INFLUENCE OF THE REGISTRATION OF VEHICLES UPON THE DEVELOPMENT OF THE ROMANIAN OIL INDUSTRY

Adi Eleonor Trifu[1]

ABSTRACT

In order to survive the turbulence of the environment, managers of companies are called into question to develop sustainable ways of adaptation, which it will improve resistance against a potential perturbation and the response to the modification of the economic environment.

The most recent important economic turbulence it was represented by the Economic Crisis, which affected all economic activities, including oil industries, by reducing the demand for crude oil, but also the demand for fuels. This event puts the companies in a special situation, because their analysis of the sustainability of the development of the oil specifically was made with the premise that oil demand will remain above 100 USD per barrel. The fuel demand slowly declines in the period of the Financial crisis mainly because of low need for transport services for goods and persons.

The main objective of this paper is to identify the influence of some environmental factors like the evolution of the registrations of new vehicles, registrations of second hand vehicles and re-registrations of vehicles. The goal is to of research provides evidence that the influence exists. Data was gathered from companies' quarterly reports, statistical yearbooks and other databases. The methods used are simple linear regression, using one x-variable a time, because of the limited data, in order to evidence the relation with the function Y represented by quarterly sales revenues.

KEYWORDS: *crisis, regression, vehicles, sustainability, sales revenues,*

JEL CLASSIFICATION: C21, E30, G01 N70,

1. INTRODUCTION

In the present situation of the global economy, the turbulent environment factors challenge the sustainable development of the companies, by directly or indirectly ways by having an impact upon the economic activities. The main weakness of the sustainable developing strategies is that are made for long term economic results, resulting that is vulnerable against the shocks of the external factors. In order creating strategies for a sustainable development, companies must identify the possible threats or opportunities of the environments, by determining the factors that provoke them (Nicolescu, 2003). Moldoveanu (2007) affirmed that he impact can be negatively for companies that are unprepared in case of a strong turbulence or positively for companies that are prepared and know what strategy must use in the case of need. Nonetheless, even a company is prepared to face the challenges of the environment with sustainable and flexible strategies, strong change or perturbation "will always have a great impact on economic results of the organization" (Graetz, 2006).

The perturbations of environmental factors like the 2008s Financial Crisis, Eurozone Crisis, Middle Eastern revolutions for regional companies, and the events in Ukraine represented powerful triggers

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[1] Bucharest University of Economic Studies, Romania, trifu_adi_eleonor@yahoo.com

of change to the business environment. With the trigger of the Financial Crisis of 2008, most the organizations, private and public, realized that their performances are not only influence by the economic branches that are in direct contact. The phenomenon of contagion, that spread the negative effects of the Financial Crisis throughout the economic branches and geographic areas, proved that even an economic domain that does not have a direct contact with the organization could provoke serious consequences. The Financial Crisis had more than one case (like the subprime crisis, USA house bobble, deregulation and so on), the trigger began with the collapse and bankruptcy of the Lehman Brothers on 15 September 2008. The shock that was provoked affected the financial markets, first in the United States of America, then around the world, resulting in hindering the loan conditions for the consumption of the population and for organizations (private and public). Because of this policy, the consumption of goods and services for the population reduces resulting in reducing the sales of companies.

The Financial Crisis of 2008 struck the oil companies around the world with a heavy blow, mainly because their strategies of sustainable development have been made for a high demand for energy. The abrupt fall of oil prices and gas prices over the long period of boom, known as the Energy Crisis of the 2000s, puts the most of these companies in a difficult situation because their investments in the increasing of oil production capacity, in the acquisition of the oil reserves or entering in alternative energy markets (solar or wind energy). The investments have been made with interest rates for high revenues from the selling of energy products.

