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The Impact of Road Transport on the Growth of Gross Domestic Product: Case Study of Tunisia

تأثير النقل البري على نمو الناتج المحلي الإجمالي: دراسة حالة تونس

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Abstract:

Many countries tend to focus on road transport as one of the most important sectors affecting economic growth. This study comes to answer the following problem: How the impact of land transport vehicles on GDP could be understood? To answer this problem, descriptive and analytical methods were used. This study aims to analyze the impact of road transport (freight and passenger transport) on Tunisia's Gross Domestic Product during the period 2005-2017. Based on GDP and the size of road transport vehicles in Tunisia, The study uses the simple linear regression method. The study suggests three main results: 1. The best case for the Tunisian economy is to increase its freight transport vehicles within an industry-based economy. 2. The worst case to be avoided is to increase its passengers transport vehicles within a service-based economy. 3. The more freight transport vehicles in a multi-sectorial Tunisian economy, the better the impact would be on GDP, when comparing the best and worst case scenarios.

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Keywords: Road transport; Transport Vehicles; Gross Domestic Production; economic growth; Tunisia.

ملخص:

تميل العديد من البلدان إلى التركيز على النقل البري على اعتباره أحد أهم القطاعات التي تؤثر على النمو الاقتصادي. تأتي هذه الدراسة لمعالجة الإشكالية التالية: كيف يمكن فهم تأثير مركبات النقل البري على الناتج المحلي الإجمالي لأجل تعزيز هذا الأخير بشكل أكبر؟ للإجابة على هذه الإشكالية، تم الاعتماد على المنهجين الوصفي والتحليلي. تهدف هذه الدراسة إلى تحليل تأثير النقل البري (نقل البضائع ونقل الركاب) على الناتج المحلي الإجمالي لتونس خلال الفترة الزمنية 2005 - 2017. بناءً على الناتج المحلي الإجمالي وعدد مركبات النقل البري في تونس، تستخدم الدراسة طريقة الانحدار الخطي البسيط. تقترح الدراسة ثلاثة نتائج رئيسية: 1. أفضل حالة للاقتصاد التونسي هي زيادة مركبات نقل البضائع ضمن اقتصاد قائم على الصناعة، 2. أسوأ الحالات التي يجب تجنبها هي زيادة مركبات نقل الركاب ضمن اقتصاد قائم على الخدمات، و3. كلما زاد عدد مركبات نقل البضائع في الاقتصاد التونسي متعدد القطاعات، كان التأثير أفضل على الناتج المحلي الإجمالي، عند مقارنة أفضل السيناريوهات وأسوئها.

الكلمات المفتاحية: النقل البري؛ مركبات النقل؛ الناتج المحلي الإجمالي؛ النمو الاقتصادي؛ تونس.

1. Introduction

Transport is considered to be one of the most influential and vibrant systems of the economy (Maciulis, Vasiliauskas, & Jakubauskas, 2009, p. 93), and a determining factor for economic development and growth (Limani, 2016, p. 123). Cities everywhere on the planet are growing rapidly, and thus the importance of road transport (freight and passengers transport) remains growing (Yildizgoz, 2016).

The overwhelming majority of studies on freight and passengers transport flows focus on analyzing passengers' flows and goods flows separately. Comparatively little is understood about cumulative treatment of passengers' and goods' flows organization. Thus there's a specific need for a far better understanding of the underlying mechanisms of all flows (Cieplinska, 2019, p. 453). Only a quality transport system that is built on a solid transport infrastructure contributes to the

development of industrial, agricultural and other productive and non-productive sectors of the national economy (Oxford Business Group, 2019). Thus, it is necessary to understand and analyze in detail freight and passengers transport, and support public passenger transport (Dedik, Cechovic, Gasparik, & Majercak, 2019, pp. 194, 195).

The Tunisian economy has faced many challenges, including, for example, the 2008 global financial crisis, the 2011 Arab Spring revolution, and so on. In any case, these recurrent economic problems have slowed economic growth (World Bank, 2019a), and yielded high unemployment rates (World Bank, 2019b).

