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EMPIRICAL ANALYSIS ON THE EFFECTS OF OPENING UP ON ECONOMIC GROWTH IN ALGERIAN RURAL STEPPIQUE AREAS

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ABSTRACT

This study aims to highlight the causal relationship between Infrastructure for opening up and economic growth in the municipality of Ksar Chellala in Algeria, which benefited from infrastructure development programs to combat its spatial and social isolation. By adopting an econometric approach based on the Cobb-Douglas production function over the period (2000-2020), the results showed that infrastructure for opening up triggered an increase in production through the strong direct causal link. Telecommunications have far impacted it, because its elasticity of 1% led to an increase of 0.93%, while they are around 0.65% for roads and electricity. The conclusions call for the continuation of operations and to give as much attention to their quality, their maintenance as well as their bioeconomic benefits.

Keywords: Local public interventions, Agricultural production, Socio-spatial opening up, Local development, Algeria.

JEL Classification: Q120 ; Q210 ; Q560

I .INTRODUCTION

Infrastructure is crucial for economic progress, as it facilitates the movement of people, goods and information, and provides energy and water, which achieves humans well-beingr and the environment (OCDE, 2020), According to United Nations standards, infrastructure is present in the Seventeen Sustainable Development Goals (SDGs) which include poverty eradication, universal access to basic services such as food, environmental protection, peace and justice (Nicolas 2017). Infrastructure plays an important role in achieving social prosperity and is also an essential element of economic growth. Some authors assert that investment in infrastructure provides direct support for productive activities and the circulation of goods and improves the productivity of all businesses that use it (Atchemdi 2008;

Bergeret et al.1977; Drobinski 2021; Nshue 2014; Quinet 1995; Pascal & Guironnet 2011; OECD 2009).

Algerian economy witnessed profound transformations in order to improve its position in the world economy through the implementation of an infrastructure project that would enable it to reduce dependence on imports and improve the standard of living of citizens. (Bessaoud et al.2019; Medjdoub et al.2022; Mouloud & Lalali 2022). The adoption in December 2001 of the orientation law for territorial planning enabled the implementation of a strategy to improve and diversify the infrastructure provided a planning framework related to the development of rural remote areas to break their isolation. These achievements were only possible with increasing revenues from hydrocarbon exports, due to the availability and influx of oil revenues which allowed the creation of numerous economic infrastructures As well as creating a balance in the concentration of infrastructure between the various regions of the country (Atchemdi 2008; Nshue 2014; Bessaoud et al.2019; Hasni & Azzaoui 2022).

The problem of the study

Questioning the contribution of opening up infrastructure to economic dynamics goes back to the question of the causal relationship between infrastructure stock and economic growth, which nevertheless remains problematic for economic debate. Some consider infrastructure as an element that can boost growth, while for others the link is the opposite. By studying the case of Ksar Chellala, we are trying to find an answer to this problem. Our main question is formulated as follows: "How do opening up infrastructure affect economic growth in the study area?"

Hypothesis of the study

It is appropriate to advance, as a starting point, with a research hypothesis which is as follows. Opening up is an element of the economic renewal of the territory; it would have a strong correlation between the infrastructure of opening up and the economic dynamic in terms of production"

Aims of the study

Our study falls under the Algerian development policy aimed mainly at opening up remote rural areas to improve human well-being to fix populations in their regions by creating productive activities. The main objectives of this study are to measure the impact of opening up actions on the growth in production; In this context and through this study, we try to confirm this vision.

Structure of the study

This document is divided into three sections, the first section a literature review of research studies examining the relationship between infrastructure and economic growth then an account of economic theories that have addressed the theme of links between infrastructure and growth. The second section began with an overview of the study area and then a presentation of the research method used to measure the impact of infrastructure on the economy growth. The third section contains a statistical and economic discussion of the most important results of the study. In conclusion, we will present relevant conclusions and recommendations on the impact of public infrastructure and their role in economic dynamics.

2. Literature Review

2.1. Economic theory of infrastructure and growth

The concept of openness constantly intervenes in the economics of transport as well as in geography and regional planning. Geographically and economically openness means that the region is not isolated from the economic activities taking place there, including production and distribution. The process of opening up usually includes repairing roads, connecting electricity and communications, as well as connecting drinking water, water and natural gas networks.

Classical economic theory suggests that there are links between transport and development, including economic, environmental and social aspects, This is confirmed by De Brucke et al.(2011) The origins of transportation as a catalyst for growth go back to Adam Smith's (1776) classic theory of the role of transportation in production. The Keynesian view is that public spending is a cause of national income (Hosni & Azzawi 2022). In the neoclassical movement, the issue of public infrastructure spending is a topic of active research; In fact, modern models of internal growth link public spending in the areas of infrastructure and growth, and address the role played by all means that contribute to geographical openness in the field of economic dynamics.

According to Barro (1990), public spending on infrastructure (transportation and communications) improves conditions for economic growth in low-income countries. This increase in growth increases government revenues, which can then increase its spending.

