, when a vector self-explanatory model is estimated, it is not expected that all the estimated coefficients related to the intervals of the variables are statistically significant, but it is possible that the coefficients in total are significant based on the F test statistics.

4.3. Vector error correction model (VECM)

To analyze the long-term impact of the variables in the growth pattern of the agricultural sector, the vector error correction model (VECM) is estimated to compare the impact of the variables in the short-term and long-term. Therefore, the model (VECM) has been estimated during the following steps. Among the models proposed in the VECM model, the model with width from the origin and no trend is chosen. The first step in VECM estimation is determining the optimal number of co-accumulation vectors. For this, conventional maximum eigenvalue and effect tests were used. The results are reported in table 9.

Table 9. Test results λ_{Max} & λ_{Trace}

Null hypothesis	**Opposite hypothesis**	$\lambda_{\mathbf{Max}}$	**Critical value (95%)**	**Significance level**
r=0	r =1	42.714	33.876	0.003
r ≤ 1	r =2	16.652	27.584	0.609
r ≤2	r =3	11.713	21.131	0.576
Null hypothesis	Opposite hypothesis	λ_{trace}	Critical value (95%)	**Significance level**
r=0	r =1	81.752	69.818	0.004
r≤ 1	r =2	39.037	47.856	0.258
r≤2	r =3	22.385	29.797	0.277

Source: research calculations

According to the results of the two effect tests and the maximum eigenvalue, the hypothesis of the existence of a long-term equilibrium vector is accepted at a significant level of 5%. The results of vector error correction model are reported in table 10.

Table 10. Estimation results of vector error correction model (VECM)

Variable	**V(-1)**	**L(-1)**	**K(-1)**	**IEN(-1)**	**CRE(-1)**	**C**
Coefficient	1.000	-2.552	-0.029	-0.018	-0.131	16.128
T-stat	-	-2.350	-2.801	-4.812	-5.795	-

Source: research calculations

According to the results obtained during the study period, labor force, capital, economic infrastructure and credits granted to the agricultural sector have a positive and significant effect on the Value added of the agricultural sector, in other words, the growth of each of these the variables will increase the Value added of the agricultural sector, which is justified. Labor and capital variables have a positive and significant effect on the Value added of the agricultural sector. The structure of production activities in the agricultural sector is such that this sector benefits from more labor than other economic sectors and is considered a user sector. Employing more labor force in the sector quantitatively increases production and ultimately increases Value added. Along with labor, capital stock plays an important role in the production process. The capital provides the necessary platform for creating and equipping infrastructure facilities in the sector. The increase in capital provides the necessary ground for the introduction of modern production technologies, increases the productivity of production inputs in the sector, and improves the level of production and Value added. Also, the infrastructure provides production facilities and stimulates economic activities, and by reducing the costs of trade and transfers, improves competitiveness, improves service delivery, and increases access to various market players (such as suppliers of institutions) , labor force and demanders of goods) which will lead to economic growth. The estimation of the VECM model also shows that the ECM coefficient is approximately equal to -0.77 and is significant at a significance level of 5%, considering that the numerical value of this coefficient is between 0 and -1, so the existence of a relationship the long-term equilibrium between the variables of the model is confirmed. Also, this coefficient shows that the shocks on the Value added variable of the agriculture sector in the short term are adjusted towards their long-term balance. It has a long-term balance. So that in each period, 77% of the error of not adjusting the GDP of the previous period is adjusted in the

current period. In addition, the mentioned result means that it takes less than two periods to correct the short-term equilibrium error and return the model to the long-term equilibrium. In general, the results of the ECM model indicate that it takes about 1.5 years for the GDP to return to its equilibrium level with the introduction of evil to any of the explanatory variables of the model.

One of the prominent tools in examining the dynamic movements of variables is stimulus response functions. In these functions, the occurrence of a shock standard deviation in each of the selected variables of the system is evaluated on all the variables of the system. Using this criterion, it is possible to determine the duration of the shock and the maximum effect of the shock after the shock occurs. In this way, policy makers can identify the impact of shocks on the economic system and use them for policy making. In this section, the impact of impulses on the Value added of the agricultural sector is investigated. In Fig1. the reaction of the Value added of the agricultural sector to the impulses from other variables is shown in the amount of one standard deviation for ten periods. According to this diagram, the variable Value added of the agricultural sector has an upward trend from the beginning of the period to the second period following the response to the changing impulse of the labor force, and from the third period, it moves towards equilibrium with a slight downward slope and maintains this trend until the end of the period. To be the capital balance has a negative downward trend from the beginning of the period and an upward trend from the second period and maintains this trend until the end of the period. The variable momentum of granted credits has a positive upward trend from the beginning of the period, and from the second to the third period, it takes a downward trend and moves towards balance. The momentum of the logarithm of the economic infrastructure has a positive upward trend from the beginning and a constant positive trend from the second period and maintains this trend until the end of the period.

