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From Roads to Riches: Infrastructure Development as a Method of Driving Growth in Romania National Economy

Rareș NIȚU[1], Robert URICARU[2*], Maria NEGREPONTI-DELIVANIS[3]

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Abstract

Currently the European Union is making significant efforts for the homogenisation of economic policies at the European level in order to reduce the level of development discrepancy between the members. State differences occur in these processes, represented by the road infrastructure which plays a complementary role in reducing transport costs and facilitating mobility in this context the concept of E-Road as a turn point by the United Nation Economic Commission for Europe (UNECE), a central element of the Trans European Transport Network (TEN-T). These forms of roads are built and maintained according to strict equality and safety standards and are designed to improve connectivity between EU member states and other European countries. In addition, they play a crucial role in regional integration as they support the increase of the level of urban connectivity by connecting less developed regions with large economic centres. The current paper observed the impact of an economic development using an economic analysis that was carried out with data extracted from the Eurostat international database and the data used for the realisation of the case study are at the level of Romania, the variable including analyses the GDP (grow domestic product aggregate), aggregate final consumption and the length of state, provincial, and municipal roads. The econometric analysis revealed the high degree of correlation that is significant between the road infrastructure development and economic growth, underlying the importance of continued investment in E-Road to support economic progress within the European Union. Road infrastructure is a central component in the European Union's efforts to create a more even and competitive economy. Investments in road infrastructure not only improve accessibility and mobility, but also help reduce transport cost and simulate economic activity, the use of the best technologies, and the most appropriate forms of road maintenance, so along with the modern forms of asphalting and intelligence monitoring of structures, facilitate economic growth and the regional development.

Keywords: roads, transportation policy, EU, development, infrastructure.

[1] Bucharest University of Economic Studies, Bucharest, Romania, niturares18@stud.ase.ro.
[2] Bucharest University of Economic Studies, Bucharest, Romania, uricarurobert18@stud.ase.ro.
* Corresponding author.
[3] University of Macedonia, Thessaloniki, Greece, delimar@uom.edu.gr.

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1. Introduction

The European Union employs efforts aimed to minimise progress differences between member states, the bystander procedures, and the extent of the economic community. Implementing this requires establishing a sustainable working environment and standardising development principles in reducing corporal cost.

In addition, the European Union must use a variety of cost cutting policies to maintain a competitive advantage, competitiveness being most commonly measured financially, as it is in this case the transport among the most common categories that must be constantly optimised and reduced by economic actors separating at European level, although it is not the only one. Government representatives must pay a lot of attention to transport activities, especially in regards to logistics (that is, the infrastructure that individuals must use to operate in the market) to support the private activity team steer the economy's direction. At the moment, E-Roads are one of the most representative strategies launched by the EU (Zuo et al., 2023).

This process associated with the European network project set out by the European Union is titled „E-ROADS", or Europe international road network (E-Roads), and it stands as a network of interconnected roads that can connect European interest points. TEN-T, the Trans European Transport Network, stands as the logistics structure which integrates these access rates, whose numbers are antedated by the letter „E". Connectivity and mobility within the member states of the European Union and other European nations are primary purposes of these roads covering long distances, facilitated by and for drivers by the uniform and simplistic numbering and signing of all E-roads in Europe. In addition, in the construction and maintenance of E-Roads, strict standards regarding the safety of participation in traffic are respected. The entire project as well as the necessary set of rules contribute to safer and more efficient journeys, including the wideness of the roads, the quality of the materials they are made of and the implementation of rest areas for the recovering of the main, direct beneficiaries of the project, namely the drivers (Ishamali, 2023). The transport of people and goods between the member states of European Union is achievable by implementing these road systems that also develop Europe's and the international economy as a whole (Pradhan & Bagchi, 2013). These firms of system help facilitate international trading stimulate tourist and economic growth factors as a whole. The economy of each area largest depends on the reduction of all possible cost, and those related to transport represent a large share of total cost. Moreover, considering the degree of recurrence of these costs, the reduction of operating times will have beneficial effect with high degree of propagating. European rules have the great advantage of connecting economically disadvantaged areas, but with a high degree of economic potential, with areas that are already mature, that are already developed and that can, through social cohesion, standardise these benefits at the level of the whole Europe (Bennett, 2019).