The Energy Crisis of 2000 started in 2003 with the event of trigger of Second Gulf war and because of growing demand for energy by the big emerging economies like China and India (OPEC, 2010), breaching the historical level of 30 USD/barrel (Ramaprasad Bhar and Malliaris A.G., 2011). This period was regarded by most of the energy companies as an opportunity to increase the capacity of production of all energy resources, both conventional and unconventional. The peak of this period was in July 2008 when the Brent oil price reached approximately 140 USD/ barrels (EIA, 2008). When the Financial Crisis began, the most of the oil companies, institutions (OPEC and EIA, 2009) and specialist planning were made with forecasts that oil prices will still grow, mainly because of the belief that the financial problem could contained and the crisis would not have a contagious effect. Resulting that most of the energy companies were caught unguarded, because of the strategies made for a price bigger than 100 USD/barrel and because the majority of investments, in growing the production capacities, was made with loans that have lower interest rates (OPEC 2009).

Grant (2003) described the strategic planning for sustainable development used by most of the oil companies in case of a turbulent environment. Grant analysed the strategic planning evolution of major oil companies between 1970 and 2000 by using EBIT data for companies like Exxon, Chevron, British Petroleum and others. Nonetheless, this strategic planning was inefficient mainly because of the great impact, which Financial Crisis had upon the entire economic system. The strategic planning, described by Grant, was mostly for small or medium turbulence that happens one short period, not powerful as an economic crisis.

Like all economies of the world, the Romanian economy was strongly perturbed by the financial crisis of 2008, even effects were seen a year later than in the United States. The Crisis was mainly propagated in Romanian through international institutions as banks, investment funds, but also through reduction of goods and services. The Romanian petroleum industry was mainly affected by the Economic crisis because of reducing demand for petroleum products or the decline complementary industries like the road transportation (Figure 1).
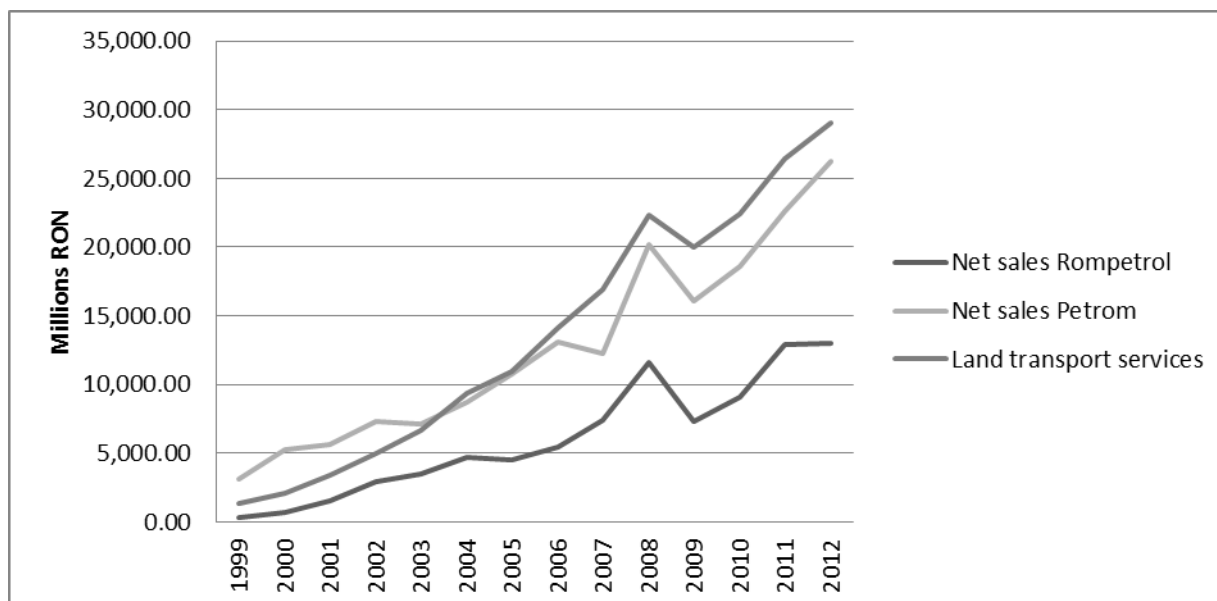
Figure 1. OMV PETROM and ROMPETROL net sales and Land transport services
Source: adapted from the 2007-2014 annual reports of OMV PETROM and ROMPETROL,
Thomson Reuters Eikon, National Institute of Statistics. Romanian Statistical Yearbook 1990-2012