The Barro model indicates that public spending has a positive impact on the growth rate of the economy. He asserts that the neoclassical and endogenous growth model such as Robert Barro's model introduces infrastructure into the production function by absorbing it into public spending. This helps generate positive external factors that lead to growth. It makes it possible to obtain the optimal size of infrastructure that increases growth **(Drobinsky 2021**; **Nicolas 2017; Nshue 2014)**

2.2 Review of Research on Infrastructure and Growth Nexus

The analysis of the impact of infrastructure on economic growth was the subject of several research studies, both macroeconomic and microeconomic. The results and conclusions are diverse, most of these studies have found positive relationships and a strong connection. among these studies we can cite Kherbachi & Touati (2014); Belakhdarand & Laib (2021); Saidi, Shahba & Akhtar (2018) ; Karymshakov & Sulaimanova (2020); Laridji, Maliki & Berbar(2019).

In Algeria, Kherbachi & Touati (2014) measured the impact of roads on production, production factors, income and household consumption using the social accounting matrix multiplier model. This work has highlighted that the increase in public investment has a positive effect on all activities, production factors and institutional sectors. Although much more extensive, And quite the contrary Laridji, Maliki & Berbar (2019) Their results showed no causality between public investment in transport and economic growth, using a production function during the period (2005-2017).Likewise Zakan (2009 Using the vector autoregressive model, no causal relationship was detected between infrastructure spending and economic growth in Algeria, and also using the principal component analysis method of Yacoub (2015), its results did not indicate a positive relationship.

In Tunisia, Belakhdar & Laib (2021), studied the relationship between road transport and economic growth during the period (2005-2017) using the linear regression method. The analysis showed that the gross domestic product is strongly linked to investments in road infrastructure this suggests that the Tunisian economy is positively affected by transport.

In Central Asia, Karymshakov & Sulaimanova (2020) analyzed the relationship between road investment and trade they detected an increase in the volume of transactions with their partners. The empirical estimation based on the analysis of data series during the period (2009-2017) concluded that transport infrastructure had a strong positive impact on foreign trade. In addition, the study in the countries of the Middle East and North Africa of (Saidi , Shahba & Akhtar 2018) showed the existence of a long-term positive relationship between infrastructure and economic growth and contributes in a positive way to economic development, using the Cobb Douglas production function. The same conclusions were drawn for several other more or less distant countries by Boopen (2006). The research examined the impact of transport infrastructure in 39 African countries and 13 small island developing states, using panel data analysis during the period (1980-2000).

In Kazakhstan, Aidarkhanova (2020) analyzed the impact of transport infrastructure on economic growth using the difference-in-difference (DiD) method for the "Khorgos–Zhetygen" railway line project. During a short (2009–2012) and medium (2013–2017) period, it highlighted a positive impact on the agricultural, industrial and construction sectors at local and regional levels. In the Republic of Kyrgyzstan. The works of Karymshakov & Sulaimanova (2019) aimed to examine the impact of the road linking Osh–Sarytash–Irkeshtam and Sarytash–Karamyk on regional economic and social development. For this, they used statistical data from the period (2005-2017) They concluded that the construction of the road had stimulated economic development and reduced poverty in the region. Likewise in Niger, the results of work based on a survey by Yonlihinza (2011) showed that road infrastructure positively affects growth. This is clearly evident in the flow of agricultural products by reducing production costs.

The econometric assessment of the work that has been presented on the relationship assessing the link between infrastructure and economic growth is that studies have used different approaches and different variables over different periods and at different levels. We note that most of the studies presented give a clear idea of the close causal relationship between economic growth and infrastructure, and that public capital positively affects productivity. This constitutes a sign of the strength of the econometric studies and approaches used.

3. MATERIALS AND METHODS

3.1. Choice of the of the study area

Opening up of remote rural areas is one of Algeria's political priorities. Ksar Chellala is also considered an example of various social and spatial changes that have long suffered from the problem of isolation. It was chosen as a study area because according to Khelil (1986) ; Laouisset (2016) It is a typical feature of the vast interior steppe region of Algeria and is considered a crossing point in the seasonal migration of livestock during the transhumance between the north and the Sahara