Deficiency in connecting all EU member states as well as other participating economies at the regional financial level is the main benefit regarding the

infrastructure and also the main reason for the project. Projects of this type can save travel times and transport costs for all economic agents that use the specific infrastructure. The proposed infrastructure model allows the ramping movement of people, goods, and other types of services. Well, these industrialised regions of the EU economically support less developed regions through social assistance and three investments that come from the economic activities in the developed areas that represent the main contributors to the local economy, the connectivity that is promised by these projects promises to unite these areas, reducing social disparity and increasing the degree of homogenisation in order to have sustained, consistent, and logical growth, as a result of which resources are used in the most optimal way. Highways that are accessible to reduce market forces promote private and trial activity. As a result, an increase in original competition makes Europe larger and more efficient a as a whole. These kinds of infrastructure are good reflections of the efforts made to nurture sustainability based on actual actions (Stănică & Stănică, 2024). Additionally, the utilisation of modern ecological, economic, and technological instruments which indicate economic progress and that shelter the creation of biomass, is included in the growth of electronic networks. One relevant example in this respect is the utilisation of ecological construction materials and electrifying roads to assist electric vehicles' functioning. They mention the above line with the European strategy that aims to reduce the polluting effect of greenhouse emissions of transport, also making it possible to incorporate cutting-edge technologies such as automated cars and integrated transportation systems (ITS) into the infrastructure industry. Within transport processes, the new infrastructure allows timely analysis of the transport-related activities by using advanced digital systems.

The possibility of measuring these parameters improves road efficiency, decreases the level of congestion in certain locations and at certain times, and increases the degree of safety of traffic participants, the development of comprehensive transportation systems such as this being facilitated by continuous innovation (Zuo et al., 2023). This measure in question is intended to support the transport policy at the European Union level. The stability that an integrated and efficient transport network can provide is a factor of economic growth. The extent of effectiveness posed by these types of investment is delineated by the sustainability of the network. For this reason, it is also the game of the European Union to develop this type of infrastructure as much as possible in order to connect the economic group polls and it balances the profitability of the coasts born by the disadvantaged royal territories. Another very important aspect is the activities related to the environment, mainly the reduction of carbon nations and those with the greenhouse effect, the reduction of material waste and the improvement of environmental damage caused by a large structure such as highway or road. The Trans Europe Transport Network (TEN-T) is a complex system that includes natal infrastructure at democratic economic level, but also at the European one, and local roads. From this perspective, the management of such a system cannot be done certainly and internationally only by a single organisation, but must be managed by local authorities, even if there is a higher authorised body that analyses and manages

the necessary bureaucracy processes. The development of a plan that includes modern means of transport for people in good another (secondary) objective of the policy to be achieved by the TEN-T project, which aims to connect all road systems at the European level. To meet these needs, together with the environmental biomass protection strategy, the solution of electronic road seems to be the ideal compromise between the ratio of the impact and effort, between the level of investment required and the possible results (Liang & Liu, 2020). In order to facilitate the transfer of the value resulting from the economic activities, the creation of such a route system contributes to the expansion of the network. A system that is better at resource optimisation has the potential to promote steady economic growth, especially when the level of cost optimisation determines the competitiveness of the system at the European level. Policies targeting a particular objective and do not depict any linkage with these end results have to be employed. In addition, they need to be brief and clear.

The governmental spending pertaining to the alleviation of the local economies of underprivileged areas and jobs will be permitted by the transport policy. Additionally, the inclusion of those areas that find themselves at the periphery of economies in the central flow, especially by extending the real network, seems to stand as a sustainability objective whose realisation can be conducted through current resources. Conversely, the electronic growth of an alternative framework for entrepreneurs who want to benefit from a homogenous logistic system and the standardised work system, regardless of the access area in the available resources, potentially promoting regional development banking access to markets in weak areas. It is possible to facilitate international trade, resource mobility, job security, and investment sustainability by reducing social inequality and limiting factors such as conscious, additional cost, or resources access through shared access (Bethany et al., 2023).

