ESTIMATED DATE OF COMPLETION OF THE PLANNED MOTORWAY SEGMENTS IN THE CENTRAL, NORTH-WESTERN AND WESTERN REGIONS OF ROMANIA

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Abstract

Romania's highways are standing ahead of considerably high investments. In the last few decades the transport infrastructure has been pushed into the background due to lack of financial support. The 21st Century has brought important breakthroughs in the building of highways. In the report on global risks in 2013 published by WEF (World Economic Forum) the "The prolonged neglect of infrastructure" is being considered such a risk. Our study focuses on the construction works that have been carried out in the Central, North-Western and Western regions of Romania. The highways of the above mentioned regions will be analysed based on three main points of focus: highways that have already been built, highways currently under construction and highways that are planned to be built. The aim is to present and compare the 3 regions' highway infrastructure, determination of an approximate end date for the highways that are currently under construction. It has been concluded, that until 2013 the construction work on segments funded by the EU progressed much faster, than the ones funded by the government. The results of the study refer to how soon could the construction works reach an end on segments currently in progress.

Keywords: *transport infrastructure, motorways, completion date, completed/under construction/planned motorway segments, Central/North-Western/Western regions.*

JEL Classification: *O18, R42.*

1. Introduction

Our case study is related to the infrastructure of highways crossing the Central, North Western and Western regions. These 3 development regions are crossed by 2 highways, A1 and A3. The A1 highway passes along the Pan-European Transport Corridor IV, which follows the route Dresden / Nürnberg - Thessaloniki / Istanbul and can be found on Romanian territory from Arad to Constanta. This route is part of the Trans-European Transport Network with the number 7[(1)] which connects Greece with the Hungarian capital, also from going from Arad to Constanta in Romania. The highway goes on the route Nadlac - Arad - Deva - Sibiu - Pitesti – Bucharest, having a length of 576,1 km. Construction of the highway is divided into eight sections (table no. 1), of which the Central region is crossed by one segment, while the Western region is crossed by 5 segments. In the table shown the gray lines are to be found in the Central and Western regions. The North-Western region is not being crossed by the A1.

Table 1. **Sections of the A1 highway**

Highway A1, Bucureşti - Nădlac		
Sections		km
I section	Bucureşti – Piteşti	109,6
II section	Piteşti – Sibiu	116,6
III section	Sibiu – Orăştie	99,3
IV section	Orăştie – Deva	32,5
V section	Deva – Lugoj	99,5
VI section	Lugoj – Timişoara	35,1
VII section	Timişoara – Arad	44,6
VIII section	Arad – Nădlac	38,9
TOTAL		576,1

(Source: Romanian National Company of Motorways and National Roads)

The A3 highway links Bucharest with Bors city, situated in the North-Western region, having the following route: Bucharest – Pitesti – Brasov – Fagaras – Sighisoara – Targu Mures – Campia Turzii – Gilau – Suplacu de Barcau – Bors. The total length of the highway is of 581,6 km. At this moment the A3 highway is not situated alongside the Pan-European Transport Corridor and Trans-European Transport Network. The construction of the A3 has been divided in 10 construction segments (table no. 2), out of which 4 segments pass through in Central region and 4 segments in North-Western region. Lines highlighted with grey cross through the above mentioned regions.

Table 2. **Sections of the A3 highway**

Highway A3, Bucuresti - Bors		
Sections		km
I section	Bucureşti – Ploieşti	62
II section	Ploieşti – Braşov	106,6
III section	Braşov – Făgăraş	53
IV section	Făgăraş – Sighişoara	52
V section	Sighişoara – Targu Mures	56
VI section	Targu Mures – Câmpia Turzii	36
VII section	Câmpia Turzii - Gilău	52
VIII section	Gilău - Mihăileşti	24
IX section	Mihăileşti – Suplacu de Barcău	76
X section	Suplacu de Barcău – Borş	64
TOTAL		581,6

(Source: Romanian National Company of Motorways and National Roads)

2. Theoretical and methodological aspects

The fundamental principles of the Common Transport Policy were established in 1957 by the Treaty of Rome in Chapter IV, Articles 74-78, establishing the European Economic Community. The Treaty provides common rules for transportation in the Member States applicable to transporters that develop activities in their territory as well as transportation safety measures and ways to improve it. In June 1985 the European Commission published a White Paper on completing the internal market, making transport policy a key piece of the overall community strategy.