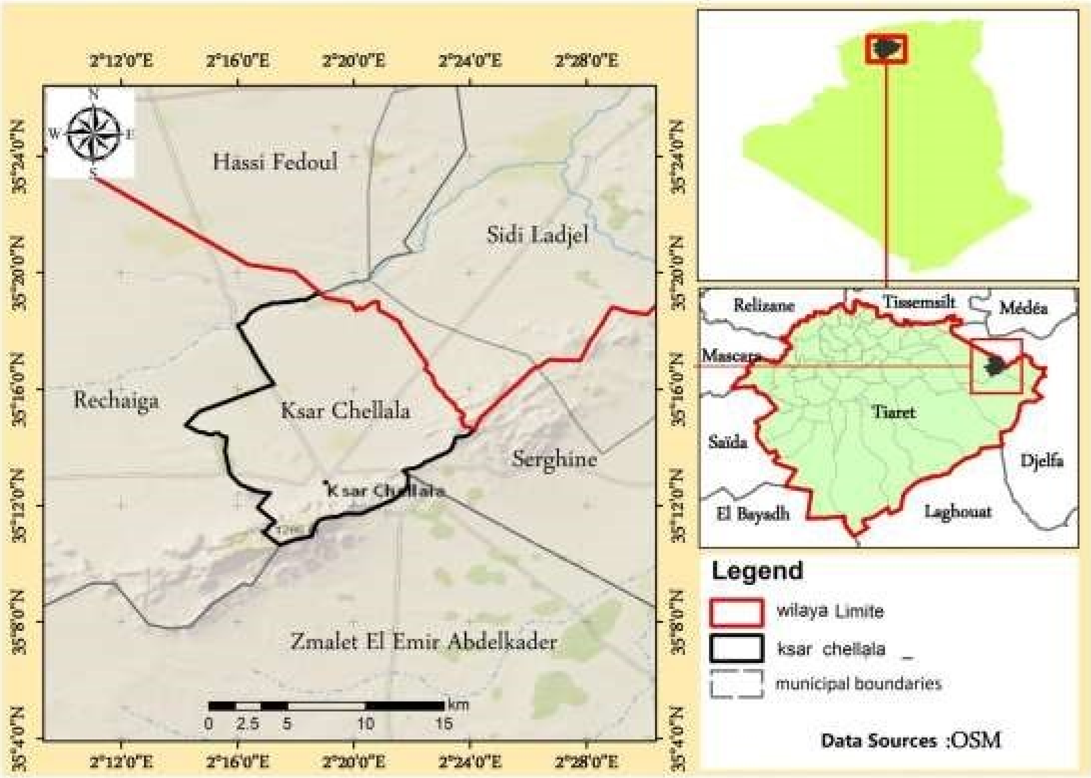

Figure 1: Geographic location of the study area.
Source: Authors (2023).

The lack of necessary infrastructure has had a significant impact which has negatively affected the social and economic situation, increased the lack of accessibility to markets and schools, leading to poor living conditions, the cause of exodus to neighboring towns. Therefore, it was necessary to formulate a strategic plan to break its isolation, in particular the opening of roads to connect rural localities to the road network, notably the Wilaya road N° 135 and the national road N°. 77. The project to open up accessibility was provided with a financial envelope estimated at 68.479.800 million dinars, which was proposed as part of the local development plan (DPAT 2020). As for the supply of electrical energy, 86% of farms were connected to electricity.