2. Problem Statement

This paper analyses the relationship between various factors of economic development using European road railways, particularly in the scope of this relationship, namely growth supported by logistic infrastructure. Highlighting the advantages that such a project would have underlined the impact of a process of homogenising the quality of mobility of production factors, even if the relationship between the efforts made and the results achieved is no longer determinable at a given moment due to the international course of the project and from the perspective of multi sourcing funding and monitoring the potential benefits such as the great importance at the local level, but also the European Union level. The basis of the studies is based on the direction of public policy that supports such projects. Due to the fact that they enable greater efficiency and connect much of the key development areas with minimal impact, road vehicles are considered development solutions. This makes them able to facilitate the rapid movement of people and goods (Crescenzi et al., 2016).

The building and maintenance of E-Roads is governed by strict safety quality standards, intended to safeguard steady performance and safety levels on the European continent, emphasising road safety and standards. Travel conditions have been enhanced by quality standards for all the users of roads, thus minimising traffic accidents. This type of standardisation can be seen on the E18 route, when running through Norway, Sweden and Russia and using sophisticated road sign and advanced traffic control systems. Improved traffic flows and cheaper transportation cost are due two ways in which the standardised road restructuring helps minimise negative all sourcing and promote economic efficiency.

The predictability and the improvement in investment expense transparency are two more advantages of these kinds of systems. By utilising green technologies and encouraging electric vehicles, the electronic route supports the European Union's sustainability goal and helps the use of greenhouse gas emissions in accordance with the country sustainable development policy. The European Union's commitments to cleaner and more energy efficient transportation is exemplified by the pilot programs like Germany's E-highway which permit electric trucks to refuel while driving (Crunțeanu et al., 2023).

An example of an active project that uses inductively charged battery technology to fuel electric vehicles while they are in motion is the Swedish Arlanda electronic road venture. Transportation plays a crucial role, the overall value of the items being decreased without compromising their quality, which result in road transportation costs. Neglected regional areas that produced little operating revenue can be included into the commerce mechanism by coordinating operations with the transportation procedure. For locals, employment opportunities may arise from the provision of logistical and storage services. Then, instead of depending on government funding, the local economy would grow organically as a consequence of consistent economic activity. Better connectivity also makes it possible to move around more.

At the macroeconomic and microeconomic levels, this point of view will be advantaged. Travelling for businesses or pleasure can both result in cost saving for individuals. With greater access to the family budget in either case, the person's general health would be significantly improved. Eventually, as mobility increases, firms will have greater access to the lab pool, improving macroeconomic efficiency. By lowering transportation costs, these liber market barriers with simultaneously less socially inequality and great benefits for a more competitive market (Bennett, 2019).

The basic concept is that the cost of operating a worker in the market is represented by the transportation costs. As a result, competitive advantage is limited to proximity because people who cannot afford these costs cannot find employment. Improving transportation and communication infrastructure with reducing equality are benefits involved (Anwar et al., 2024).

Nevertheless, the global electronic rule structure has some disadvantages and difficulties. In the first place, strains are generated through the implementation and maintenance costs posed by electronic road networks. In this sense, cost allocation is a point of concern and it is necessary to establish, knowing the involved benefits, the amount that should be spent by every economy in accordance with the

great immediate cost that the project involves. To find an ordinary denominator, there are several approaches. Most often, countries expressing rest in thinking part only in those portions that cross their borders. The project fails to meet its objectives, and the richer regions continue to prop growth even faster, severally disadvantageously impacting economies that cannot afford to participate in these initiatives (Stanică & Stănică, 2024).

