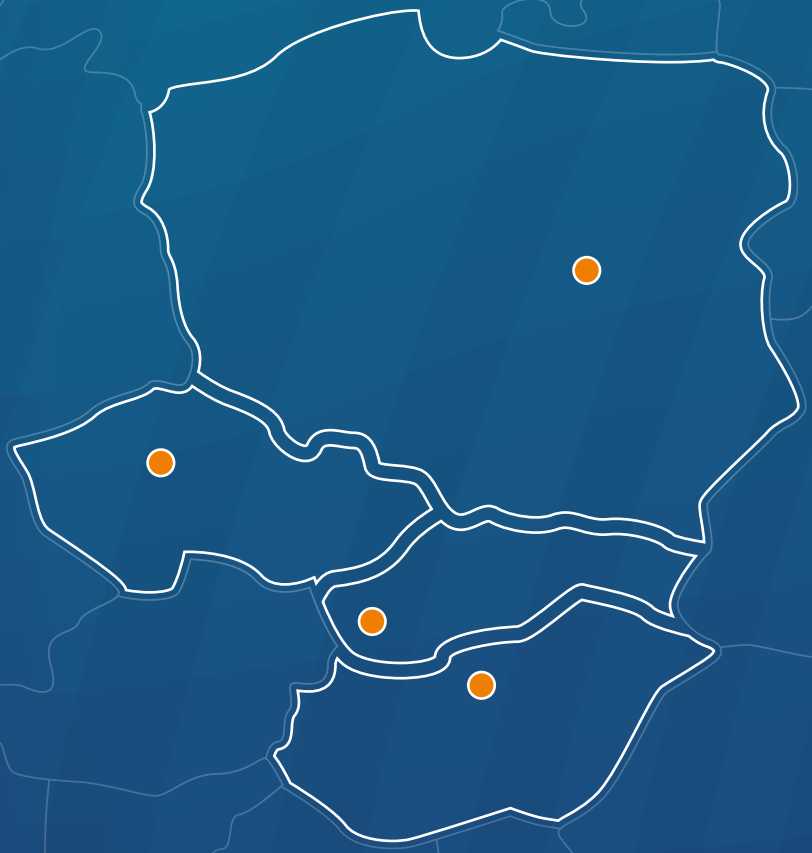
FUTURE

of the Visegrad Group



ABBREVIATED VERSION:

THE FUTURE OF INFRASTRUCTURE

GLOBAL SHAPERS COMMUNITY WARSAW

Lesław A. Paga Foundation

Visegrad Fund

FOREWORD

Wojciech Przybylski
Editor-in-chief
of Eurozine & Visegrad Insight
Chairman of Res Publica Foundation

2016 marks a quarter of a century in a pro-Western trajectory of four Visegrad countries. The group, formally established on February 15th, has had two basic goals. One was to join NATO to increase security and independence from Moscow. The second was to join the common European (Western) project for prosperity and security of our societies. Both goals seemed to have been fulfilled in 2004.

The Visegrad countries have been co-coordinating their diplomatic efforts to facilitate the withdrawal of the Red Army from their territories, finally accomplished in 1993 - at first, before the formal establishment of the cooperation. Then, parallel efforts to meet harsh criteria of accession were made. One may argue which of those processes have been more transformative. There is no doubt, however, the economy and infrastructure would not be developed without the process of EU enlargement, if not an unprecedented effort by Central European societies to reform, rebuild, and modernize that has been met by support comparable only to the Marshall Plan funds for Germany launched in 1948.

One may compare the process of change to a train trip. The departure station has been somewhere in the east, the next station was in the west, but currently the destination is unknown. We had to speed up the train and set up its tracks to get to where we are. Once set in motion, the train is still on the move. The growing ambitions and appetites reinforce and push the European project further, with its economic, infrastructural, and political potential. Today, the New Europe does not mean solely that much of a political struggle for independence in geopolitical terms, but more a search for new engines of growth and development. The Visegrad Group is exploring this direction and seeks to improve its own, hence European competitiveness. Under the EU strategy, the V4 countries seek development through innovation, healthy fiscal policies, and bettering energy and transportation infrastructure. Often, those efforts are blurred and overshadowed by current political developments. But by any means, they are not supposed to be disregarded. They are one of cornerstones to secure the fundamental accomplishments of those last 25 years.