The focus on the increase of the number of Transport vehicles in Tunisia during a period of time may be considered sufficient to know the impact of road transport on the country's GDP on a particular side, especially if we focus on the direction of such influence, to find which sectors it has had a good effect on and which other sectors it has not. And by focusing on which sectors are affected by the large volume of commodity and non-commodity transport vehicles, and which are not (Central Intelligence Agency, 2018).

Economists are well aware that the growth of the land transport sector is considered to be a sufficient reason for the growth of GDP, even if that is in an indirect way in most cases. The choice of independent and dependent variables is determined within the standard model, as will be illustrated by the study later, but through the relative importance of those variables in each of the road transport sector as an impact factor, and economic growth within the country as a factor affected by that, and therefore, it is due to economic theory and other tests, In addition, we find that we need to include element ε, which of course represents a group of unobserved factors, including those that influence their role in GDP, other than these, and some of which are errors in measuring the impact, where finally, we find that we need to deal with ε without deleting it, which is perhaps the most important element in the economic analysis of that particular effect.

2. Statement of the problem

Based on the above discussion, it is clear now that the problem tackled by the study is the lack and insufficient covering of both types of road transport (freight and passengers) impact on the economic growth in Tunisia, and the question to be answered is: is it possible to track the impact of change in freight and passengers road transport on Tunisian GDP? In some sense, two sub-questions emerge as follows: (1) How to understand the impact of road

transport vehicles on Tunisia's GDP?; and (2) How to get more stimuli to the economic growth in Tunisia, in terms of the impact of those transport vehicles involved? To answer the study's problem and its sub-questions, two main hypotheses were proposed as follows: (1) the change in freight transport has a different impact on GDP compared to passengers transport; and (2) Tunisian gross domestic product (GDP) that is predominately made of productive sectors stimulates growth differently than that in the case of a GDP predominately made of non-productive sectors, and therefore, economic growth in Tunisia needs to reveal its strengths and weaknesses, in order to raise the relative importance of road transport impact on GDP.

3. Significance of the study

It is clear that economic growth is one of the most important goals that governments constantly seek to achieve. Tunisia as an Arab developing country tends to focus more on its competitive economic sectors, but often, these countries remain trapped in sectors in which they have competitive advantages that exceed other sectors, and therefore, their focus remain on the relevant sectors, even in light of deteriorating economic conditions and bad international political conditions, ..etc. On this basis, we could say that the importance of the treated issue arises from the fact that there is a trend in Tunisia today regarding interest in developing road transport, which is one of the most important economic sectors, in terms of the possibility of its potential impact on the rest of economic sectors, along with its self-effect on economic growth itself, by directly stimulating the growth of GDP.

4. Objectives of the study

The current study aims at first to show the impact of road transport on Tunisia’s other economic sectors, and how is the nature of this impact on Tunisia’s important economic sectors compared to those with low relative importance. Then, the study aims to determine how could the economic growth in Tunisia be maximized through focusing on a particular domain of the Tunisian road transport sector.

5. Outline of the study

To address the above mentioned problem and achieve its objectives, the current study was organized into nine sections. Section 1 provides a brief discussion about how transport sector in Tunisia stimulates other economic sectors through the impact of road transport on GDP, and how this impact could be understood through pairing economic analysis and practical application, in order to build a standard economic model. Section 2 presents the

statement of the problem. Section 3 presents the significance of the study. Section 4 presents the objectives of the study. Section 5 presents an outline of the study. Section 6 provides data to be used in the study. Section 7 presents the methodology of the study. Section 8 presents a discussion of its findings. Finally, Section 9 is the conclusion. It summarizes the discussions on the implication of the study's findings.