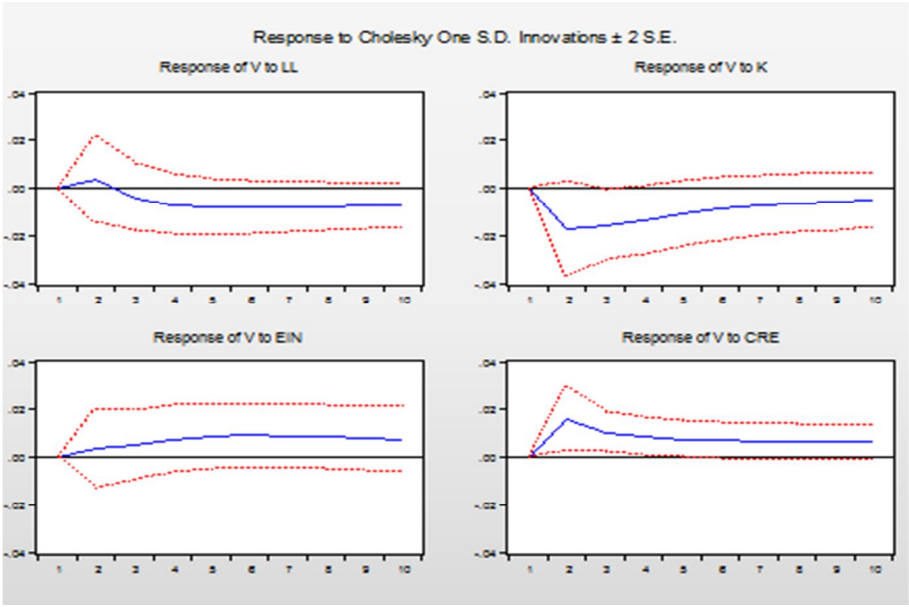

Fig 1. Stimulation response function

Source: research calculations

In this part, the results related to the analysis of the variance of the value-added variable are examined, with the help of the analysis of the variance, the contribution of the instability of each variable against the shock to each of the other variables of the model is determined. With the help of variance analysis, it is possible to determine how many percentages of the forecast error variance is explained by the variable itself and how many percentages are explained by other variables. The first column, marked with S.E, shows the forecast error in different periods. The reason for the increase in forecasting error over time is that the error in each year is calculated based on the previous year's error Based on the results of Table 11, in the first period, all changes in the dependent variable (employment in the agricultural sector) are explained by the variable itself. In the following periods, this share decreased and reached its minimum value in the tenth period. With the decrease of the share of the variable during the studied periods, the share of other variables has been on the

rise. Among the variables, capital has had the largest share in all periods. And after that, the credits given to agriculture sector, economic infrastructure and labor force are placed in the next categories.

Table 11. The results of analysis of variance of prediction error

Course	S.E	V	L	K	EIN	CRE
1	0.054	100.00	0.000	0.000	0.000	-
2	0.060	83.88	0.367	8.088	0.399	8.088
3	0.063	75.915	0.758	13.198	0.997	9.129
4	0.066	69.786	1.766	16.240	2.124	10.08
5	0.068	65.165	3.009	17.696	3.537	10.590
6	0.070	61.654	4.188	18.264	4.954	10.937
7	0.0726	58.953	5.208	18.396	6.199	11.242
8	0.074	56.826	6.065	18.338	7.218	11.59
9	0.075	55.107	6.787	18.208	8.023	11.872
10	0.077	53.680	7.404	18.055	8.650	12.209

Source: research calculations

4. Conclusion

Today, progress in infrastructures is one of the most basic indicators for measuring the development of countries, so that in the international ranking system, the expansion of the system of exchange of goods and services is one of the conditions for the superiority coefficients of countries. One of the important reasons for this is the dependence of economic growth on the development of communication and the variety of transportation methods. It should be kept in mind that the growth of the transportation sector is not possible without the creation and development of economic and social infrastructure. Infrastructure, in the most general case, is a group of interconnected structural factors that introduce the consumption costs of public goods by the government. Therefore, with the development and progress of the infrastructure by the government, the resulting benefit includes the general public. Therefore, investment in infrastructure is of considerable importance. Investment in infrastructures due to the continuous

increase in demand for food and other agricultural products can provide the growth of production and employment in this sector and due to the previous and subsequent connection of transportation with other sectors and their production also helps. In fact, an increase in demand causes the price to rise, and an increase in the level of prices can stimulate investors' motivation to increase. Therefore, more investment will lead to more production growth and more employment. The agricultural sector in Iran's economy, as a supplier of the country's food resources, has a significant contribution in creating Value added. For this reason, determining and examining the impact of infrastructure development on the Value added of the agricultural sector, which is effective in the growth and development of this sector, will be able to contribute significantly to national growth and development. In addition, the agricultural sector is important in three ways:

First: the agricultural sector is a suitable source for the development of the industrial sector, and perhaps the reflection of industrial development in the rural sectors will lead to a dynamic experience of the positive interaction between the two sectors of agriculture and industry;

Second: the strategic importance of food and products is an issue that no country can neglect; *Third:* the growth of the agricultural sector is largely dependent on the agricultural sector. So that the growth of the income of the direct and indirect workers in the agricultural sector causes an increase in the demand for labor, and also the increase in the wage rate causes the rejection of the non-agricultural rural sector and diverts the pressure of migrant labor from the cities. In addition to what was mentioned, the Value added of the agricultural sector has an undeniable effect on other sectors of the economy of a society. For this reason, having an efficient and active infrastructure has a significant effect on increasing the production and productivity of other production and consumption factors. According to the conditions of the international economy, the agricultural sector can be taken into consideration by the policymakers in neutralizing the effects of the cruel international sanctions against the Islamic Republic of Iran.