As Maria Vincze wrote in her book "European economics", published in 2008, the Court of Justice of the European Union had amerced the Council due to the fact that they violated the basic treaties, delaying the making of laws on common traffic and transport policy. In this book we can find that, after a period of 13 years, more precisely in 1998, a more or less uniform, liberalized traffic and transport has been created. (Vincze, 2008)

In the late 80s a discussion on infrastructure development Trans-European Networks has been initiated, also including the field of transport.

„By the time the ideas formulated in the 1980s became Union documents in the 1990s, the map of Europe changed. In 1989, the Berlin Wall collapsed and the Iron Curtain disappeared, and it became clear one had to think in terms of a larger Europe still. The process of approving the TEN concepts had been taking its Union course, but parallel with that, there began in 1991 a process of negotiations called the Pan-European transport conference, in which (1991: Prague, 1994: Crete, 1997: Helsinki) delegates of respective specialist ministries accepted plans for so-styled "Helsinki corridors" or "Pan-European corridors", i.e. Eastern extension of the TEN." (Fleischer, 2007)

In December 1992 the European Commission published the " Communication on the future development of the common transport policy". This communication has changed the EU transport policy from a sectoral to an integrated approach based on sustainable mobility. It brings up questions on transport security, foreign relations, taxation policies, social and environmental protection. As next, we can find in the "Transport Policy", written by the European Institute of Romania, that in December 1995 the Green Paper has been published- "Towards fair and efficient pricing in transport". which brings into question the fiscal side of the transport policy. (European Institute of Romania, 2005)

In 1995 the European Commission published a second White Paper on "Fair charging for infrastructure use: a phased approach to a common framework for infrastructure use in the EU", in which the Commission debated the issue of a harmonized Community approach to taxation in the transport sector. In September 2001 the European Commission published a White Paper on Community Transport Policy. The document proposed measures to avoid economic losses caused by congestion, pollution and accidents.

Before the 1990`s there had been 2 highway sectors built, Bucuresti – Pitesti 96 km and Fetesti – Cernavoda 17,2 km. Works on the Highway of the Sun, linking Bucharest with Constanta, had been still going on for a short period of time after 1990, but due to lack of financial resources the works were stopped by the government. The period 2001-2013 has brought lots of innovation in terms of transport infrastructure, but the period 2013-2025 seems to be even more successful.(2) Taking in consideration the above mentioned the following question seems to be just: now which regions is the most developed in regards to highway infrastructure? All 3 regions include highway segments which are finalized, under construction and in plan, also the A1 highway crosses the Central and Western region. Knowing that for the A1 highway there are EU funds available we are supposing that regions crossed by this particular highway are more developed in terms of highway infrastructure than the North-Western region. In the following we are searching for an answer for the following question: when will the highway construction works end in the Central, North-Western and Western region? In the period between 2001-2013 the progress of construction works was quite slow, but the forecast for the upcoming years seems to be a more positive one. Taking in consideration not only the length and time required for their construction, but also assuming that in the next period there will be even more highways built than in the last one, leads us to the hypothesis that the highways currently under construction will reach completion in all 3 regions in the period 2013-2020.

In Romania we can already speak of several completed highway segments, and their number is gradually increasing as more highway constructions are currently in progress. In the first part of the study we will present the routes of the A1 and A3 highways. As next the Romania`s highways will be presented, the status of the May 2013 construction works, followed by a comparison in terms of highway infrastructure in the Central, North-Western and Western region, on basis of which we will do statistics and provide answers to our hypothesis. In the following we will analyse the segments completed by May 2013, and based on the results we will try to determine until when the planned segments will be completed in the 3 regions. The study is based on data from May 2013, published by the NCHNR(3).