Finding a middle ground in creating an unfair atmosphere that could increase social inequalities if a solution cannot not be found. As a result, conscious member states, particularly those with less developed economies, may find the price of improving current roads to bring them up to the European standards excessively costly, hence it is necessary to build a resilient banking system to ensure the continuity of the systems as well as sound governance, since this cost includes not only the initial construction but also regular maintenance, the modernisation of existing infrastructure, and introduction of new technologies (Otovescu & Otovescu, 2023).

For example, the modernisation of the E85 route in both Bulgaria and Romania poses significant financial and logistical challenges, highlighting the obstacles that poor member states of the European Union faced in providing funding for large construction projects. Opportunity cost economics says that huge spending is required to bring up to EU standards, they can divert funds from other urgent needs that help both private and microeconomic levels, for example the visible character of interest in developing educated public policies in order to extend the national infrastructure (Crescenzi et al., 2016).

Another problem is the gap in quality standards that exist between individual countries. There are many European standards for the development of road constructions, but nevertheless differences in the way the standards are implemented at the national level can lead to quality and operability difficulties as countries do not accept the same standard as their neighbours do. Therefore, it is only logical and natural for the states that want to start a project as big as developing an electronic road or a specific road that would connect well developed economic polls, to establish certain standards and to be sure that the bureaucracy process they are going to specifies very clearly which country is going to be responsible for what actions. Also, they have to determine the weight of the financial involvement that they are going to occur into (Liang & Liu, 2020).

Road quality varies and different definitions and approaches for different route. The types may impact the consistency of the electronic road network. Inaccuracy in the quality of infrastructure can lead to interruptions in customer service and make driving difficult. To do this, generally accepted methods must be established, recognised by both participating economies, and applied as a national standard of excellence. The issue that comes up again with the first topic, financial performance, is the growing economies which need to meet the same standard, when it comes to assets with higher quality expectation (Eaves et al., 2024).

In some countries, the roads can be kept up-to-date and to insure a high-quality, while in other countries, this cannot be achieved. This can cause travel to become

even riskier for users. They asserted that deviation can pose a drastic impact on traffic speed and the efficiency of global transport. In this situation, two factors need to be carefully considered. Firstly, to ensure that the first stations in the road construction are carried out in a monitored, transportation, and certified manner, and that resources are preserved to the maximum extent possible throughout the project, it is necessary to ensure that no adverse, environmental effect occurs. Similarly, the entire construction process needs to be configurated to guarantee that every method of work complies with the emission standards and environmental laws (Geng & Lo, 2023).

In the recent years, several types of previously unavailable manufactured goods have become available throughout discrete, sustainable techniques. Technological advances make this particularly possible. Moreover, car exhaust and other chemicals can be generated, thus triggering pollens and the damaging of local wildlife (Crunțeanu et al., 2023).

Ongoing maintenance and expansion operations have to be performed on highways to assure the safety and efficiency of any e-road. Nevertheless, this process may impose costs and complexity. Constant interaction between different member states. Road infrastructure must adapt to climate changes and increases cost as it must respond to severe weather, such as floods and temperature fluctuations (Ishamali, 2023).

The development of weatherproof roads is one of the new problems that thermal dynamic and climate change bring to the infrastructure. For instance, the roads that belong to areas with extreme temperatures or that are facing flood risk need to be optimised to properly face disasters, steps that raise the efforts needed maintenance and modernisation, designing, financing, and implementing an electronic road project, that also needs interstate cooperation, that may reflect difficulty or efficiency. Furthermore, due to certain objectives or financial difficulties, the implementation of the project may reflect a slow or uneven pace.

Cross border initiatives require the cooperation between member states, but political, economic, and bureaucratic obstacles can act as downgrading points and can slow down their application and increase costs. Apart from the advantages that they trigger for mobility and accessibility within Europe, electronic roads also bring some significant disadvantages. Several variables, including the high prices, bearing standards, the negative environmental impact, and the need for ongoing maintenance and coordination problems, must be taken into account to permit the continuous functioning of an electronic road network. To mitigate these issues in an efficient way, European policies must supply an adequate amount of funding, define roofing techniques, promote sustainable construction practices, and foster the partnerships between member countries (Nguyen et al., 2023).