6. Data of the study

The study area concerns Tunisia, officially the Republic of Tunisia. Tunisia is a country in the Maghreb region. Tunisia is bordered by Algeria to the west and southwest, Libya to the southeast, and the Mediterranean Sea to the north and east (Fadhil, Sangidu, & Manshur, 2017, p. 8). It consists of 24 Wilaya covering an area of 163.610 km2. These Wilayas are further divided into 264 districts, and further subdivided into baladiyats and Imadats (World Bank, 2014, p. 7). Tunisia had a population of 11,7 million inhabitants at the 2019 census (Arieff, 2020, p. 2), which gives a density of 71,64 persons/km².

Tunisia is an export-oriented country in the process of liberalizing and privatizing an economy that, while averaging 5% GDP growth since the early 1990s (AFDB and OECD, 2003, p. 311), has suffered from corruption that benefits the politically connected elites. As it accounts for lots of jobs and may be a major supplier to the food industry, the sector is of great significance in economic and socio-political terms. However, the contribution to GDP made by industrial (textiles, leather, food, electrical engineering) and services sector has increased disproportionately in recent years and has overtaken that of agriculture.

Tunisia has 19.232 km of roads, with three highways (Central Intelligence Agency, 2020): (1) A1 Tunis-Sfax (works ongoing for Sfax-Libya); (2) A3 Tunis-Beja (works ongoing Beja-Boussalem, studies ongoing Boussalem-Algeria); and (3) A4 Tunis-Bizerte. The railway network is operated by SNCFT and amounts to 2.135 km in total.

7. Methodology of the study

Along with the information available in official reports and statistics, the current study used R Statistical software in order to perform the regression model preferred. At first, in order to verify the conditions of regression, and although it is sensitive to the assumptions of its theoretical application, its application within the current study is not intended to be used in predicting GDP during a given period, therefore, finding the regression equation is sufficient, without the need to make sure that the conditions for the

regression application are met or not, given that the aim of this study is only to compare the impact of road transport (freight and passengers transport) as an independent variable, with GDP (GDP from manufacturing sector and GDP from services sector) as a dependent variable (Zeina, 2017, pp. 110-116). Tests to be applied for the purpose of validity of the regression model in prediction are: (1) review of sediments (errors) in various methods, such as the absence of a non-linear relationship between residuals and estimated y (Nonlinearity); (2) normal distribution of sediments (Normality); (3) Homogeneity of Variance; (4) lack of Outliers; and (5) Independence of Residuals (Zeina, pp. 110-116). In the view of this study with regard to the existence or lack of outliers, in such regression in question, it is evident that some values may be considered anomalies but they do not significantly affect the regression line estimation, and do not change its general direction, especially because the current study just aims to compare between simple linear regression lines.

On the other hand, in terms of the possible significant effect of the sample size towards the quality of the regression model, it is interesting to note that this study does not aim to calculate the multiple correlation because of the use of only one independent variable at a time, where the aim of the study is to know which independent variable affects a dependent variable. In terms of independence of residuals, they are supposed to be related to each other in a linear regression model, which means that the error in the future does not depend on the error in the past. In terms of testing such hypothesis, according to Durbin Watson test depicted in Figure 1, null hypothesis (H0: $p = 0$) versus the alternative hypothesis (H1: $p \neq 0$), the result shows that for the simple linear regression of the total road transport impact in predicting GDP of Tunisia, the condition of independence of residuals is actually fulfilled since $p > 0.05$.

Figure N° 1: Durbin Watson test output

```
> library(car)
> durbinWatsonTest(mouse.regression)
 lag Autocorrelation D-W Statistic p-value
   1       0.2732031     1.236249    0.09
 Alternative hypothesis: rho != 0
```

Source: Outputs of R statistical software.

On the other hand, it is important to note that the current study covered data of both Gross Domestic Product of Tunisia (GDP from services sector and GDP from industrial sector) as a dependent variable measured by million Tunisian dinars, and size

of road transport vehicles (freight and passengers transport) as an independent variable, and this is over the period from 2005 to 2017 as showed in Figure 2.