3. Methodology

The methodology used is a simple linear regression, because of the small amount of observation provided by the quarterly reports of the selected companies (30 observation) Direction for Road Driving Licenses and Vehicle Registration (DRPCIV) statistics. The external factors are the registration of the new vehicles, registration of second hand vehicles and re-registration of vehicles. The software used for regression calculation is Eviews 7, using the Least Square method for the calculation of the regressions. The purpose of these regressions is to identify if exists a relation between the evolution of the numbers of types of vehicles and the sales of the companies. The confidence level of 95% is represented by the probability by the value than 0.05. (Kenney, J. F. and Keeping, E. S., 1962)

All used time series will be separately analyzed the stationarity by using the unit root test : Augmented Dickey-Fuller test statistic (1984). The Null hypothesis of the test is that the time series sample is not stationary. In order to reject the Null hypothesis, the time series sample must have the probability value less the 0.05. If the probability value of the time series is above 0.05, the time series must be stationarized by using the first difference.

The formula for the simple linear regression function is taken from Mittelhammer, R. C. (1996) book Mathematical Statistics for Economics and Business:

$Yi=a +b*Xi+\varepsilon i$

Legend:

Yi – dependent variable
Xi – exogenous variable
εi -residuals
a - constant
b - Intercept of the Xi variable

The null hypothesis (H0) is: "the exogenous variable does not have an influence on the dependent variable" (Ezequiel). The alternative hypothesis (H1) is: the exogenous variable has an influence on the dependent variable. In order to reject the null hypothesis and to accept the alternative hypothesis, the probability value must be the under the 0.05.

4. Study case

The case study tries to analyse the influence of external factors like registration of the new vehicles, the registration of second hand vehicles and the re-registration of vehicles in Romania on the quarterly fuel sales revenues of the Romanian petroleum companies. Data of the companies were collected from the published quarterly reports and the Thomson Reuters Eikon platform. Data on the evolution of the registration of the new vehicles, registration of second hand vehicles and re-registration of vehicles was gathered from the Direction for Road Driving Licenses and Vehicle Registration (DRPCIV) statistics. Auto vehicles consisted of four categories: cars, vans, buses and microbuses. Due to the reduced number of observations, the regressions of this research must have the value of the R-squared above 0.3. (Maddala, 1992)

The study case limitations are represented by a small number of observations, the total number of registered vehicles in Romania, the registration for other types of vehicles, de-registered vehicles, the consumption of fuels for every category of analysed variable, the distance travelled by the vehicles and the market share of the analysed companies.

The data, used in the study case, are presented in the tables below:

Table 1. Quarterly net sales revenues of PETROM and ROMPETROL

Periods	Sale revenues PETROM (thousand RON)	Sale revenues ROMPETROL (thousand RON)
Mar-2007	2,757,491	459,213
Jun-2007	2,676,286	457,539
Sep-2007	3,238,086	650,113
Dec-2007	3,612,515	674,828
Mar-2008	3,718,804	877,806
Jun-2008	4,554,765	1,218,800
Sep-2008	4,733,251	1,349,084
Dec-2008	3,743,906	1,153,389
Mar-2009	3,870,010	1,631,913
Jun-2009	3,458,090	1,813,006
Sep-2009	4,538,230	2,057,708
Dec-2009	4,223,400	1,924,254
Mar-2010	3,933,800	2,049,926
Jun-2010	4,409,390	2,496,119
Sep-2010	4,814,930	2,384,188