3. Research Questions / Aims of the Research

The article aims to establish how the infrastructure of countries is able to influence their financial growth. In more detailed terms, the research scrutinises the probability of the existence of a linkage between a country's infrastructure and its general level

of economic growth. Romanian statistical data was used in the analysis and data collection. In order to carry out the analysis using the econometric application EViews, a set of three relevant variables were collected, and all of which have a direct relationship with the level of infrastructure in Romania. Indicators include GDP and its main component (production, expenditure, and revenue), final consumption aggregates by the ability and road length at the national, provincial and municipal levels. The first indicator, GDP, is chosen as the dependent variable, with total consumption and infrastructure size serving as the explanatory variables. The data comes exclusively from the Eurostat database and only the data available for Romania were taken into account for the analysis.

The GDP and final consumption value are calculated in countless euros, while the length of highways is measured in thousands of kilometres. To arrive at the same unit of measurement, the % change from year-to-year formula was used to each of the given inquiries. The time periods provided from the database were selected, ranging from 1995 to 2022. The analysis began in 1996 due to the application of the formula $(\Delta T1-\Delta T0) / \Delta T0 = \%\Delta$, which allowed for absolute value variations. As a result, the study includes a series of 28 queries, which is a little smaller than the 32 data points evaluated suitable for analysis.

The GDP development indicator is calculated by Eurostat by the sum of the gross value added of all resident production units plus taxes on products and less subsidies on products. The second indicator, the one related to the value of aggregate final consumption, is often calculated, as in this case, in terms of durability, which also includes in its analysis durable, semi-durable goods, and non-durable goods. Durable goods are products that have a long period of use, such as cars or household appliances. Expenditure is quantified by the sum of the value of purchases of durable goods by households. Durable goods are those that have an average useful life, such as clothes or shoes, and these expenses are similarly calculated by the sum of values purchased directly. The last element consists of nondurable goods that have the largest share, the least cycle of use, but as a result also have the highest consumption rate, namely goods that have a short life span are food or fuel. They are often associated with recurring consumption of products, that is, with those elements of strict necessity. The last indicator, called Length of state, provincial, and communal roads, represents the number of kilometres that has been completed from one period to another for each of the three categories of roads. State roads are administered nationwide and are the main transport arteries. The length is calculated by the sum of all sections of road that are classified by the state as national roads.

These segments have the largest printer because they significantly help reduce transportation costs by reducing reaction times, reducing transport costs, reducing consumption, and better mobility that allows companies to display their products at competitive costs in a wider geographical area. Provincial roads, the second element taken into account for the formation of the indicator, are roads administered at regional or provincial level. The length of these is calculated the same as the first. Communal roads are the segments of roads that are under the local or communal administration of governing bodies. This segment is also calculated as the length of

all road segments classified as such. The importance of the last two elements lies in the risky access that areas would have to the economic circuit. Reducing the length of transport routes and people's access to a well-developed infrastructure interconnected with several development points is an essential condition for local economic growth, which translates into economic growth at national level and automatically increases the standard of living of individuals.

Table 1. Eviews processing data

Dependent Variable: **Length of state, provincial and communal roads**				
Method: Least Squares				
Date: 26/05/24 Time: 16:25				
Sample: 1 28				
Included observations: 28				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.957816	0.709819	1.349382	0.1893
Length of state, provincial and communal roads	0.466871	0.198502	2.351965	0.0269
Final consumption aggregates	0.903410	0.049029	18.42601	0.0000
R-squared	0.932359	Mean dependent lime		9.546429
Adjusted R-squared	0.926948	S.D. dependent lime		10.31441
S.E. of regression	2.787801	Akaike info criterion		4.989340
Sum squared resid	194.2958	Schwarz criterion		5.132076
Log Likelihood	-66.85076	Hannan-Quinn criter.		5.032976
F-statistic	172.2987	Durbin-Watson State		1.761598
Prob(F-statistical)	0.000000			

Source: authors' own processing of data using Eviews software.