Figure N° 2: Output of linear Modular of Sample Data Used

```
> library(foreign)
> mouse.data
```

	Year	GDP	GDPs	GDPi	FTV	PTV	RTV
1	1	2224	131	2093	8000	25000	33000
2	2	2280	129	2151	8000	30000	38000
3	3	2485	125	2360	9000	30000	39000
4	4	2638	139	2499	10000	33000	43000
5	5	2556	133	2423	12000	35000	47000
6	6	2716	159	2557	14000	45000	59000
7	7	2736	158	2578	12500	35000	47500
8	8	2706	167	2539	12000	37000	49000
9	9	2798	169	2629	12000	35000	47000
10	10	2817	175	2642	13800	37100	50900
11	11	2795	181	2614	12400	36100	48500
12	12	2848	186	2662	14400	36400	50800
13	13	2859	192	2667	11391	35963	47354

Source: Outputs of R statistical software.

Note that:

GDP: Gross Domestic Product;

GDPs: GDP from services sector (Trading Economics, 2018a);

GDPi: GDP from industrial sector (Trading Economics, 2018b);

FTV: Size of freight transport vehicles;

PTV: Size of passengers transport vehicles;

RTV: Size of road transport vehicles (freight and passengers transport) (Knoema, 2018).

8. Discussion of findings

In this section, the impact of both types of road transport (freight and passengers transport) on GDP, and thus the order of the relative importance of freight and passengers transport impact on GDP by services sector and industrial sector will be shown.

8.1. The diversified impact of freight and passengers transport on GDP

According to the simple regression equation that represents the impact of road transport (freight and passengers transport) in Tunisia on GDP by both industrial and services sectors. As showed in Figure 3, the two parameters of the equation are respectively $\beta 0 = 1487.1$; and $\beta 1 = 0.0252$.

Figure N° 3: Simple Linear Regression between road transport and GDP

```
> library(foreign)
> mouse.regression <-lm(GDP~RTV, data=mouse.data)
> summary(mouse.regression)

Call:
lm(formula = GDP ~ RTV, data = mouse.data)

Residuals:
    Min      1Q  Median      3Q     Max
-258.33  -94.94   46.85   80.37  178.24

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) 1.487e+03  2.648e+02   5.615 0.000157 ***
RTV         2.521e-02  5.684e-03   4.435 0.001003 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 130.6 on 11 degrees of freedom
Multiple R-squared:  0.6413,Adjusted R-squared:  0.6087
F-statistic: 19.67 on 1 and 11 DF,  p-value: 0.001003
```

Source: Outputs of R statistical software.

The results show that there is a statistical significance that we observed, according to the statistics of the significance test for each of the two parameters, and that this is subject to the distribution of Student, according to its p-value that is less than 0.05. We also noted that the standard error for residuals is 187,635.03 on 11 degrees of freedom, as well as on the adjusted coefficient of determination that is about 0.6087 which means about 60.9% of change in GDP. This change is explained by the change in the size of road transport vehicles.

About the whole significance of the model, the value of F-statistic is 19.67 with 11 degrees of freedom for the denominator and with significance of $p < 0.010$. Thus the resulting impact could be determined by the following simple linear regression equation, where $\beta 0$ represents the constant, and $\beta 1$ represents the parameter estimate of RTV:

$$GDP = 1487.1 + 0.0252 * RTV$$

On the other hand, it is important to explain the impact of each type of road transport separately on GDP. On this basis, in terms of freight transport impact on GDP, as depicted in Figure 4, the simple regression equation for this shows that its two parameters are as follows: $\beta 0 = 1700.27$; and $\beta 1 = 0.0826$.

Figure N° 4: Simple Linear Regression between freight transport vehicles (FTV) and GDP

```
> library(foreign)
> mouse.regression <-lm(GDP~FTV, data=mouse.data)
> summary(mouse.regression)

Call:
lm(formula = GDP ~ FTV, data = mouse.data)

Residuals:
     Min       1Q   Median       3Q      Max
-141.281  -81.420    2.684   69.948  217.336

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) 1.700e+03  1.794e+02   9.479 1.26e-06 ***
FTV         8.264e-02  1.535e-02   5.383 0.000222 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 114.4 on 11 degrees of freedom
Multiple R-squared:  0.7248,Adjusted R-squared:  0.6998
F-statistic: 28.98 on 1 and 11 DF,  p-value: 0.0002223
```

Source: Outputs of R statistical software.