3. Empirical results

According to data taken from NCHNR there were 4 highways completed/under construction/in plan and 3 highways proposed in May 2013, totalling 2108,8 km, which would require an estimated budget of 21.227,78 mil. Euro (table no. 3). We have listed the proposed highways, but we won`t include this data in our calculations. We can already speak of 1435,5 km of highways(4), out of which 748,2 km are in plan, 543,7 km completed and 143,6 km under construction (table no. 4). Below you can see the proportion of highways that have already been built and sections that are still under construction and planned, expressed in kilometers, as follows:

Table 3. **Romania`s highways**

Highways	Distance - km -	completed - km -	under construction - km -	planned - km -	completion date (estimate)	Funding		Investment -mil. Euro-
						European Union	Romanian Government	
A1	576,1	213,4	126,4	236,3	2016	2326,17	3745,57	6071,74
A2	203	203	-	-	2012	1001.63	176.76	1178,39
A3	581,6	107,5	15,2	458,9	2016 (partially)		3996,65	3996,65
A4	74,8	19,8	2	53	unannounced	403,75	71,25	475
Total	1435,5	543,7	143,6	748,2		3731,55	7990,23	11721,78
Proposed								
Jucu - Bistrita	75	-	-	75	unannounced		750	750
Ploiesti - Albita	288	-	-	288	unannounced	2223.6	392,4	2616
Targu Mures – Iasi - Ungheni	310,3	-	-	310	unannounced	5219	921	6140
Total	673	-	-	673		7442,6	2063,4	9506
TOTAL	2108,8	543,7	143,6	1421,2		11174,15	10053,63	21227,78

(Source: Romanian National Company of Motorways and National Roads)

Table 4. **Romania`s completed/under construction/planned highway segments**

Highways			
	completed	under contruction	planned
A1	Bucuresti – Nadlac		
	Bucuresti – Pitesti + Pitesti bypass: 96+13,6 km Sibiu bypass: 17,2 km Orastie – Deva: 32,5 km Timisoara bypass: 9,5 km Timisoara – Arad: 32,3 km Arad bypass: 12,3 km	Sibiu – Orastie: 82,1 km Deva – Lugoj: 27,6 km Arad – Nadlac: 16,7 km	Pitesti – Sibiu: 116,6 km Deva – Lugoj: 71,9 km Lugoj – Timisoara: 25,6 km Arad – Nadlac: 22,2 km
A3	Bucuresti – Bors		
	Bucuresti – Moara Vlasiei: 13 km	Bucuresti – Moara Vlasiei: 6,5 km	Ploiesti – Brasov: 106,6 km
	Mora Vlasiei – Ploiesti: 42,5 km		Brasov – Fagaras: 53 km
			Fagaras – Sighisoara: 52 km
			Sighisoara – Targu Mures: 56 km
	Campia Turzii – Gilau: 52 km	Gilau – Nadaselu: 8,7 km	Targu Mures – Campia Turzii: 36 km
			Nadaselu – Mihailesti: 15,3
			Mihailesti – Suplacu de Barcau: 76 km
			Suplacu de Barcau – Bors: 64 km
A4	Constanta – Vama Veche		
	Constanta bypass: 19,8 km	Lazu – Constanta Port: 2 km	Constanta – Vama Veche: 53 km

(Source: Romanian National Company of Motorways and National Roads)

Which regions of these 3 is the most developed in terms of highway infrastructure?

In the following we will calculate which region occupies 1st, 2nd and 3rd place in terms of development, using two different methods. The level of development is being calculated by taking in consideration the amount of highways completed, under construction and planned. By most developed region we refer to the one where we can find most highway works that reached completion, also where the number of highways planned is the lowest and there are construction works in progress. In the first calculus method (table no. 5) we have considered the total length of highways situated in the Central, North-Western and Western region, 762,9 km as 100%.

Table 5. **The status of highways in the Central, North-Western and Western regions**

	Centre region		North-West region		West region	
	%	km	%	km	%	km
Completed	2,26 %	17,2 km	6,81 %	52 km	11,35 %	86,6 km
Under construction	10,76 %	82,1 km	1,14 %	8,7 km	5,81 %	44,3 km
Planned	25,82 %	197 km	20,36 %	155,3 km	15,69 %	119,7 km
TOTAL	38,84 %	296,3 km	28,31 %	216 km	32,85 %	250,6 km

(Source: own calculations)

Most important in our calculus are the completed highway segments, which reach 60%, followed by segments under construction - 30% and highways planned - 10% (table no. 6).