The first time, it is observed that the indicators of relevance meet the criteria. Thus, an adjusted violation of R squared of 92.69% shows that the two elements contribute to explaining changes in GDP to a large extent. As such, we need to analyse these variables. The intercept coefficient is 0.95781, but it is not significant due to a too high probability. The 95% confidence model indicates that when the other two variables are zero, the dependent variable has an estimated value of 9.95, but the value is not significantly different from zero. On the other hand, the other two variables are representative. The length of national, provincial, and communal roads has a coefficient of 0.466871, so an increase in this indicator by one unit of measurement, ceteris paribus, will lead to an increase of 0.46687 units in GDP. In addition, the aggregate final consumption will lead by increasing by one unit to an increase of 0.93034 unit of the dependent variable.

Given the high values of Log Likelihood, as well as the Akaike, Schwarz and Hannan-Quinn criteria, more appropriate matching patterns can be identified for explanations of changes in GDP. If the ample nature of the aggregate is taken into account, it is difficult to identify the best explanatory model, but the model

suggests the need to assimilate these variables as well for a more complete picture. However, the analysis passes the significance tests as will be observed. The regression model indicates that the two dependent variables are significant in explaining GDP variability. It is mentioned that the percentage of 92.69% does not represent the extent to which the variable factor is explained by the two elements, but rather the fact that infrastructure and aggregate consumption contribute to explaining GDP to a large extent.

After verification of the relevance tests, tests of normality of distributions were carried out. As a result, it is found that at 28 observations and two elements, according to the critical value tables at a confidence degree of 5%, a value of dl of 1.35 and du of 1.54 is observed. The Durbin Watson test value of 1.7615 is in the range (du < DW < 4 - du), indicating that there is no significant autocorrelation of the reconstructions. The asymmetry with slightly negative value indicates a slight asymmetry towards the left area of the graphical representation of the reconstructions. In addition, Kurtosis has a tangential value of three, i.e. the optimal threshold, which suggests a normal, bell-shaped distribution. In addition, the model can be considered correctly specified because the average value is close to zero (described in the table as a scientific value, not nominal), a phenomenon that occurs within the model that has correctly specified and outlined parameters.

The Breusch-Godregy test was used to test autocorrelation. The procedure was used to reinforce the Durbin Watson test values on the lack of autocorrelation and to obtain additional data on the dependence of indicators on residual values.

Note the high probability value of the F-statistical indicator of 0.004268 indicating the possibility of obtaining an equally high value under the condition of null hypothesis, i.e., if there is no autocorrelation. The value much higher than the threshold of means cp cannot refute the null hypothesis, so in other words, there is insufficient evidence to assert that there is a phenomenon of serial self-correlation within the reconstructions of the model. The high probability value of Obs*R-squared reinforces the rule. The values of the two variables are not significant, so they do not contribute significantly to the reconstruction model. Because the time series is annual, two LAG variables were used to run the analysis. The two values are large enough to state that neither the t-1 nor t-2 values of the same indicator have the property of influencing the present value of rewalls, at a residue probability level of (-1) in value of 0.9018 and for (-2) a probability value of 0.9824.

The next step towards completing the analysis and affirming that infrastructure is a vital element in the process of economic development is to test the phenomenon of heteroscedasticity, that is, to observe whether within the model there are variations of errors that are not constant over time. For this, the Breusch-Pagan-Godfrey test was run, being the most used and appropriate test where previous elements of the analysis did not raise suspicions about the character of the data.

All three representative results, namely those of F-statistical (0.494398), Obs*R-squared (1.065316), Scaled explained (0.871791) have a probability level higher than the reference level of 0.05, and as a result it is observed that there is not enough evidence to accept the heteroscedasticity phenomenon within the model, so the null

hypothesis cannot be rejected. The probability associated with the two explanatory factors suggests that they are not significant, indicating that the two variables do not explain the volatility of the rebuilding squares. In the current context, a small adjusted square R value is preferable because it suggests that adding variables to the model does not improve the explanation of redivision variability.