According to the statistic of the significance test for each of the two parameters, since p-value is less than 0.05 so the values are significant. In addition, the standard error is about 143955.14 on 11 degrees of freedom, and the adjusted coefficient of determination is estimated to be 0.6998 (70%). The value of F-statistic is 28.98 on 11 degrees of freedom for the denominator and with significance of $p < 0.002$. On this basis, the impact of freight transport in Tunisia on GDP could be determined according to the following simple linear regression equation:

$$GDP = 1700.27 + 0.0826 * FTV$$

Concerning the impact of passengers transport in Tunisia on GDP, based on Figure 5, the simple regression equation shows that its two parameters are as follows: $\beta 0 = 1509.8$; and $\beta 1 = 0.0329$.

Figure N° 5: Simple linear regression between passengers transport vehicles (PTV) and GDP

```
> library(foreign)
> mouse.regression <-lm(GDP~PTV, data=mouse.data)
> summary(mouse.regression)

Call:
lm(formula = GDP ~ PTV, data = mouse.data)

Residuals:
    Min      1Q  Median      3Q     Max
-275.01 -105.85   41.98   96.94  165.45

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) 1.510e+03  3.145e+02   4.800 0.000553 ***
PTV         3.292e-02  8.999e-03   3.658 0.003770 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 146.5 on 11 degrees of freedom
Multiple R-squared:  0.5488,Adjusted R-squared:  0.5078
F-statistic: 13.38 on 1 and 11 DF,  p-value: 0.00377
```

Source: Outputs of R statistical software.

According to the statistic of the significance test for each of the two parameters, since p-value is less than 0.05, the values are significant. The standard error is about 236064.32 on 11 degrees of freedom, and the adjusted coefficient of determination is estimated to be 0.5078. The value of F-statistic is 13.38 on 11 degrees of freedom of the denominator and with significance of $p > 0.0038$. On this basis, the impact of change in passengers transport in Tunisia on GDP could be determined according to the simple linear regression equation as follows:

$$GDP = 1509.8 + 0.0329 * PTV$$

based on the above obtained results, it is clear that the impact of freight transport vehicles shows and explains the change in the gross domestic product (GDP) of Tunisia more than road transport vehicles (both freight and passengers transport included), and that road transport explains a greater change in GDP in contrast with passengers transport vehicles, and this is according to the dependence on the determining factor, which is 70%, 60.9%, 50.8% for the three cases mentioned respectively. Now the question is: What is the greatest explanation of freight transport impact and the least passengers transport impact on GDP (both GDP from industrial and services sectors) of Tunisia?

8.2. The impact of transport vehicles on sectors of GDP

Examining the impact of the change on both freight and passengers transport on Tunisian GDP by both industrial and services sectors, Figure 6 shows the simple linear regression between the size of freight transport vehicles (FTV) and the gross domestic product from industrial sector (GDPi), and Figure 7 shows the simple linear regression between the size of freight transport vehicles (FTV) and the gross domestic product from services sector (GDPs).

Figure N° 6: Simple linear regression between FTV and GDPi

```
> library(foreign)
> mouse.regression <-lm(GDPi~FTV, data=mouse.data)
> summary(mouse.regression)

Call:
lm(formula = GDPi ~ FTV, data = mouse.data)

Residuals:
     Min       1Q   Median       3Q      Max
-139.191  -81.191    8.243   53.386  181.700

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) 1.635e+03  1.623e+02  10.074 6.87e-07 ***
FTV         7.464e-02  1.389e-02   5.373 0.000226 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 103.5 on 11 degrees of freedom
Multiple R-squared:  0.7241,Adjusted R-squared:  0.699
F-statistic: 28.87 on 1 and 11 DF,  p-value: 0.0002258
```

Source: Outputs of R statistical software.