Periods	Sale revenues PETROM (thousand RON)	Sale revenues ROMPETROL (thousand RON)
Dec-2010	5,457,570	2,077,982
Mar-2011	4,978,090	2,635,002
Jun-2011	5,292,990	3,292,637
Sep-2011	5,952,540	3,501,388
Dec-2011	6,390,030	2,683,183
Mar-2012	6,004,990	3,083,059
Jun-2012	6,196,990	3,466,068
Sep-2012	6,983,300	3,294,355
Dec-2012	7,072,850	3,320,897
Mar-2013	5,788,930	2,483,775
Jun-2013	5,787,180	2,967,815
Sep-2013	6,574,200	3,699,228
Dec-2013	6,034,910	3,941,141
Mar-2014	5,295,930	3,513,256
Jun-2014	5,423,330	3,687,543

Source: collected from quarterly reports 2007-2014 of OMV PETROM and ROMPETROL and Thomson Reuters Eikon data base

Table 2. New vehicle registrations

Periods	New car registrations	New bus registrations	New microbus registrations	New vans registrations
Mar-2007	59873	233	667	9372
Jun-2007	83536	317	297	11259
Sep-2007	89157	202	314	9740
Dec-2007	80024	257	512	10417
Mar-2008	66469	812	990	9864
Jun-2008	75801	533	820	12723
Sep-2008	78662	233	372	10124
Dec-2008	57007	213	840	8136
Mar-2009	29125	94	333	4690
Jun-2009	33532	115	99	3961
Sep-2009	25984	35	84	3071
Dec-2009	27375	19	124	5823
Mar-2010	8819	25	155	1088
Jun-2010	27817	29	67	1998
Sep-2010	25944	18	81	2220
Dec-2010	32193	102	124	3181

Periods	New car registrations	New bus registrations	New microbus registrations	New vans registrations
Mar-2011	9679	26	207	2503
Jun-2011	22079	24	79	3462
Sep-2011	24123	29	104	3579
Dec-2011	25828	15	110	3655
Mar-2012	13965	18	275	2803
Jun-2012	19378	33	145	3339
Sep-2012	15785	36	270	3458
Dec-2012	17308	151	657	2593
Mar-2013	11233	83	313	2581
Jun-2013	13316	30	77	2591
Sep-2013	16524	42	102	2996
Dec-2013	16637	76	157	3690
Mar-2014	13345	51	93	2933
Jun-2014	17880	63	148	3450

Source: adapted from the Direction for Road Driving Licenses and Vehicle Registration (DRPCIV) statistics

At the first view, it can be observed that the registration for all new vehicles suffered a powerful decline in the last quarter of 2008 and first quarter of 2009. The decline was probably influenced by the Financial crisis contagion on the Romania economy, the unsuccessful the implementation, by the government, of the environmental tax and the registration of vehicles in Bulgaria, because of lower taxes and lower costs for the third party insurance.

Table 3. New vehicle registrations

Periods	Second hand car registrations	Second hand bus registrations	Second hand microbus registrations	Second hand vans registrations
Mar-2007	14252	188	57	4138
Jun-2007	23460	202	56	4647
Sep-2007	46263	180	113	4996
Dec-2007	39867	197	134	4715
Mar-2008	35616	329	452	6108
Jun-2008	32633	283	332	6103
Sep-2008	92996	394	180	7861
Dec-2008	132546	371	99	8023
Mar-2009	76790	138	29	4258
Jun-2009	52288	122	15	3476
Sep-2009	36100	97	18	2248
Dec-2009	47660	160	7	2967
Mar-2010	35414	134	17	2780
Jun-2010	41111	107	12	2141
Sep-2010	46292	139	13	3193
Dec-2010	88000	353	30	5709