Table 6. **The status of highways in the Central, North-Western and Western regions expressed in kilometer rates**

	Centre region	North-West region	West region
Completed	17,2 X 0,6 = 10,32	52 X 0,6 = 31,20	86,6 X 0,6 = 51,96
Under construction	82,1 X 0,3 = 24,63	8,7 X 0,3 = 2,61	44,3 X 0,3 = 13,29
Planned	197 X 0,1 = 19,70	155,3 X 0,1 = 15,53	119,7 X 0,1 = 11,97
Total	54,65	49,34	77,22

(Source: own calculations)

In regards to highways completed the Western region is in a leading position, having also the least highways planned, which means that work is in progress here. In the Central region we can find the most highways under construction, followed by the Western region. The North-Western region contains lesser segments planned than the

Central region. We would like to note that there is little discrepancy in the results received regarding the level of development in highway infrastructure of the Central and North-Western regions.

Using another method of calculus we received the exact same results as before: the Western development region occupies 1st place in the rank, the Central region the 2nd and the North-Western the 3rd (table no. 8). In this calculus (table no. 7) we took the length of each highway separately in the Central, North-Western and Western regions, considering the length of each 100%. In the category „completed highways" and „highways under construction" we gave 3 point to the highest, and 1 point to the region with the lowest percentage. In case of planned segments the region with lowest percentage will be given 3 points.

Table 7. **The status of highways in the Central, North-Western and Western regions expressed in kilometers and in percentages**

	Centre region		North-West region		West region	
	%	km	%	km	%	km
Completed	5,80 %	17,2 km	24,07 %	52 km	34,56 %	86,6 km
Under construction	27,71 %	82,1 km	4,03 %	8,7 km	17,68 %	44,3 km
Planned	66,49 %	197 km	71,90 %	155,3 km	47,76 %	119,7 km
TOTAL	100 %	296,3 km	100 %	216 km	100 %	250,6 km

(Source: own calculations)

Table 8. **The level of development of the highways in the Central, North-Western and Western regions**

	Centre region		North-West region		West region	
Completed	5,80 %	1	24,07 %	2	34,56 %	3
Under construction	27,71 %	3	4,03 %	1	17,68 %	2
Planned	66,49 %	2	71,90 %	1	47,76 %	3
TOTAL	6		4		8	

(Source: own calculations)

When will the highways currently under construction in the Central, North-Western and Western regions reach completion?

Based on the results received we will try to analyse and find an answer to the question when the planned sections of highways currently under construction will be completed in the 3 regions studied. As starting point we chose the year 2001, because that is when the construction works started, and ending point would be 2013, due to the fact that we are using data from May 2013 in our study. There are exactly 12 years between 2001-2013, therefore we chose another 12 year period, 2013-2025. If we consider 1st of January 2001 as starting point and 31st of December 2013 as ending point, than we have 13 years in between. As works did neither exactly start on 1st of January, nor end on the 31st of December, we will only consider 12 years in the study. As well as for the completed sections: we did not consider 1st of January as starting point and 31st of December as ending point, that is why for example between 2004-2010 we consider to work with 6 years instead of 7. The next table (table no. 9) shows segments completed until May 2013. From the table we can conclude how much time was needed for these segments to be completed, and if there were EU funds assigned to them.

Table 9. **Highway segments completed up to 2013 May**

Sections	Distance - km -	Timetable	Construction duration - year -	Funding
A1				
Pitesti bypass	13,6 km	2004 - 2007	3 years	EU and Romanian Government
Sibiu bypass	17,2 km	2004 - 2010	6 years	EU and Romanian Government
Orastie – Deva	32,5 km	2011 - 2013	2 years	EU and Romanian Government
Timisoara bypass	9,5 km	2011 - 2012	1 years	EU and Romanian Government
Timisoara – Arad	32,3 km	2009 - 2011	2 years	EU and Romanian Government
Arad bypass	12,3 km	2009 – 2012	3 years	EU and Romanian Government
A3				
Bucuresti - Ploiesti	55,5 km	2007 – 2012	5 years	Romanian Government
Gilau – Campia Turzii	52 km	2004 - 2010	6 years	Romanian Government
A2				
Bucuresti - Constanta	185,8 km*	2001 - 2012	11 years	EU and Romanian Government
A4				
Constanta bypass	19,8 km	2009 – 2012	3 years	EU and Romanian Government
TOTAL	430,5 km		12 years	