Based on the Figure 6, the two parameters of the simple regression equation for the impact of freight transport vehicles are about β0 = 1635.06; and β1 = 0.0746 in relation to the GDP from industrial sector. Thus, the impact of change in the size of freight transport vehicles in Tunisia on GDP from industrial sector could be determined according to the simple linear regression equation as follows:

$$GDPi = 1635.06 + 0.0746 * FTV$$

Figure N° 7: Simple linear regression between FTV and GDPs

```
> library(foreign)
> mouse.regression <-lm(GDPs~FTV, data=mouse.data)
> summary(mouse.regression)

Call:
lm(formula = GDPs ~ FTV, data = mouse.data)

Residuals:
    Min      1Q  Median      3Q     Max
-28.237  -7.238  -0.229   5.763  35.636

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) 65.213095  26.079844   2.501  0.02948 *
FTV          0.008002   0.002232   3.585  0.00428 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 16.63 on 11 degrees of freedom
Multiple R-squared:  0.5388,Adjusted R-squared:  0.4969
F-statistic: 12.85 on 1 and 11 DF,  p-value: 0.004282
```

Source: Outputs of R statistical software.

As showed in Figure 7, the two parameters of the simple regression equation for the impact of freight transport vehicles are about β0 = 65.21, and β1 = 0.008 in relation to the GDP by services sector. Thus, the impact of change in the size of freight transport vehicles in Tunisia on GDP from services sector could be determined according to the simple linear regression equation as follows:

GDPs = 65.21 + 0.008 * FTV

Also, based on Figures 6 and 7, it is important to note that the standard error, test the value of F-statistic, and the determination parameter in the last case are less than in the case mentioned before. Noting that the statistic of the test F is only a significant value in both cases, based on its p-value, as well as the significance of the two parameters on the other hand, and the degree of freedom in the standard error and the test F, at the value of 11 for both cases.

Now, examining the impact of the change in passengers transport on Tunisian GDP from both industrial and services sectors, Figure 8 shows the simple linear regression between the size of passengers transport vehicles (PTV) and the gross domestic product from industrial sector (GDPi), and Figure 9 shows the simple linear regression between the size of passengers transport vehicles (PTV) and the gross domestic product from services sector (GDPs).

Figure N° 8: Simple linear regression between PTV and GDPi

```
> library(foreign)
> mouse.regression <-lm(GDPi~PTV, data=mouse.data)
> summary(mouse.regression)

Call:
lm(formula = GDPi ~ PTV, data = mouse.data)

Residuals:
    Min      1Q  Median      3Q     Max
-246.51  -80.62   55.36   77.39  134.50

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) 1.454e+03  2.813e+02   5.168 0.000309 ***
PTV         2.999e-02  8.050e-03   3.725 0.003350 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 131 on 11 degrees of freedom
Multiple R-squared:  0.5579,Adjusted R-squared:  0.5177
F-statistic: 13.88 on 1 and 11 DF,  p-value: 0.00335
```

Source: Outputs of R statistical software.

Based on the Figure 8, the two parameters of the simple regression equation for the impact of passengers transport vehicles are about $\beta 0 = 1454.01$; and $\beta 1 = 0.03$ in relation to the GDP by industrial sector. The value of F-statistic is 13.88 on 11 degrees of freedom, as well as registering a modified limiting factor with a value of 0.5177. Thus, the impact of change in the size of passengers transport vehicles in Tunisia on GDP from industrial sector could be determined according to the simple linear regression equation as follows:

GDPi = 1454.01 + 0.03 * PTV

Figure N° 9: Output of Simple linear regression between PTV and GDPs

```
> library(foreign)
> mouse.regression <-lm(GDPs~PTV, data=mouse.data)
> summary(mouse.regression)

Call:
lm(formula = GDPs ~ PTV, data = mouse.data)

Residuals:
    Min      1Q  Median      3Q     Max
-28.496 -14.597   2.036  10.770  30.952

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) 55.798582  42.592045   1.310   0.2169
PTV          0.002927   0.001219   2.402   0.0351 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 19.84 on 11 degrees of freedom
Multiple R-squared:  0.344, Adjusted R-squared:  0.2843
F-statistic: 5.768 on 1 and 11 DF,  p-value: 0.03513
```

Source: Outputs of R statistical software.