Therefore, it must be stressed this report explores the key areas of future cooperation. It is an explorative and informative reading, prepared by the future leaders, who at an early stage of their careers, demonstrate how a visionary approach may meet excellent analytical skills. If one wondered about the future after 25 years of cooperation, one finds many answers in this report. It is a must read for all interested in prospects of the European project from the Central European perspective.

ACKNOWLEDGMENTS

This publication originates from a sincere concern about the region's future. Being proud of the region's development over the last 25 years we were looking for ways to influence its development in future. Seeking for like-minded supporters, we have found exceptional people, who supported us in our endeavours of creating this report.

First of all, we would like to recognize the invaluable contribution of the Lesław A. Paga Foundation, which daily inspires us to thrive for the best in our professional and personal lives. The Foundation has constantly supported us throughout all stages of the project – from finding an appropriate team to enabling us to contribute to the public debate with our findings. This report would not be possible without the Lesław A. Paga Foundation.

We wish to thank Global Shapers Warsaw Hub, which supported us with providing us with an exceptional network of brilliant minds. We hope that the ongoing feedback on our ideas helped the report to become visionary and practical at the same time. We highly appreciate the support of all the reviewers engaged from across the region, who generously invested their time and ideas in our initiative. We would like to thank you in detail at the end of our report. We wish to acknowledge the support provided by our partners Aspen Institute Prague, Republikon Institute form Hungary, Res Publica from Poland and the International Visegrad Fund, which funds this publication. We are looking forward to further initiatives to facilitate the collaboration of Visegrad.

Finally, we give our sincerest thanks to the whole team of V4 Future: Joanna Rycerz, Petra Kaciakova, Damian Szewczyk, Sebastian Wieczorek, Zsombor Incze, Tomasz Nisztuk, Ondřej Dvouletý, Dominik Keil and Piotr Krzemiński. The debates from across the region proved not always to be easy, but worthwhile!

Sincerely Yours,

Damian Polok and Paweł Michalski
Project Leaders V4 Future

Damian Polok

Paweł Michalski

ABOUT THE LESŁAW A. PAGA FOUNDATION

Since 2003, the Lesław A. Paga Foundation has enabled young leaders to excel their potentials by actively contributing to the shape of the region's future. The foundation aims at creating a network of highly ambitious students and young professionals, who not only seek to advance in their professional lives, but also want to make an impact in their immediate environment and society. Our educational projects cover the fields of:

- Capital markets (Capital Market Leaders Academy, CEE Capital Market Leaders Forum),
- Energetics (Academy of Energy; New Energy Forum),
- Healthcare (Healthcare Leaders),
- Technology and innovations (Young Innovators, Innovation Day)
- Media (Academy of Analysis and Media)

The Alumni of the Foundation are given unique chances to learn from the best experts and gain practical experience in over 70 partner companies. There are about 500 Alumni, who support each other not only professionally, but also on the private ground.

It is also our mission to promote the highest ethical standards and culture among entrepreneurs. This is why, every year, we grant the Lesław A. Paga award to businessmen, activists, and institutions. This honorary distinction constitutes a commemoration of our Patron's work. In previous years, the winners were: Krzysztof Lis, Leszek Czarnecki, Leszek Balcerowicz, Igor Chalupec, Joseph Wancer, Janusz Lewandowski, prof. Grzegorz Domański, Zygmunt Solorz-Żak, prof. Marek Belka, Jacek Siwicki, and Hebert Wirth.

Our vision of promoting the highest ethical standards is not limited to professionals and students. We give secondary school students the opportunity to participate in the Stock Market Game (SIGG), and those who finish their secondary education can apply for the Indeks Start2Star Scholarship, awarded during the whole period of studies.

Apart from our regular projects, we organize conferences, workshops, and lectures, whose speakers are the best specialists of the Polish and European markets.