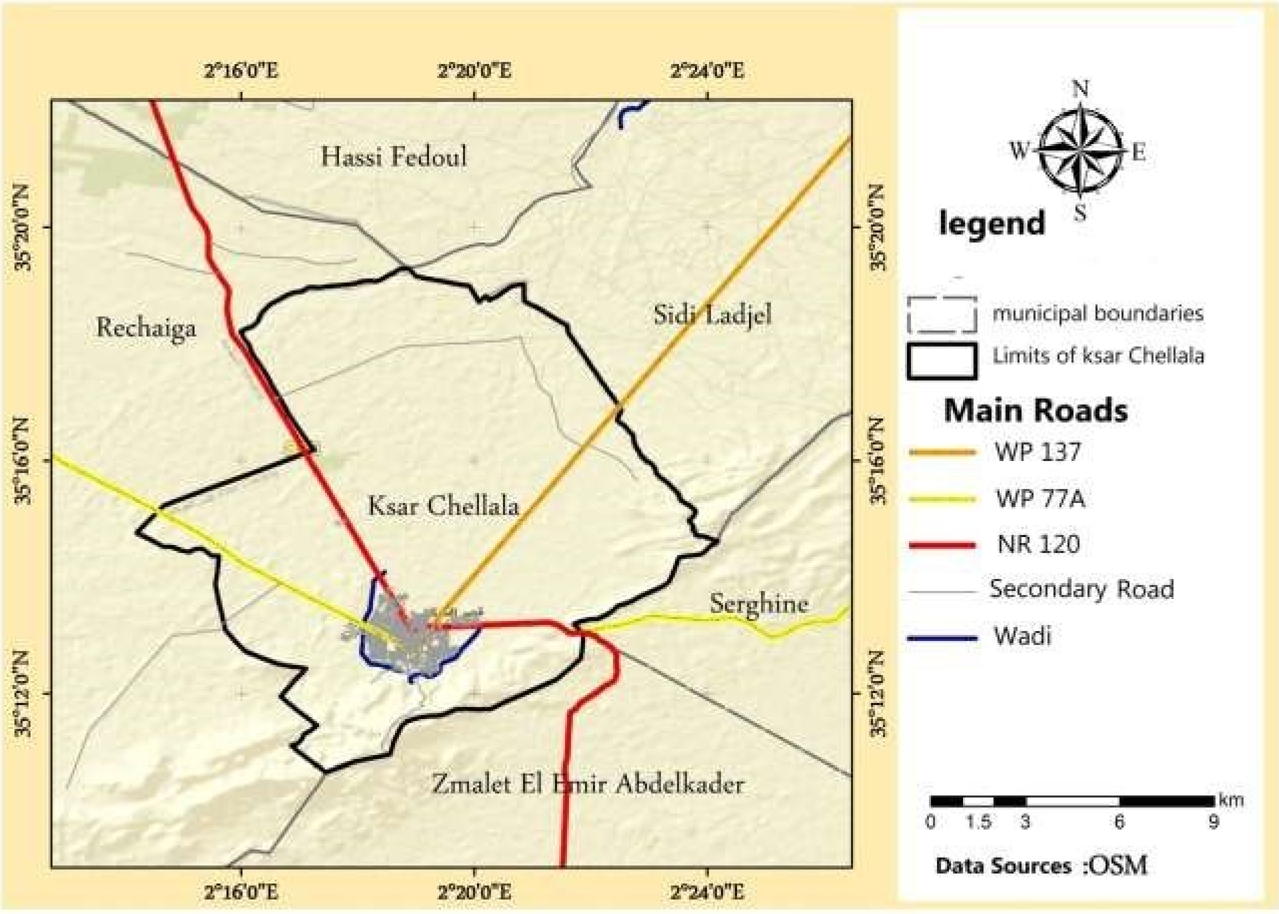

Figure 2: Road infrastructure in the municipalty of Ksar Chellala.
WP. Wilaya Path;
NR. National Road : Source:
Authors (2023).

Creating new infrastructure to open communication routes linking rural areas can have an impact on economic growth, by attracting the labor force and allowing better exploitation of natural resources. The study site has important water resources as it is located in the middle of Oued Touil, where there are 12 aquifers in addition to wind and solar energy (Laouisset 2016).

3.2.Presentation of the work methodologie

According to **Mounier (1992)** Cobb-Douglas production function specifies the relationship between the quantity of a good produced and the factors needed to produce it, and is usually written in the following form:

$$y = A\,K^{\alpha}\,L^{\beta}$$

$$A > 0\ ;\ \alpha > 0\ ;\ \beta > 0$$

A is a positive constant; it is an efficiency parameter which reflects the general state of technology. $\alpha + \beta + \delta = 1$ is the degree of the function, α, β It is the elasticity of production with respect to the factors of production, K and L represent the factors of production,

The equation has a nonlinear form. After logarithm the model becomes linear.

$$\text{Lny} = \text{LnA} + \alpha\text{Ln K} + \beta\text{Ln L}$$
$$\text{Lnyt} > 0;\ log\text{Kt} > 0;\ \text{Log Lt} > 0$$

According to **Daniel (2021)** the function follows the logic of diminishing returns, This means that when we increase K and ΔK, the increase in ΔY of y is positive but less significant. The derivative of y with respect to K must be positive and the second derivative negative. This means that α is positive and α – 1 negative. The same goes for β:

α + β=1 In this case we have a fixed return, α +

β<1 in this case we have diminishing returns, α

+ β>1 It indicates an increasing return

3.3. Model development

In order to show the relationship between the infrastructure and the level of economic growth, we adopt the Cobb-Douglas production function defined in equation (1):

$$y = f\ (\text{E, R, T}) = \text{A E}^{\alpha}\ \text{R}^{\beta}\ \text{T}\delta + \mathcal{E} \ldots\ldots\ldots \quad (1)\ y$$

$$= \text{A E}\alpha\ \text{R}^{\beta}\ \text{T}\delta + \mathcal{E} \ldots\ldots\ldots \quad (2)$$

y: the production; Annual production during the period (2000-2020) The unit is expressed in thousand tones.
A: the model constant. Is A fixed coefficient which represents total factor productivity with a relative variation (technical progress);
E: Electric energy; Percentage (%) of total annual electricity costs, This variable provides a rough estimate of the cost of electricity consumption to the farmer and indirectly shows the extent to which the farmer has access to electricity.
R: Road infrastructure; the length of the road network (in linear kilometers), all roads that the public administration develops and maintains for use in the public interest.
T: Telecommunication; Represented by the number of telephone lines in the operators' possession α, β, δ represent respectively the elasticity, of electrification, of the road network of telecommunications; Ɛ: Error term.
The production function was obtained by specifying that the elasticities of production are log-linear functions of the inputs, Starting from Cobb-Douglas which observes that the logarithms of output, equation (2) is a non-linear production function. After logarithmic transformation the equation becomes as follows: $\log y = \log A + \alpha \log E + \beta \log R + \delta \log T + \mathcal{E} \ldots\ldots \quad (3) \quad \log y > 0; \log A > O; \log (E) > O\ ; \log(R) > 0;\ \log (T) > O$

After logarithm the model becomes linear, we can therefore estimate it using the EVIEWS 12 software.

Table 2. Description of the variables used in the study.

year	Production (y)	Electrification (E)	Road (R)	Télécommunication (T)
2000	20	10	0,2	1,84
2001	21	10	0,5	1,95
2002	20	15	0,9	2
2003	18	17	1,5	2,17
2004	31,185	20	2	2,3
2005	31,393	22	2	2,34
2006	33,486	25	2	2,5
2007	34,526	27	6	2,6
2008	35,363	28	7	2,63
2009	35,572	29	9	2,68
2010	53	50	10	2,69
2011	59,2	73	11	2,77
2012	73,5	73	12	2,89
2013	70	75	16	2,9
2014	73,718	78	30	2,95
2015	94,5	80	30	3
2016	97,4	81	33	3,11
2017	103,655	84	48	3,3
2018	81	85	48	3,43
2019	96,24	86	53	3,45
2020	121,8	88	54	3,49

Source: Agricultural Services Department (2023).