Based on the Figure 9, the two parameters of the simple regression equation for the impact of passengers transport vehicles are about $\beta 0 = 55.8$; and $\beta 1 = 0.0029$ in relation to the GDP from services sector. The value of F-statistic is 5.77 on 11 degrees of freedom, as well as registering a modified limiting factor with a value of 0.2843. Thus, the impact of change in the size of passengers transport vehicles in Tunisia on GDP from services sector could be determined according to the simple linear regression equation as follows:

$$GDPs = 55.8 + 0.0029 * PTV$$

At the end, it could be said that the change in freight transport vehicles size has a very important impact on GDP from industrial sector, unlike GDP from services sector. Although this result is very logical, it is relatively illogical to find in contrast, that the change in the size of passengers transport vehicles impact is more important on GDP from industrial sector and not from services sector. However a paradox emerges, the change in passengers transport vehicles size has a very important impact on GDP from industrial sector. Also, it must be noted that the relative importance of the change in freight transport vehicles size increases its interpretation of the GDP resulting from both sectors concerned more than the GDP generated only by industrial sector.

On the other hand, it is important to note that the impact of the change in passengers transport vehicles size on the GDP produced by industrial sector outweighs the impact of the change in freight transport vehicles size on the GDP produced by services sector. So, it could be said that the impact of the change in passengers

transport vehicles size on the GDP of the industrial sector exceeds the impact of passengers transport vehicles size on GDP from services sector, whereas the impact of freight transport vehicles size on the GDP from services sector is less significant than the impact of freight transport vehicles size on the GDP from industrial sector.

Regarding the impact of the change in freight transport vehicles size on the GDP resulting from industrial and services sectors that exceeds the impact of the change in freight transport vehicles size on the same mentioned GDP, it also outweighs the impact of the change in total transport vehicles size (both freight and passengers transport vehicles) on the GDP from industrial or services sectors, and exceeds the impact of the change in the total transport vehicles on the GDP from both sectors concerned (industrial and services sectors together). On the other hand, the impact of the change in passengers transport vehicles size on the GDP from industrial and services sectors combined exceeds the impact of the change in the total transport vehicles size on the GDP from services sector, however, it remains less significant than the impact of the change in the total transport vehicles size on the GDP resulting from both industrial and services sectors.

CONCLUSION

By focusing on the use of road transport in commercial and economic life in Tunisia, and pushing economic growth, it could be said that this could only be optimized through effective and sustainable strategies. If the Tunisian economy is considered to consist of two sectors, in which the industrial sector reflects all other productive sectors, and the services sector is translated into it by the rest of the other non-productive sectors, then the relative importance of the impact of change in road transport vehicles size (both freight and passengers transport) on the Gross Domestic Product (GDP) of Tunisia is revealed with its limited determinants. In this context, the best case in which the Tunisian economy can flourish is to include a larger size of freight transport vehicles within an economy based on industrial sector, while the worst case to be avoided is to include more of passengers transport vehicles within a services-based economy. Considering that the Tunisian economy is essentially a multi-sectorial economy, the more freight transport vehicles are at the expense of passengers transport vehicles, the better the impact on GDP than the aforementioned worst case, but less favorable than the previously mentioned optimum situation. If the Tunisian economy remains a multi-sectorial economy, and tends to be marked by the same freight and passengers transport vehicles size, then this case is considered a good case, but it is not the desired situation.