In the present study, the effect of economic infrastructure development on the growth of Iran's agricultural sector during the 1991-2019 was investigated. For this purpose, the necessary statistics and information related to the country's economic infrastructure were collected at the macro level, and then the importance coefficient of each infrastructure criteria was determined using the AHP method. For this purpose, 10 questionnaires were designed and completed with the consensus of university experts regarding the impact of economic infrastructure on the Value added of agriculture. This questionnaire includes four main criteria as follows:

1- *Transportation;* including the sub-criteria of the length of rural asphalt roads, road transportation of products, length of railway lines and rail transportation of products;
2- *Energy;* including the sub-criteria of the number of reservoir dams, the volume of dam reservoirs and electrified villages;
3- *Information technology*; including the sub-criteria of rural areas with telephone connection, computer access and the number of rural information and communication technology (ICT) offices.

By comparing the results obtained from the hierarchical analysis (AHP) with the real world, access to water resources is confirmed as the most important economic infrastructure in the growth of the Value added of the agricultural sector. Therefore, increasing the volume of dams and the number of dams to contain water and make it available to farmers should be prioritized. That the infrastructure of access to water resources was approved as the most important economic infrastructure in the growth of the Value added of the agricultural sector with 21 percent. In the following, the Vector Autoregression model was used to investigate the effect of economic infrastructure on the Value added of the agricultural sector. For this purpose, in the first step, the reliability of the variables was examined. According to the results of the generalized Dickey-Fuller test, the Value added variable of the agricultural sector, labor force, capital and credits were stationary in the first order difference. The economic infrastructure composite variable did

not need to be differentiated and was at a stable level. Then, the optimal interval of the model, the first interval, was considered. To know the long-term relationship between the variables, the vector error correction model was used. The results showed that there is a long-term equilibrium vector at a significant level of 5% and labor, capital, economic infrastructure and credits granted to the agricultural sector had a positive and significant effect on the Value added of the agricultural sector. In the meantime, the expansion of infrastructures provides production facilities and stimulates economic activities, and by reducing the costs of trade and transfers, improves competitiveness, improves service delivery, and increases access to various market players (such as suppliers of institutions, labor force and demanders of goods) which will lead to economic growth. The results of stimulus response functions also show the positive effect of infrastructure expansion on the Value added of the agricultural sector. So that the momentum of the logarithm of the economic infrastructure has a positive upward trend from the beginning and takes a constant positive trend from the second period and maintains this trend until the end of the period. The results of variance analysis showed that from the second period onwards, the contribution of other variables in explaining changes in the dependent variable increases. The results obtained from this article are in line with the findings of Hosseininia et al. (2019), Morsali et al. (2018), Badakhshan et al. (2019) With the difference that the present research revealed another aspect of the relationship between the development of infrastructure and the above-mentioned value of the agricultural sector by using a new index definition and using the time series method.

Suggestions

- Investing in economic infrastructure for the economic growth of the agricultural sector should be prioritized and a fixed dedicated budget that is not affected by the changing social, political and cultural factors of the society should be considered for the growth of the agricultural sector;

-In order to get the maximum benefit from the expansion of infrastructure, it is recommended to prepare a community plan for the development of the agricultural sector and identify investment priorities;
-Due to the lack of compensation for depreciation by investment, it is recommended to maintain the existing infrastructures and fleets on the condition of economic efficiency based on scientific planning;
-Increasing private sector investment and more support for farmers can be a source of positive effects;
-Creating the necessary background for the formation of healthy competitive markets in the agricultural sector through privatization and reducing the power of the government and other institutions, which will be achieved with the withdrawal of the government from the cycle of taking over activities and reducing interference in various fields and creating the environment for the presence of all economic actors;
-Infrastructure such as information technology can play an effective role in the development and profitability of businesses for smallholder farmers and family farmers (businesses such as processing, marketing and storage). The public sector usually plays the main role in infrastructure investment, although in recent years, the participation of the private and non-governmental sector in providing rural infrastructure has increased. Global surveys have shown that investing in the development of infrastructure in rural areas has advantages and benefits: 1) Improving the livelihood of villagers. 2) Participation of villagers in planning, monitoring, implementation and financing of infrastructure investment projects and empowering those 3.) Investment in infrastructure is based on the demand and needs of villagers and does not lead to wastage of resources.

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Authors' contributions

All authors had contribution in preparing this paper.

Conflicts of interest

The authors declare no conflict of interest

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