4. RESULTS AND DISCUSION

4.1. Descriptive results

To demonstrate the strong causal relationship between the variables, in this case the residuals of the phenomenon are analyzed, the descriptive results were important. They consisted of testing the Stability of the Model (Cusum Test), Cointegration tests, and unit root tests. Obviously, for models with endogenous variables we used robust regression models such as the DOLS (Dynamic Ordinary Least Squares) model.

4.1.1. Descriptive analysis of model variables

Table 3: Descriptive analysis.

	Mean	Médian	Maximum	Minimum	Std. dev
Y	57.35895	53	121.8	18.0	32.50
E	50.28571	50	88.00	10.0	30.59
R	17.90952	10	54.00	0.20	19.09

T	2.713810	2.6	3.400	1.84	0.494

Source: Authors calculation using Eviews 12 (2023).

Concerning the production variable (y), the coefficient of variation (56.6%) is high, which leads to the conclusion that the series has dispersion characteristics. The serial telecom data account (T) is characterized by non-dispersion sees a 14% reduction in the coefficient of variation and the fact that the median (2.6) is closer to the mean (2.7) indicates that the data is consistent. Regarding the electricity data series (E), it is characterized by a high dispersion because the coefficient of variation (60%) is very high. The road network data series (R) is characterized by high dispersion, because the value of the coefficient of variation (102%) is very high.

4.1.2. Correlation matrix of the variables

Based on the correlation matrix presented in (Table 4), it appears that all the correlation coefficients of the variables are significant. Production is strongly linked with all the variables (the road network, telecommunications as well as electrification) because their correlation coefficients, which are respectively (0.92; 0.92; 0.95) are close to unity, indicating that there is a strong positive link between production and the explanatory variables.

Table 4: Correlation Matrix.

	Y	T	R	E
Y	1	0.92587933	0.92173681	0.95136458
T	0.92587933	1	0.91099055	0.92587202
R	0.92173681	0.91099055	1	0.8646104
E	0.95136458	0.92587202	0.8646104	1

Source: Estimated by authors using the Eviews 12 (2023).

4.1.3. Unit roots test

The method used in the unit root test is Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP). Processing time series requires a constant distribution over time. In the case of non-stationarity of the series, the ordinary least squares (OLS) method cannot be applied.. In any case, the analysis resorted to checking the stationarity of each series. We conclude that all the series were stationary at the first level I(1) and had a constant distribution over time.

Table 2: Augmented Dickey-Fuller (ADF) stationarity test.

Variable	At the level		In first differences		Conclusion
	ADF	Result	ADF	Result	
Y	0.276688	Non-stationary	- 4.194437	stationary	I(1)
E	-0.573239	Non-stationary	-2.936644	stationary	I(1)
R	1.037831	Non-stationary	-4.487833	stationary	I(1)
T	-0.998191	Non-stationary	-3.562390	stationary	I(1)

Source: Estimated by authors using Eviews 12 (2023).

Table 3: Philips Perron (PP) stationarity test.

Variable	At level		In first differences		Conclusion
	PP	Result	PP	Result	
y	1.904189	Non-stationary	-4.579346	Stationary	I(1)
E	-0.573239	Non-stationary	-2.288114	Stationary	I(1)
R	1.437726	Non-stationary	-4.427833	Stationary	I(1)
T	-1.016052	Non-stationary	-3.499365	Stationary	I(1)

Source: Estimated by authors using Eviews 12 (2023).

4.1.4. Cointégration

There is a Cointegration equation at the 5% threshold. In conclusion, the model is cointegrated; Electric power, transportation and telecommunications infrastructure have had an effect on agricultural production in the long term.

Table 4: Johannsen Cointegration Test.

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No of CE(s	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.**
None *	0.858519	63.66905	47.85613	0.0009
At most 1	0.649409	26.51282	29.79707	0.1141
Max-eigenvalue test indicates 1 cointegrating egn(s) at the 0.05 level *denotes rejection of the hypothesis at the 0.05 level **Mackinnon-Haug-Michelis (1999) p-values Unrestricted cointegration rank test (maximum eigenvalue)				
Hypothesized No of CE(s	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.**
None*	0.858519	37.15623	27.58434	0.0022
At most 1	0.649409	19.91456	21.13162	0.0733

Source:Estimated by Authors' by Eviews 12 (2023).

4.1.5. Stability Test (Cusum Test)

Based on the representation of Cusum test graphs (Figure 3) The stability test allowed us to conclude that there was no structural break;. It is clear that the middle trend line relative to the other diverging curve has led to accepting the null hypothesis of stable parameters. we can conclude that there is no structure break, we will conclude that the parameters are stable