*Fetesti – Cernavoda: 17,2 km built before 1989

(Source: Romanian National Company of Motorways and National Roads)

Considering the data listed in the above table we calculated how many km of highway has been built with financial support from the EU and without in the period between 2001-2013 (table no. 10). During our calculations we gave importance to time as an influential factor, taking each completed segment separately and calculating an average out of it.

Table 10. **Construction of highway segments finished up to 2013 with and without EU funding**

Period	Year	Km
2001 – 2013: EU + Romanian Government	12 years	323 km
2004 – 2012: Romanian Government	8 years	107,5 km

(Source: Romanian National Company of Motorways and National Roads, www.130km.ro)

Calculations on the average of the segments built with financial support on behalf of the EU is presented in the below table (table no. 11):

Table 11. **Construction of highway segments finished up to 2013 with EU funding**

Sections	Distance - km -	Construction duration - year -	Own calculations	
1. Pitesti bypass	13,6 km	3 years	13,6 / 3 = 4,53	1) 1 year = 4,53 km
2. Sibiu bypass	17,2 km	6 years	17,2 / 6 = 2,86	2) 1 year = 2,86 km
3. Orastie – Deva	32,5 km	2 years	32,5 / 2 = 16,25	3) 1 year = 16,25 km
4. Timisoara bypass	9,5 km	1 year	9,5 / 1 = 9,5	4) 1 year = 9,5 km
5. Timisoara – Arad	32,3 km	2 years	32,3 / 2 = 16,15	5) 1 year = 16,15 km
6. Arad bypass	12,3 km	3 years	12,3 / 3 = 4,1	6) 1 year = 4,1 km
7. Bucuresti - Constanta	185,8 km	11 years	185,8 / 11 = 16,89	7) 1 year = 16,89 km
8. Constanta bypass	19,8 km	3 years	19,8 / 3 = 6,6	8) 1 year = 6,6
TOTAL	323 km		76,88	76,88 / 8 = 9,61

(Source: Romanian National Company of Motorways and National Roads, www.130km.ro)

Calculations on the average of the segments built without financial support on behalf of the EU is presented in the below table (table no. 12):

Table 12. **Construction of highway segments finished up to 2013 without EU funding**

Sections	Distance - km -	Construction duration - year -	Own calculations	
1. Bucuresti – Ploiesti	55,5 km	5 years	55,5 / 5 = 11,1	1) 1 year = 11,1 km
2. Gilau – Campia Turzii	52 km	6 years	52 / 6 = 8,66	2) 1 year = 8,66 km
TOTAL	107,5 km		19,76	19,76 / 2 = 9,88

(Source: Romanian National Company of Motorways and National Roads, www.130km.ro)

The results show that in one years time there have been 9,61 km highway built with EU funds and 9,88 km without these funds. Our results show that in both cases there could be approximately 10 km highway built, leading to the impression: if the country is in possession of sufficient funds, there could be just as many highways built from state funds as from EU funds. In our calculations we did not include highways built before 1989, like Bucuresti – Pitesti and Fetesti – Cernavoda segments, as well as highways currently under construction have not been taken in consideration, as they are currently under construction or already finished. The results are due to calculations in which completed segments have been included. We are studying planned segments in the Central, North-Western and Western regions, assuming that works on these have started in 2013. The estimated year of completion for these segments would be somewhere around 2013-2014-2015-2016. In the next table (table no. 13) we will present the estimated year of completion for segments situated in the above mentioned three regions. In case of segments funded by the EU we calculated with 9,61 km/year, and those without EU funds with 9,88 km/year.