Periods	Second hand car registrations	Second hand bus registrations	Second hand microbus registrations	Second hand vans registrations
Mar-2011	31440	210	21	5570
Jun-2011	13004	75	20	6728
Sep-2011	21692	178	11	8149
Dec-2011	28352	204	13	10584
Mar-2012	35299	146	23	9944
Jun-2012	38430	187	19	10386
Sep-2012	47395	173	23	11075
Dec-2012	53826	236	61	11843
Mar-2013	53029	239	48	11170
Jun-2013	48706	157	16	10412
Sep-2013	64342	161	25	11401
Dec-2013	55775	254	24	11739
Mar-2014	46866	320	30	11072
Jun-2014	51767	228	26	11485

Source: adapted from the Direction for Road Driving Licenses and Vehicle Registration(DRPCIV) statistics

The all types of second hand vehicle registrations suffered a decline from the beginning of the 2009 to the end of 2010. In addition, the registrations for the second hand van was the only type of registration that surpassed, in the third quarter of 2011, the number of registrations from last quarter 2008. The decline of registrations of second hand car was triggered mostly by the same factors like the decline of registrations for new cars

Table 4. Second hand vehicle re-registrations

Periods	Second hand car re-registrations	Second hand bus re-registrations	Second hand microbus re-registrations	Second hand vans re-registrations
Mar-2007	118904	357	761	11366
Jun-2007	95462	289	627	9291
Sep-2007	97154	395	530	9287
Dec-2007	124727	341	497	9105
Mar-2008	114055	401	903	13010
Jun-2008	88066	491	850	9460
Sep-2008	77997	240	415	9381
Dec-2008	73265	265	600	9620
Mar-2009	86735	252	496	10988
Jun-2009	85660	263	437	10847
Sep-2009	86771	191	429	11144
Dec-2009	90229	199	438	11618
Mar-2010	92493	248	512	13718
Jun-2010	91597	285	469	9494
Sep-2010	91898	234	525	13040
Dec-2010	101262	331	510	13216

Periods	Second hand car re-registrations	Second hand bus re-registrations	Second hand microbus re-registrations	Second hand vans re-registrations
Mar-2011	99548	363	663	14303
Jun-2011	98536	211	444	13768
Sep-2011	97074	199	449	13058
Dec-2011	116281	406	640	16052
Mar-2012	79941	224	506	12612
Jun-2012	82746	309	474	12285
Sep-2012	90935	220	347	11766
Dec-2012	102987	474	625	13953
Mar-2013	48405	181	308	8884
Jun-2013	49441	251	318	9307
Sep-2013	54692	223	320	8719
Dec-2013	53015	253	347	9395
Mar-2014	50631	200	407	11366
Jun-2014	53950	140	289	9291

Source: adapted from the Direction for Road Driving Licenses and Vehicle Registration (DRPCIV) statistics

The re-registration of vehicles did not suffer a substantial impact at the 2009-2011 period. In the first quarter of 2013, the car re-registrations suffered a decline from 102987 re-registrations to 48405 re-registrations, in December 2012. The same phenomenon is observed also for buses and microbuses, where the registration number declines with almost a half of the previous period.

Table 5. Augmented Dickey-Fuller test statistic

Variables	t-Statistic	probability value
Sales revenues PETROM	-1.905942	0.3251
Sales revenues ROMPETROL	-1.397175	0.5680
New car registrations	-5.810908	0.0001
New bus registrations	-2.288190	0.1822
New microbus registrations	-2.920981	0.0551
New van registration	-1.603325	0.4682
Second hand car registrations	-3.131576	0.0352
Second hand bus registrations	-3.487732	0.0160
Second hand microbus registrations	-2.065023	0.2593
Second hand vans registrations	-0.744627	0.8196
Second hand car re-registrations	-2.210167	0.2071
Second hand bus re-registrations	-4.649285	0.0009
Second hand microbus re-registrations	-3.623600	0.0114
Second hand vans re-registrations	-1.675923	0.4320

Source: made by the author

From the Augmented Dickey-Fuller test statistic, resulted that only stationary time series are the new car registrations, Second hand car registrations, Second hand bus registrations, Second hand bus re-registrations, and second hand microbus re-registrations. The rest of time series samples must be stationarized by using the first difference and tested again with the Augmented Dickey-Fuller test statistic.