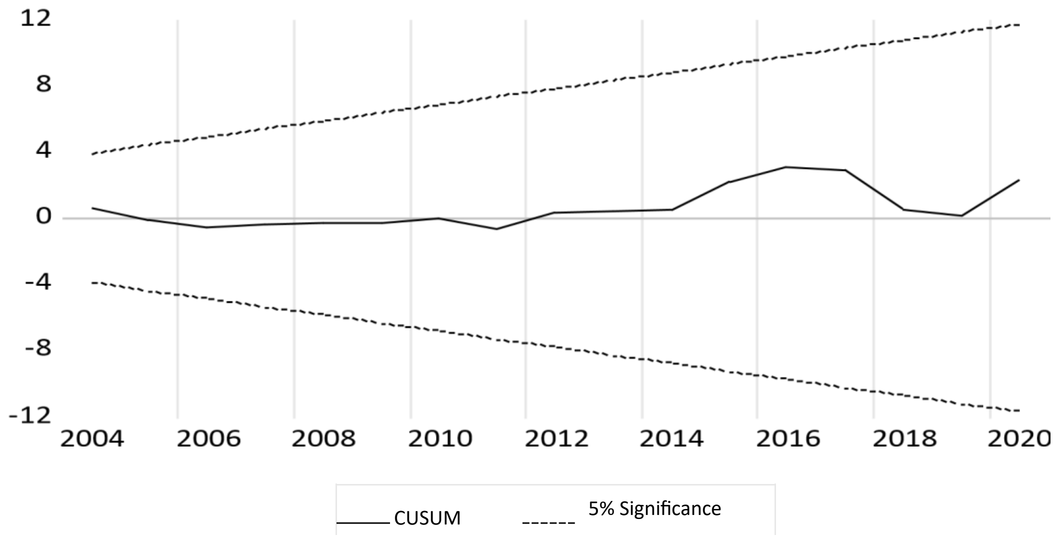

Figure 3: Cusum Test

Source: Estimated by Authors using Eviews 12 (2023)

4.2. Residue Analysis

(Table 4) showed that the probability value 0.8678 was greater than 5%; therefore, the null hypothesis was rejected and the conclusion of no autocorrelation of errors in the model was retained.

Table 4**:** Autocorrelation test of LM Test.

Breusch-Godrey Serial Correlation LM test: Null hypothesis H0: no autocorrelation of errors			
F-statistic	0.028603	Prob. F(1.16)	0.8678
Obs* R-squared	0.037474	Prob.Chi-Square(1)	0.8465

Source: Authors calculation using Eviews 12 (2023).

4.3. Dynamic Estimation of Panel Data

Based on the previous results and especially those in (table 7), we exactly obtained the production function which established the relationship between production (y) and the explanatory variables (E, R and T).

Table 7: GMM Régression Analysis.

Variables	Coefficients	t-statistique	P>|t|
Constant	10.76764	0.418842	0.6806
E	0.641504	3.931013	0.0011
R	0.658401	0.238484	0.0134
T	0.935248	0.076168	0.9402
R2=			0.94

F-statistiques			95.66
Prob (F-statistic)			0.000000
Durbin-Watson			1.86

Source: Estimated by authors using Eviews 12 (2023)

We replace the elasticity values in equation (3) The log-linear form of the production function of the model takes the following form:

$$\mathbf{Y = log10.76 + 0.64\ log\ E + 0.65\ log\ R + 0.93\ log\ T} + \mathcal{E}$$ The

form of the Cobb-Douglas production function is estimated as follows:

$$\mathbf{Y = 1.03\ \ E0^{\cdot}64\ R0^{\cdot}65\ \ T0^{\cdot}95}$$

4.4. Discussion

4.4.1. Statistical discussion

At first sight, the elasticities of the factors in relation to the market garden product of Ksar Chellala and the constant presented positive signs. Then, the result of the correlation coefficient R2 was very significant (0.94). This showed that the variation of 94.40% of the dependent variable (y) was explained by the exogenous variables; while the remaining 5.60% was explained by other variables not captured (the error Ɛ) by the model. The variables are strongly correlated with each other. Then, by the Fisher value (95.66) greater than 2.65 corresponding to the average calculated by Fisher; the overall model was significant and the F-statistic probability of 0.00 confirmed the result obtained. Furthermore, the Durbin-Watson statistic reaching 1.86 gave a positive idea about the occurrence of the test, le Endogeneity Test (Table 8) using the DOLS (Dynamic Ordinary Least Squares Model) model allows for probabilities greater than 5% for all variables, which allows us to conclude that all the variables in the model are exogenous. But the autocorrelation test of LM errors (F-statistic test) showed with probability (0.86) the absence of autocorrelation of errors in the model. Furthermore, the value of the Jarque-Bera Statistic 0.65 highlighted that the Residuals of the model were normally distributed. In the same vein, concerning telecommunications represented by the number of telephone lines, the analysis of the Cusum Test observed that the model was stable over the entire period studied.

Table 8 : Endogeneity Test.

Variables	t-statistique
T	0.6233 0.2154
R	0.3174
E	

Source: Estimated by Authors using Eviews 12 (2023).

All the statistical variables aptly led to the conclusion that the regression analysis gave satisfactory results. This immediately led to the acceptance of the results from an economic point of view.

4.4.2. Economic discussion

It was found that there is a significantly positive relationship between the components (E, R, T) and production (y), confirming the classic economic theory of Smith (De Brucker, Macharis & Verbeke 2011).