Lesław A. Paga Foundation

CEE Capital Market Leaders Forum

In 2014, the Leslaw A. Paga Foundation organized, with the Warsaw Stock Exchange as the strategic partner, the first edition of international CEE Capital Market Leaders Forum. We are proud of organizing the first event for bringing together and growing new generations of capital market leaders.

The main idea of the event is to establish a communication platform for regional peers, which enables young leaders to experience and participate in professional workshops that combine theoretical knowledge with capital market practice. The Forum intends to create a framework to create lifetime networks, aimed at developing future international collaboration in the center of Europe.

Lesław A. Paga (24.09.1954 – 02.07.2003)

Lesław A. Paga was one of the forefathers of the capital market in Poland. As an expert in macroeconomics, ownership transformation, and capital market sector, he co-created the Polish Securities Trading Act, the Act on Bonds, and other securities trading acts of law. He specialized in managing enterprises, strategy, and restructuring. He conducted projects related to an enterprise strategic assessment, managing by values, investors' relations, and investigations concerning financial crimes.

Lesław A. Paga was respected by entrepreneurs and all political wings. After 1989, he was advisor to various prime ministers. Faced with corruption scandals in Poland and other countries, he fought for corporate governance, transparency, invitations to tender, and any business activity. He was a tough negotiator, devoted to his mission. Notwithstanding difficulties, he always examined problems holistically.

Lesław A. Paga was a versatile person - having graduated from science studies, he also took interest in the humanistic field. He was fascinated with classical music, contemporary literature, and theatre. He enjoyed directing. Lesław A. Paga was a creative man, whose enthusiasm and positive attitude towards life motivated other people.

FUTURE

of the Visegrad Group

INTRODUCTION INTO THE PROJECT

[We, the young] should develop our vision, we should have a view that in a sense a prescientific of what the game is about, about the way the beast functions, about the way the various parts of economics and social science are related and, yes, about our own maps of Utopia. Once we have a vision, then our control of theory, our command of institutional detail, and our knowledge of history are to be marshalled to support the vision.

- Hyman P. Minsky

The Visegrad Group celebrates its 25th anniversary. The 1991 meeting in the city of Visegrad, old capital of Hungary, provided for a link to a meeting held almost 7 centuries ago at the same place. In 1335, the Visegrad Castle hosted King of Bohemia John of Luxembourg, King of Poland Casimir II, and King of Hungary Charles I of Anjou. The first Visegrad meeting tried to establish closer relationship and cooperation among the three kings and their states. The aim of both were the same – to guarantee peace and facilitate cooperation.

In both cases, the members of the Group agreed on many things they had in common. In the 90s, the former communist countries, with historical enmity often resulting in open struggles, saw a possibility to join forces, once again, to jumpstart their European integration process. And so, on 15th February 1991, at a meeting of the President of the Czechoslovak Republic Václav Havel, the President of the Republic of Poland Lech Wałęsa, and the Prime Minister of the Republic of Hungary József Antall, the Visegrad Group was established. With the dissolution of Czechoslovakia, in 1993, into two independent countries -the Czech Republic and the Slovak Republic, the Group grew into four members. From that time, the Group is commonly referred to as the Visegrad Four or V4.

Before the establishment of the International Visegrad Fund, in 1999, there were no common agendas, nor regular meetings and discussion among the Group Members, except for NATO and European Union enlargement talks. Then, in 2002, the Expert Working Group on Energy commenced its works. After the V4 countries joined the European Union on May 1st 2004, the regional cooperation precipitated. In 2011, the Group formed the Visegrad battlegroup to serve as an EU Battlegroup in 2016 and in 2019. Some successful trade and diplomatic initiatives happened along the way. And so, the 25 years passed.

The fathers of V4 created foundations and new forms of political, economic, and cultural cooperation in the altered Central Europe. They strived to achieve full restitution of state independence, democracy, and freedom after decades of a totalitarian system. And they, we succeeded on many fronts. But these achievements are merely a stepping stone. New challenges lie ahead of us, and we need to aim high, once again. Especially in terms of economic cooperation, there is a lot to be done to reveal the full potential of the V4 countries. In our mid-20s, we are the V4 offspring, and it is our generation that will shape the next 25 years of the Group. We feel responsible for our countries, and that is why we decided to speak up about the future in which we would like to live.