Table 6. Augmented Dickey-Fuller test statistic in the first difference

Variables	t-Statistic	probability value
Sales revenues PETROM	-5.404599	0.0000
Sales revenues ROMPETROL	-5.738302	0.0001
New bus registrations	-5.780771	0.0001
New microbus registrations	-7.123518	0.0000
New van registration	-5.649912	0.0001
Second hand microbus registrations	-4.903075	0.0005
Second hand vans registrations	-4.494258	0.0014
Second hand car re-registrations	-6.313489	0.0000
Second hand vans re-registrations	-9.055999	0.0000

Source: made by the author

From the Augmented Dickey-Fuller test statistic in the first difference resulted that the rest of the time series samples can be stationarized by using the first difference.

The regression equations for the analysed companies are:
d(PETROM) = C(1) + C(2)*d(NVR) + C(3)*d(NMBR) + C(4)*NCR + C(5)*d(NBR) + C(6)*SHBR + C(7)*SHBRR + C(8)*SHCR + C(9)*d(SHCRR) + C(10)*d(SHMBR) + C(11)*SHMBRR + C(12)*d(SHVRR) + C(13)*d(SHVR)
d(PETROM) = C(1) + C(2)*D(NVR) + C(3)*d(NMBR) + C(4)*NCR + C(5)*d(NBR) + C(6)*SHBR + C(7)*SHBRR + C(8)*SHCR + C(9)*d(SHCRR) + C(10)*d(SHMBR) + C(11)*SHMBRR + C(12)*d(SHVRR) + C(13)*d(SHVR)

Legend

d(variable) – first difference of variable
C(1) – constant
C(2), C(3), C(4), C(5), C(6), C(7), C(8), C(9), C(10), C(11), C(C12), C(13) – intercept of the exogenous variables
PETROM- Sale revenues PETROM
ROMPETROL -Sale revenues ROMPETROL
NBR -New bus registrations
NCR - New car registrations
NBS - New bus registrations
NBR -New microbus registrations
NVR -New van registration
SHCR - Second hand car registrations
SHBR - Second hand bus registrations
SHMBR - Second hand microbus registrations
SHVR - Second hand van registrations
SHCRR - Second hand car re-registrations
SHBRR - Second hand bus re-registrations
SHVBRR - Second hand microbus re-registrations
SHVRR - Second hand van re-registrations

The results of Ordinary Least Square method, for OMV PETROM regression, are described in the table below:

Table 7. Ordinary Least Square method for OMV PETROM

Variable	Coefficient	Std. Error	t-Statistic	Probability
C	-320328.9	539903.0	-0.593308	0.5613
D(NVR)	32.18116	77.27815	0.416433	0.6826
D(NMBR)	-599.2109	584.4098	-1.025327	0.3205
NCR	0.586124	5.160180	0.113586	0.9110
D(NBR)	-3600.191	1894.441	-1.900397	0.0756
SHBR	-2515.521	1848.570	-1.360793	0.1924
SHBRR	-1650.678	2055.501	-0.803054	0.4337
SHCR	4.998377	7.054294	0.708558	0.4888
D(SHCRR)	28.68263	10.42302	2.751853	0.0142
D(SHMBR)	7241.193	3900.662	1.856401	0.0819
SHMBRR	2234.250	1530.037	1.460259	0.1636
D(SHVRR)	-134.6180	86.00584	-1.565219	0.1371
D(SHVR)	212.2470	102.6125	2.068432	0.0552
R-squared	0.605277			
Adjusted R-squared	0.309235			

Source: calculated by the author

In the above table, it can be observed that model is better fitted to the data, because R-squared is 0.6. The Adjusted R-square value describe the number of parameters that fitted by the regression, in the analysed study the adjusted R-square is 0.309 meaning that some parameters are fitted with regression. The second had car re-registrations are only variable that have the probability value under 0.05, meaning that its coefficient is significant for a confidence level of 95%. In addition, the new bus registrations, second hand microbus registration and second hand van registrations have the coefficients significant for a confidence level of 90%, because the probability values are under 0.10. The rest of coefficient and the constant are not significant.