Telecommunications has had a positive and energetic impact on the growth of the production of market garden products in the territory. The 1% increase in the elasticity of telecommunications impacted agricultural production (potatoes and onions) by 0.93%. As for transport infrastructure, the value 0.65 was very interesting with 1% of its elasticity inducing an increase of 0.65% in market garden products. For this second resource, these results confirm those of several authors among these authors we can cite (Belakhdar & Laib 2021; Aidarkhanova 2020; Karymshakov & Sulaimanova 2020; Yonlihinza 2011; Assoul 2018; Boopen 2006). However, they are contrary to the conclusions of Laridji, Maliki & Berbar (2019), de Yagoub (2015) and Zakan (2009) en Algérie. Despite Laridji, Maliki & Berbar (2019) relied on the same methods (Cobb-Douglas function and multiple linear regression). The non-existence of causality would perhaps be due to the globality of their indicator. Indeed, the spatial heterogeneity making up the immensity of the national territory could conceal spaces less equipped with infrastructure to open up access, thus dragging down the causal link of the phenomenon studied.

The electrical energy resource and production were similarly positively linked, such that the 1% increase in its elasticity led to a 0.64% increase in production. Electricity was not lacking in importance as long as it was subsidized and produced from natural gas, therefore less polluting as an energy source.

Regarding all variables including electricity and telecommunications, the conclusions are similar to those of Kherbachi & Touati (2014) on a global level, but with a different approach (social accounting matrix multiplier model). However, other studies do not achieve the same results, especially for electrical and road infrastructure. This would probably be attributable to the context of an economic recovery in Algeria in 2018 and to the targeted sector (industrial) which often has low productivity in this emerging country (Assoul 2018). Furthermore, the explanation would come from the type of products used in the causality measurements; Currently, these are agricultural products different from industrial ones from the point of view of productivity and level of horizontal or vertical processing, for example.

Among the three integrated factors, telecommunications have most stimulated economic activities in the region. The explanation would come from its quality, its cost price and its maintenance compared to transport and electrification infrastructure, The understanding would be due equally to the qualitative leap and the residue of technological progress which remained, for years, unexplained by classical economic theory **(Atchemdi 2008).**

Technological development and openness contribute to the country's agricultural development **(Atchemdi 2008).** In this sense, large public spending leads to strong positive externalities arising from the economic dynamics ksar Chellala centered on agricultural production. It would lead to the creation of more wealth, employment and income distribution, leading to the well-being of societies **(Barrow 1990).**

CONCLUSION

This study aims to determine the extent of the impact of infrastructure on economic growth and apparently it was realized, using the econometric approach on time series during the period (20002020), which allows us to draw some interesting conclusions. This is achieved through significant progress in production, as evidenced by the study that there is a causal relationship between public spending on infrastructure in the transport, communications and electricity sectors and economic dynamics in terms increase in agricultural production.

In fact, production is positively affected by the road, electricity and communication network, because the production function has increasing returns because the sum of the elasticities of the road, electricity and communication network are positive. Communications have had a positive and vital impact on the growth of agricultural production in the region, increasing communication elasticity by 1% had an impact on increasing agricultural production by 0.93%. As for transport infrastructure, the value of their elasticity was very interesting since 1% of its elasticity led to an increase of 0.65% in agricultural production, The impact of electrical energy was also positive, since its increase of 1% led to an increase in agricultural production of 0.64%. And in the same way, electric energy by 1% had increased agricultural production by 0.64%. The Cointegration test also showed that there is a longterm positive effect between the variables studied and production.

Public spending on infrastructure has very significant positive effects on economic growth and is stimulating for the economic regeneration of the region on the basis of a strong link between opening up and economic dynamics. Therefore, economic dynamism in the field of agricultural production is affected by infrastructure in the long term, and it is also clear that communication infrastructure is what has greatly influenced this increase according to the link between resource elasticity and recorded agricultural production. Clearly, these findings do not concretely indicate social and environmental benefits.

Finally, the study allows us to draw the following recommendations: Investments in roads, rural electricity and communications should be prioritized given their role in economic dynamism. Strategic planning and investment in infrastructure is a key issue for economic growth necessary to achieve sustainable economic development. These conclusions pave the way for other studies, in particular on the relationship between opening up and social well-being, as well as their impact on environmental factors.

REFERENCES

Aidarkhanova, B. (2020). Measuring Impacts and Financing Infrastructure in Kazakhstan. Asian Development Bank Institute Working Paper. 1159.

Assoul, N. (2018). Essai d'analyse de l'impact du développement de l'infrastructure du réseau électrique sur la croissance de la valeur ajoutée industrielle en Algérie. Les Cahiers du MECAS. 14(1) : 96.

Atchemdi, K.A. (2008). La recherche agronomique et la situation alimentaire en Algérie. Thèse doctorat. INA Alger .

Azhgaliyeva, D., Mishra, R., Yoshino, N., & Karymshakov, K. (2021). Infrastructure and firm performance in CAREC Countries: cross-sectional Evidence at the Firm Level. Asian Development Bank Institute (ADBI) Working Paper. 1265

Barro, R. J. (1990) Government spending in a simple model of endogenous growth. Journal of Political Economy, 98(5, Part 2).

Bedjaoui-Benammar, H. (2011). Stratégies de développement rural en Algérie. Revue d'économie et de management.10(1): 142-147

Bergeret, A., Godard, O., Morales, H.L., Passaris, S., & Romanini, C. (1977). Nourrir en harmonie avec l'environnement. Paris: éd. Mouton & Co, Lahay et Maison des sciences de l'homme.