Just as the regional rulers in the XIVth century and democratic presidents in the 1990s, we were looking for ways to join forces and face the upcoming challenges. That is why we prepared recommendations for the next steps to be taken to improve V4 cooperation. Although our ideas are often supported by numerical data, our aim was to be visionary, therefore, more qualitative than quantitative. We hope for this report to start a serious discussion about the future and a true dialogue between generations. In the months following the publication of this report, we plan to build on this idea. We hope to mobilize experts, industry specialists, business leaders, and public officials to help us prepare detailed plans to achieve our goals.

Dear Reader, we wish you an inspiring lecture. And for you, dear Visegrad Group, we wish all the best for the 25th birthday. Let the next 25 be even better!

INTRODUCTION INTO THE REPORT

"Know from whence you came. If you know whence you came, there are absolutely no limitations to where you can go."

- James Baldwin

To shape the future, it is necessary to analyse the past. Therefore, before exploring our potential, we gathered a wide range of information on our economic development over the last 25 years. This data is not exhaustive, but will give our readers a rough picture of what the V4 countries have accomplished so far.

The following chapters present our vision on the V4 economic development in the fields of entrepreneurship, finance, energy, and infrastructure. We also prepared a short case discussion on the matter of adopting EURO as a common currency in all Visegrad countries. We hope, in the months and years to come, we can build upon our recommendations and actively participate in the ongoing transformation of our economies.

1. VISEGRAD GROUP ECONOMIES UNVAILED

Ondřej Dvouletý

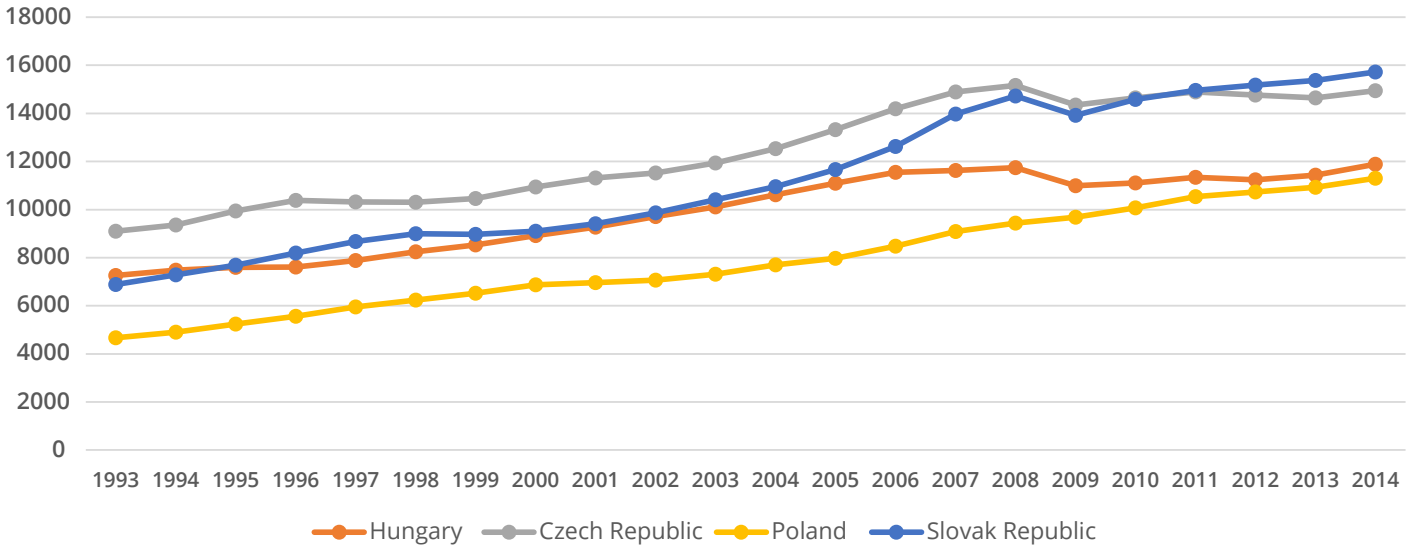
Over the last 25 years, the V4 countries grew significantly and became **richer in economic terms** (Table 1). This can be observed in the development of the life expectancy rates and the GDP per capita (Figure 1). After the fall of communism, the Visegrad Group member states **integrated their economies into international trade**, which contributed to the countries' GDP. The rising number of people obtaining tertiary education indicate the **ongoing transformation into knowledge-based economies**.