The last element in analysing the model is the multicollinearity check, which was done using the VIF (Variance Inflation Factor) test. For interpretation, Centered VIF was analysed, which is calculated using the coefficient of determination R2 obtained from the regression of each explanatory variable based on the other variables in the analysis model. According to the data, the values in both cases are very close to 1 and 2 respectively, suggesting the lack of problematic multicollinearity in the regression model, namely a value for Length of state, provincial and communal roads of 1.1023 and a value for Final consumption aggregates of 2.098, both for Centered VIF. As a result, each of the variables in the model adds unique information within the model and is not strongly correlated with each other. The reduced multicollinearity in the model assumes that the estimates of the coefficients in the regression model are reliable and do not distort the strong relationships between the explanatory variables.

5. Findings

The examination passes all model quality checks. Although there are not enough time periods to improve the accuracy of the models, the model is considered functional due to the high value of the agreement. Indicators result, architecture plays a role in generating gross value, added for the gross domestic product is directly and strongly related to the level of economic development. The quality of the indicator is defined in particular by the analysis of specific types of infrastructure that connect disadvantaged areas with developed areas. The creation of infrastructure has a significant impact on economic group. And increasing length is associated with an increase in the growth, domestic product of the country, highlighting the importance of infrastructure for the Romanian economy.

The importance of household consumption is fostering economic growth, and it is demonstrated by the large impact that aggregate final consumption, which includes the spending on durable, semi durable, and non-durable product, has on the gross domestic product of the country. The shows that the two explanatory variables (aggregated consumption length) play a significant part in explaining change, increasing consumption and infrastructure, support, economic growth, according to the positive and significant coefficient. The validity of the model confirmed by the economic test, which showed no significant autocorrelation in residues or regarding heteroscedasticity.

Findings shows that improving grow infrastructure increasing aggregated final consumption have a broad and beneficial impact on Romania's GDP growth. Investment structure increases access and connectivity, low transportation cost, and boosts economic activity. Aggregate final consumption, meaning household expenditures on durable, semi durable, and brittle product, is crucial for increasing

demand and for economic growth. The analysis discloses that both determinants have a considerable impact on the growth, domestic product growth, emphasising the importance of infrastructure consumption for Romania's prosperity.

6. Discussion

At European level, smart pavement, digital monitoring, automation, and green technologies are some examples of innovative technologies used in roads, construction, and maintenance. Some of the advantages of using new materials and smart paving processes are the minimisation of wear and the enabling of maintenance. Additionally, employing a digital monitoring system allows the timely identification and repairment of damages. Enabling an infrastructure project to have a lowered carbon impact can be achieved by the utilisation of recycled materials and other environmentally friendly instruments. Infrastructure is being built more sustainably thanks to automation and rotation, which also increase productivity and reduce its cost overtime. By addressing these issues and using modern technologies, Romania devises the modernisation of its road, infrastructure, thereby strengthening the economic expansion and improving the well-being of its population.

More focused and efficient forms of infrastructure imaging improve technology and higher quality processes with accelerated development, as the role of infrastructure in the process of economic growth has been demonstrated thus, it would be advantageous for developing economies to take up new technologies as soon as visible in order to surpass more established and financially stable societies. Innovative and state of the art approaches, including electronic roads systems, and all the technology that goes along with them, electrical infrastructure projects like the electronic highway in Germany, which was developed by Siemens technologies, and inductively charged project for electric trucks, expansion of the economy and in treatment of public welfare. Although electric trucks can travel on E-Roads just like any other vehicles, the process of fuelling them while they are moving is still being worked on. Pilot programs and other initiatives are researching at the moment the capability of checking certain road segments in order to allow electric trucks charging while they are in movement. This project includes the usage of inductive charging and the installation of overhead powerlines.