Table 13. **Estimated date of completion of the planned highway segments in the Central, North-Western and Western regions**

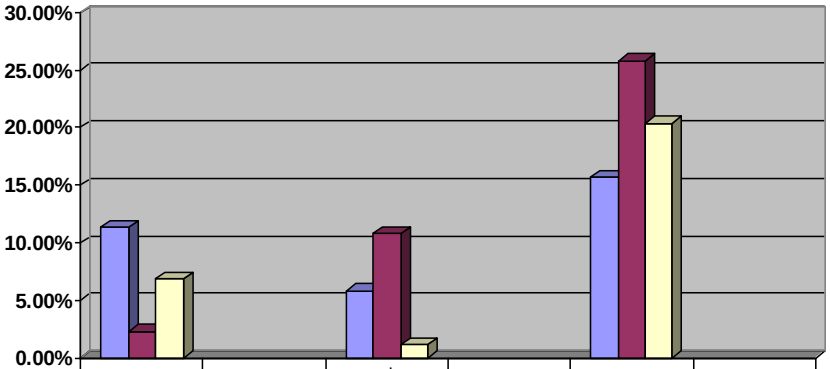
A1 and A3 highway Central, North-Western, Western regions	Distance - km -	Funding	Status	Calculations	Completion date
A1: West region					
Deva – Lugoj	71,9	European Union and Romanian Government	planned	71,9 / 9,61 = 7,48 => 7 years	2020
Lugoj – Timişoara	25,6	European Union and Romanian Government	planned	25,6 / 9,61 = 2,66 => 3 years	2016
Arad – Nădlac	22,2	European Union and Romanian Government	planned	22,2 / 9,61 = 2,31 => 2 years	2015
A3: Centre region					
Braşov - Făgăraş	53	Romanian Government	planned	53 / 9,88 = 5,36 => 5 years	2018
Făgăraş - Sighişoara	52	Romanian Government	planned	52 / 9,88 = 5,26 => 5 years	2018
Sighişoara – Targu Mures	56	Romanian Government	planned	56 / 9,88 = 5,66 => 6 years	2019
Targu Mures – Câmpia Turzii	36	Romanian Government	planned	36 / 9,88 = 3,64 => 4 years	2017
A3: North-West region					
Nădăşel - Mihăileşti	15,3	Romanian Government	planned	15,3 / 9,88 = 1,54 => 2 years	2015
Mihăileşti – Suplacu de Barcău	76	Romanian Government	planned	76 / 9,88 = 7,69 => 8 years	2021
Suplacu de Barcău - Borş	64	Romanian Government	planned	64 / 9,88 = 6,47 => 6 years	2019

(Source: own calculations)

4. Conclusions

By comparing the 3 regions we came to the conclusion that in terms of infrastructure the Western region is the most developed, followed by the Central region and the North-Western region, considering the finished highways, highways under construction and planned highway segments (fig. no. 1).

Figure 1. **Completed/under construction/planned highway segments in the Central, North-Western and Western regions**



	completed		under construction		planned	
West region	11.35%	86.6 km	5.81%	44.3 km	15.69%	119.7 km
Centre region	2.26%	17.2 km	10.76%	82.1 km	25.82%	197 km
North-West region	6.81%	52 km	1.14%	8.7 km	20.36%	155.3 km

(Source: own calculations)

If works start in 2013, than the earliest year for the completion of planned highways is 2015, and the latest – 2021 (table no. 14). These results are only valid if construction works progress evenly.

Table 14. **Estimated date of completion of the planned highway segments in the Central, North-Western and Western regions**

A1 and A3 highway Central, North-Western, Western region	Distance - km -	Funding	Status	Completion date (estimate)
A1: West region				
Deva - Lugoj	71,9	EU* + RG**	planned	2020
Lugoj – Timişoara	25,6	EU + RG	planned	2016
Arad – Nădlac	22,2	EU + RG	planned	2015
A3: Centre region				
Braşov - Făgăraş	53	RG	planned	2018
Făgăraş - Sighişoara	52	RG	planned	2018
Sighişoara – Targu Mures	56	RG	planned	2019
Targu Mures – Câmpia Turzii	36	RG	planned	2017
A3: North-West region				
Nădăşel - Mihăileşti	15,3	RG	planned	2015
Mihăileşti – Suplacu de Barcău	76	RG	planned	2021
Suplacu de Barcău - Borş	64	RG	planned	2019

* EU – European Union,
** Romanian Government

(Source: own calculations)