For a better estimation of the regression model, were eliminated the constant and all coefficients will probability value above 0.10, resulting:

Table 7. Ordinary Least Square method for OMV PETROM

Variable	Coefficient	Std. Error	t-Statistic	Probability
D(NBR)	-3553.624	1580.700	-2.248134	0.0336
D(SHCRR)	15.36940	5.760973	2.667847	0.0132
D(SHMBR)	5703.589	2940.564	1.939624	0.0638
D(SHVR)	138.6588	76.32649	1.816654	0.0813
R-squared	0.342456			
Adjusted R-squared	0.263550			

Source: calculated by the author

The regression model is fitted because the value of the R-square is 0.34 and Adjusted R-square reduce its value to 0.263, even were eliminated eight variables and the constant. The new bus registrations and the second hand car re-registration are only variable that have coefficients significant for a confidence level of 95%. The second hand van registrations and second had microbus have a confidence level of 90%.

The regression model with a confidence level of 95% is:

d(PETROM)=-3553.6241*d(NBR)+15.3693*d(SHCRR)

The regression model with a confidence level of 90% is:

d(PETROM)=-3553.62*d(NBR)+15.36*D(SHCRR)+703.58*d(SHMBR)+138.65*d(SHVR)

The results of Ordinary Least Square method, for ROMPETROL regression, are described in the table below:

Table 9. Ordinary Least Square method for ROMPETROL

Variable	Coefficient	Std. Error	t-Statistic	Probability
C	209000.8	506073.3	0.412985	0.6851
D(NVR)	-12.36610	72.43599	-0.170718	0.8666
D(NMBR)	21.78922	547.7913	0.039776	0.9688
NCR	1.124644	4.836849	0.232516	0.8191
D(NBR)	-43.53185	1775.738	-0.024515	0.9807
SHBR	-1895.856	1732.741	-1.094137	0.2901
SHBRR	-244.9982	1926.706	-0.127159	0.9004
SHCR	0.976218	6.612280	0.147637	0.8845
D(SHCRR)	4.581787	9.769930	0.468968	0.6454
D(SHMBR)	135.3933	3656.251	0.037031	0.9709
SHMBRR	585.5090	1434.166	0.408257	0.6885
D(SHVRR)	-35.27863	80.61681	-0.437609	0.6675
D(SHVR)	-38.77877	96.18291	-0.403177	0.6922
R-squared	0.222165			
Adjusted R-squared	-0.361211			

Source: calculated by the author

The model of the ROMPETROL regression is not fitted because the R-squared is near zero and the Adjusted R-squared has a negative value. In addition, the model does not have any coefficient significant even for the confidence level of 10%, because probability value is not under the 0.10.

5. CONCLUSIONS

In conclusion, it can be observed that the evolution of the number of vehicle registration can have a great influence on the evolution of the fuel sales for petroleum companies; even the number of observations is very low. Even the second hand car registrations were only variable that have a coefficient, with a confidence level of 95%, from the full model; all variable should have an impact on the fuels sales because of the complementary relationship between vehicles and fuels. In addition, confidence level of 90% of the new bus registrations, second hand microbus registration and second hand van registrations strengthen the hypothesis that exist a relation between the sales revenues of OMV PETROM and registration of vehicles. The smaller market share and limited number of samples probably influenced the estimation failure of ROMPETROL regression model.

From this paper resulted that oil companies must develop sustainable strategies which will make more flexible and resistance their economic activities against the evolution of the external factors. The management should diversify their portfolios in order to diminish the dependence of the transport sector. In addition, all companies that want to have a sustainable development ought to research all the economic sectors that can influence their activities, a high priority having the complementary ones.

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