As one of the most cutting-edge projects in the sector, Siemens's German e-Highway serves as both a model of best practice and a cutting-edge project. Parts of the freeway have overheard electrical lines that enable pantograph equipped electric tracks to connect and charge in real time the potential of technologies currently being evaluated throughout pilot project that are being carried out in strategic freeway areas. With the exception of being transmitted from coils embedded in the road to receivers on the motor vehicles, inductive charging is a type of current infrastructure that, in its most basic form, combines regular highways with electrification lines used by trams and trolley buses.

Currently undergoing testing, this technology makes it possible to charge cars without requiring physical connections. A road statement in Stockholm was electrified with overheard wires for automobiles as part of a test project conducted

by Sweden. The study illustrates the use of pantographs by track to link the power lines and self-charge while in motion, in the long term, the union and its member states are examining the expansion of technologies in order to create a sustainable transport system. Modernising the electric trucks high has the potential to dramatically reduce carbon emissions and the dependence on fossil fuels, helping the united Europe to meet its sustainability goals. However, until these technologies come more widespread, electric cars will largely have to rely on the existing battery, charging infrastructure, such as fast charging station on and near highways and major traffic routes.

Conclusions

Romanian logistics development is a long-term process faced with a number of challenges and obstacles. The latter include deficiencies, such as an efficient or inefficient financing of project cost, a high-level of bureaucracy, corruption, and limited administrative capacity of the responsible institutions. Technical problems associated with complex geographical conditions, such as the mountain road project, lead to even higher costs, and problems associated with the equipment required to realise the project. There is a strong, high probability correlation between GDP growth and the aggregate final cost at the economy level. Road infrastructure constantly contributes to improving access to the free market and high mobility, reducing operating cost and travel time, elements that stimulate economic activity and increase the growth rate of gross domestic product. Equitable development between urban and rural development contribute to balanced growth.

The integration of intelligent road signals, such as the traffic light based on traffic levels, data, flow, automation, digital infrastructure, monitoring for maintenance procedures, and intelligent paving are some of the contemporary working techniques utilised in the construction industry. Utilising sustainable resources and technological work processes extends the infrastructure useful and improves the return on investment by reducing wear and tear overtime. Additionally, it permits the quick identification of destructions, whose rapid repairment can be performed to counteract harms to the infrastructure. In addition, the usage of rework processes, for instance recycled materials can minimise the carbon footprint of infrastructural projects. Operations such as repairments, periodic technical evaluations intended to maintain works in optimal parameters, automatisation, and rotation processes in the construction and maintenance industries trigger improved efficiency and reduced costs in the long run.

Such an approach with the neighbour Romania expedites the infrastructure modernisation process, towards creating a more environmentally, friendly, and energy efficient system. Examples of such integrated projects are the German electronic highway in the infrastructure design for electronic trucks, inductive charging as it is the project from Sweden.

The European project, E-Roads, holds major advantages. On one hand, it leads to greater mobility and more logical and coherent road connections. In addition, such project aims to reduce social inequality. Roads are necessary for international

trade and to promote economic group factors such as tourist or the mobility of production factors through fast, safe, and efficient transport, both locally and at the European level. Reducing waiting and operating time reduces cost at the microeconomic level, increases competitiveness, and increases individuals' financial resources by maintaining a higher disposable income. However, developing such a project also comes with its challenges. Investments for such projects are high and quality standards vary from country to country, for the European Union member states. This means that the results cannot be homogenised (through various compromises) and the quality cannot be the same for every participating country. The large investments assumed to modernise such infrastructure may result in funds being diverted from others, more important needs that would have a greater impact in the short term. Therefore, it is a long-term investment that requires sustained effort. Therefore, the infrastructure plays a crucial role in boosting the economy of Romania and the EU. The use of modern technologies and available financial resources represents the main starting point for the implementation of some supporting measures for a row development. Romania can be a direct beneficiary of these processes, both in terms of local investments and with the help of economic policies at the European Union level.

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