Note

In our study we are working with data taken from the NCMNR from May 2013. At this time there were 27,6 km under construction on the A1 highway, segment Deva – Lugoj and 71,9 km in plan. In June 2013 the whole segment turned its status to under construction highway segment. The segment is divided in 4 subsegments, to which the following completion dates have been associated:

- Lot 1: 27,6 km – 2013;
- Lot 2: 28,6 km – 2015;
- Lot 3: 21,2 km – 2015;
- Lot 4: 22,1 km – 2015-2016;

A 19,8 km segment of motorway was finalised and another 2 km were under construction in May 2013 on the A4 motorway, between Ovidiu - Portul Constanta. In July 2013, the entire 21,8 km segment of Constanta bypass had been completed.

Endnotes

(1: Also named TEN-T)

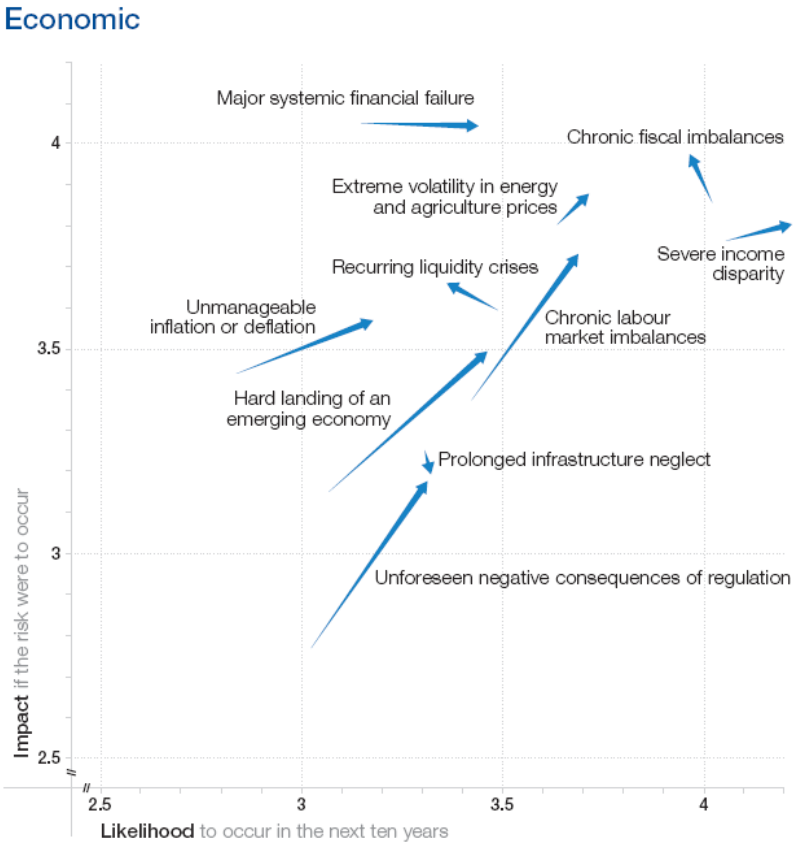
(2: We chose 2001 as starting point due to the fact that construction works started in this particular year, and endpoint year 2013, because our study relies on data from May 2013. There are 12 years between 2001-2013, thus we have chosen another 12 year period, 2013-2025)

(3: Romanian National Company of Motorways and National Roads)

(4: completed/under construction/in plan)

5. Annexes

Figure 2. **Global Economy Risks**



(Source: Global Risks 2013, Eighth Edition, © 2013 World Economic Forum, ISBN: 92-95044-50-9, 978-92-95044-50-0, REF: 301211)

Table 15. **Global economy risks in 2013 as compared to 2012**

	Explanation	Probability	Expected effect	Likelihood max 5	Impact max 5
Prolonged negligence of the infrastructure	Chronic negligence of investments for the rennovation and securization of infrastructural networks	Slight growth	Slightly weakens	3.32 +/- 0.06	3.19 +/- 0.05

(Source: Global Risks 2013, Eighth Edition, © 2013 World Economic Forum, ISBN: 92-95044-50-9, 978-92-95044-50-0, REF: 301211)

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[10] ***www.ec.europa.eu/transport/index_en.htm