At the end, the study suggests that the direction of the Tunisian economy should be altered to focus on the economic sectors in which it has a comparative or competitive advantage, especially where some of them have not provided a good financial return, in exchange for the deteriorating economic conditions surrounding, or negative international political conditions affecting them at some point. Also, it is necessary to focus on the development of economic sectors with high productivity, either directly as it is known, or by influencing them by the road transport sector, which is considered a sector with the advantage of indirect impact on the gross domestic product (i.e. through impact on those sectors other than the road transport sector). Greater attention must be paid to what strategies are to be pursued to drive Tunisian economic growth through the road transport sector, given that the latter's determinants (the road transport sector) are primarily fundamentally different from one another, towards the determinants of Economic growth (other sectors of the economy).

Bibliography List :

AFDB and OECD. (2003). *Tunisia.* France: OECD Publishing, African Economic Outlook.
Arieff, A. (2020). *Tunisia: In Brief.* The USA: Congressional Research Service.
Central Intelligence Agency. (2018). *The World Factbook: Tunisia, Economy*. Récupéré sur Central Intelligence Agency: https://bit.ly/3rtMiaa (Consulted on 02/06/2020)
Central Intelligence Agency. (2020). *The World Factbook: Tunisia, Transportation*. Récupéré sur Central Intelligence Agency: https://bit.ly/3eonSex (Consulted on 02/06/2020)
Cieplinska, J. (2019). The Role of Transport Organisers in the Integration of Passengers and Goods Flows Within Urban Areas. *Transportation Research Procedia. Vol 39*.
Dedik, M., Cechovic, T., Gasparik, J., & Majercak, J. (2019). Milan Dedík et al. Rationalization of the Passenger Transport System as an Important Transport System. *13th International scientific conference on sustainable, modern and safe transport*. Slovak Republic, May 29-31, 2019.
Fadhil, A., Sangidu, S., & Manshur, F. (2017). Changes of Religious Behaviours: Sociological Analysis of Literature of the Novel Al-Thaliyâniy by Syukrî Al-Mabkhũt. *Jurnal Studi Al-Qur'an, Vol 13, No 1*.
Knoema. (2018). *World Motor Vehicle Sales by Country and Type: Tunisia 2005-2017*. Récupéré sur Knoema: https://bit.ly/30WVKXI (Consulted on 18/04/2020)
Limani, Y. (2016). Applied Relationship between Transport and Economy. *IFAC-PapersOnLine. Vol 49: 29*.
Maciulis, A., Vasiliauskas, A., & Jakubauskas, G. (2009). The Impact of Transport on the Competitiveness of National Economy. *Transport. Vol 24: 2*.
Oxford Business Group. (2019). *The Report: Tunisia 2019, Transport Summary*. Récupéré sur Oxford Business Group: https://bit.ly/2P3zK7Z (Consulted on 03/03/2020)
Trading Economics. (2018a). *Tunisia GDP from Utilities: 2005-2017, Annual by every July*. Récupéré sur Trading Economics: https://bit.ly/2P8op6q (Consulted on 03/12/2019)
Trading Economics. (2018b). *Tunisia GDP from Manufacturing: 2005-2017, Annual by every July*. Récupéré sur Trading Economics: https://bit.ly/2CPtA95 (Consulted on 04/12/2019)
World Bank. (2014). *Tunisia: Breaking the Barriers to Youth Inclusion.* The USA: World Bank.

World Bank. (2019a). *GDP Tunisia: 2000-2018*. Récupéré sur World Bank Group: https://bit.ly/2DjTmSM (Consulted on 05/01/2020)
World Bank. (2019b). *Unemployment: Tunisia 2000-2018*. Récupéré sur World Bank Group: https://bit.ly/2DeoEu3 (Consulted on 19/02/2020)
Yildizgoz, K. (2016). *The Contribution of Public Transport to the Competitiveness of Cities.* Turkey: Advancing Public Transport.
Zeina, M. (2017). *Statistical programming language R. [In Arabic]*. Syria: Unknown publisher, 110-116.