Table 1: General statistics of V4 countries

Country	Czech Republic		Slovakia		Poland		Hungary	
Indicator								
Population in 2014	**10 510 566**		**5 418 506**		**37 995 529**		**9 861 673**	
Surface area (sq. km, 2014)	**78 870**		**49 036**		**312 680**		**93 030**	
Average GDP growth for years 1993-2014 (%)	**2,4**		**4,0**		**4,2**		**2,0**	
Year	**1993**	**2014**	**1993**	**2014**	**1993**	**2014**	**1993**	**2014**
GDP per capita (constant 2005 US$)	**9 095**	**14 945**	**6 884**	**15 727**	**4 665**	**11 305**	**7 255**	**11 888**
Unemployment rate (%)	**4,3**	**6,1**	**12,2**	**13,2**	**14,0**	**9,0**	**12,1**	**7,7**
Merchandise trade (% of GDP)	**71,9**	**158,6**	**71,6**	**168,9**	**36,4**	**79,3**	**53,7**	**157,0**
Year	**1993**	**2013**	**1993**	**2013**	**1993**	**2013**	**1993**	**2013**
Life expectancy at birth (years)	**72,8**	**78,3**	**72,4**	**76,3**	**71,6**	**76,8**	**69,1**	**75,3**
Year	**1995**	**2013**	**1993**	**2013**	**1993**	**2013**	**1993**	**2013**
Health expenditure, total (% of GDP)	**6,7**	**7,2**	**6,1**	**8,2**	**5,5**	**6,7**	**7,3**	**8,0**
Year	**1998**	**2013**	**1993**	**2013**	**1993**	**2013**	**1993**	**2013**
Population with tertiary education as a share of population 15-64 (%)	**8,5**	**19,1**	**8,1**	**18,1**	**8,5**	**23,8**	**10,6**	**20,2**

Source: World Bank and Eurostat (2015)

Figure 1: GDP per capita in constant prices (2005)



Source: World Bank and Eurostat (2015)

1.1 Competitiveness

To compare the V4 economies, we used several indices, including political stability, competitiveness, innovativeness, and law enforcement rankings (Table 2). Surprisingly, the Czech Republic, Slovakia, and Hungary worsened their world positions, measured by Global Competitiveness, with **Poland being the only country among the 4 to improve its position slightly.** The **biggest problems** of V4 economies were identified in public sector related areas, specifically, in **tax regulations** and **bureaucracy** (World Economic Forum).