Bessaoud, O., Pélissier J. P., Rolland J.P., & Khechimi W. (2019). Rapport de synthèse sur l'agriculture en Algérie. Rapport de recherche, IHEAM-IAMM, Montpelier 13

Boopen, S. (2006). Transport infrastructure and economic growth: evidence from Africa using dynamic panel estimates. The Empirical Economic Letters. 5: 39-52.

Daniel, J.M. (2021). Taité d'économie. Paris: 3eme Ed. Ellipses.

De Brucker, K., Macharis, C., & Verbeke, C. (2011). Multi-criteria analysis in transport project evaluation: an institutional approach. European Transport. 47, 3-4.

DPAT. (2022). Le réseau de télécommunication de la région de Ksar Chellala de 2000 à 2020. Monographie de la wilaya de Tiaret, Service de planification. Document de travail. DPAT Tiaret.

Drobinski, V. (2021). Introduction a l'économie. Paris : 3eme éd. Ellipses.

Hasni, A., & Azzaoui, K. (2022). La relation entre les dépenses publiques et l'importation en Algérie (2000-2020). Journal of Contemporary Business and Economic Studies. 05 (3): 396-411.

Himri, Y., Rehman, S., Setiawan, A.A., & Himri, S. (2012). Wind energy for rural areas of Algeria. Renewable and Sustainable Energy Reviews, 16(5): 2381-2385.

Karymshakov, K., & Sulaimanova, B. (2019). Measuring the impact and financing of infrastructure in the Kyrgyz republic. Asian Development Bank Institute (ADBI) Working Paper. 988: 8-9.

Karymshakov, K., & Sulaimanova, B. (2020). The Impact of Infrastructure on Trade in Central Asia. Asian Development Bank Institute (ADBI) Working Paper. 1184:7-19.

Kherbachi, H., & Touati, K. (2014). Etude d'impact des programmes d'investissements publics sur la croissance économique. Revue des Sciences Économiques et de Gestion. 14: 49-64.

Khelil, A. (1986). Maturation et faisabilité d'une mise en valeur intégrée cas de projet Oued Touil. Dans: Séminaire international sur la stratégie générale d'aménagement de la steppe et des zones arides, Tebessa, 26 au 30 avril 1985, 237-244

Laouisset, M.B. (2016). Aménagement hydro-agro-sylvo-pastoral du sous bassin versant d'ouedtouil-aval / ksar-chellala dans le contexte de la lutte contre la désertification. Thèse doctorat.

Université Mostapha STAMBOULI de Mascara.

Laridji, M.A., Maliki, SB ., & Berbar, B.W. (2019). Analyse empirique sur l'effet des investissements publics dans le transport sur la croissance économique en Algérie. Revue Algérienne d'Économie de gestion. 12(02): 134-147.

Mdjdoub, R., Benamirouche, H., Kadi, M., Ameur, F., Medouri, A., Merouani, W., Boudeja, K., Lassassi, M., & Hernoun, F. (2022) Transformations structurelles, diversification économique et exigences pour une croissance durable (article éditorial). Les Cahier du CREAD. 38 (3): 7-26.

Mouloud, A., & Lalali, R. (2022). L'investissement privée en Algérie chronomogie de 60 années de réformes juridique inachevée (1960-2022). les cahier du CREAD .32(3) :197-228.

Mounier, A. (1992). les théories économiques de la croissance agricole. Paris : éd. Economica.

Nicolas, C. (2017). Infrastructures: comment quantifier les besoins dans les pays en développement? In transport et infrastructures. Paris : éd. ARMAND COLIN.

Nshue, A.M.M. (2014). Croissance économique, une perspective africaine. Paris: éd. L'Harmattane.

OECD. (2009). Investissement en infrastructure: lien avec la croissance et rôle des politiques publiques. In réformes économiques. Edition de l'OCDE, 1(05).169-186.

Pascal, L., & Guironnet, Y. (2011). Diagnostique de territoire mythologie de projet, centre de formation professionnelle et de promotion agricole (CPPA) de Carmegane.

Quinet, E. (1995). *Principes d'économie des transports*. Paris: éd. Economica.

Saidi, S., Shahbaz, M., & Akhtar, P. (2018). The long-run relationships between transport energy consumption, transport infrastructure, and economic growth in MENA countries. Transportation research. Volume 111:78-95

SONELGAZ de Tiaret (2022). Consommation électrique de la région de Ksar Chellala durant la période 2000-2020. Document de travail. SONELGAZ de Tiaret.

Yagoub, M. (2015). Détermination Du Rôle Des Dépenses Publiques Du Transport Sur La Croissance Économique En Algérie «1980 – 2013»: Étude Économétrique. Algerian studies of Accounting and Financial Review. (01) 2015:17-27.

Yonlihinza, I.A. (2011). Transport désenclavement dans la problématique du développement local à Téra au Niger. Thèse doctorat. Université Toulouse II.

Zakane, A. (2009). Impact des dépenses d'infrastructure sur la croissance en Algérie .une approche en séries temporelles multivariée (VAR). les cahiers du CREAD. 87: 27-48