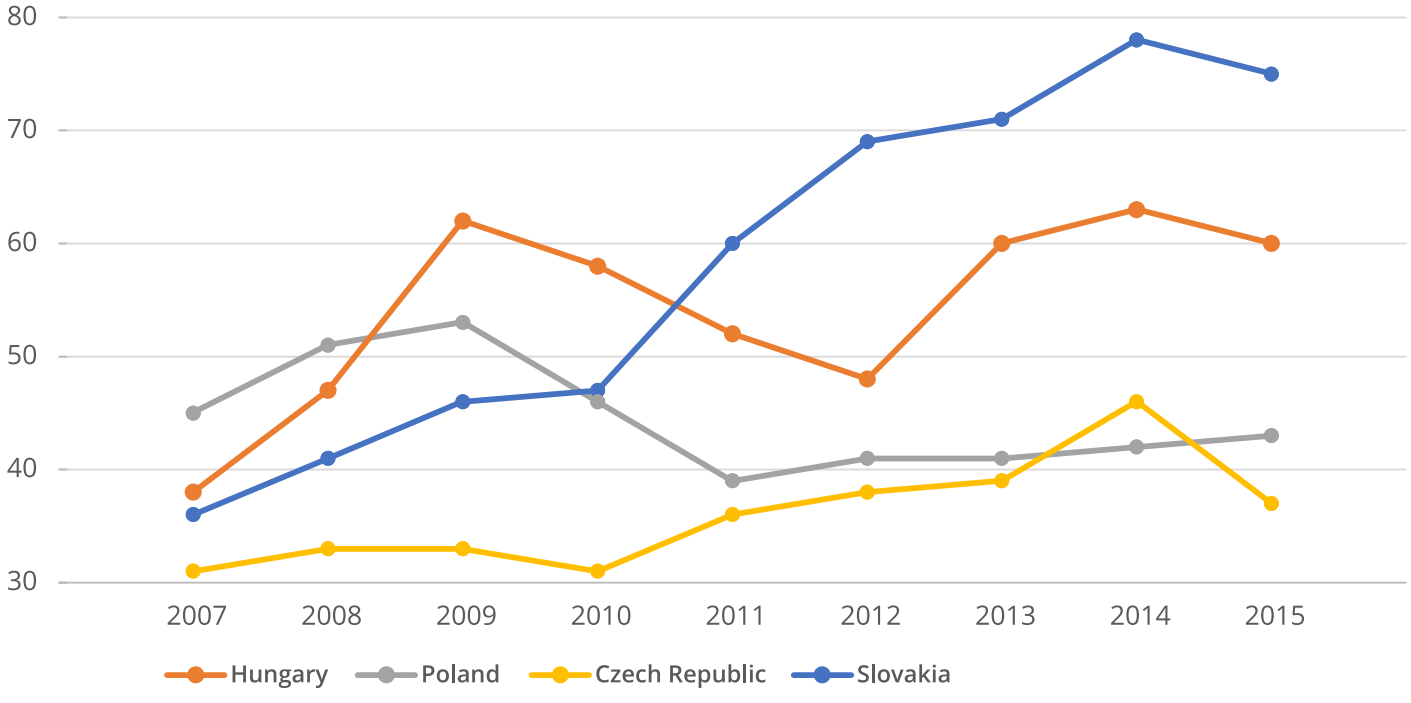
Table 2: Selected indicators representing competitiveness of V4 countries

Country	Czech Republic		Slovakia		Poland		Hungary	
Indicator								
Year	**2006-2007**	**2014-2015**	**2006-2007**	**2014-2015**	**2006-2007**	**2014-2015**	**2006-2007**	**2014-2015**
Global Competitiveness Index	**4,7**	**4,5**	**4,5**	**4,1**	**4,4**	**4,5**	**4,3**	**4,5**
Global Competitiveness Index Rank	**31**	**37**	**36**	**75**	**45**	**43**	**38**	**60**
Year	**1995**	**2015**	**1995**	**2015**	**1995**	**2015**	**1995**	**2015**
Economic Freedom Index	**67,8**	**72,5**	**60,4**	**67,2**	**50,7**	**68,6**	**55,2**	**66,8**
Year	**1998**	**2014**	**1998**	**2014**	**1998**	**2014**	**1998**	**2014**
Corruption Perceptions Index	**4,8**	**5,1**	**3,9**	**5,0**	**4,6**	**6,1**	**5,0**	**5,4**
Year	**1995**	**2012**	**1995**	**2012**	**1995**	**2012**	**1995**	**2012**
Knowledge Economy Index	**7,8**	**8,1**	**7,2**	**7,6**	**6,9**	**7,4**	**7,5**	**8,0**
Year	**1996**	**2014**	**1996**	**2014**	**1996**	**2014**	**1996**	**2014**
National Patent Office Applications per thousand of population 15-64	**0,7**	**0,2**	**0,7**	**0,1**	**0,2**	**0,2**	**0,4**	**0,1**

Source: Heritage Foundation, Transparency International, World Bank, World Economic Forum (2015)

Corruption remains a problem. Looking at the data from the Corruption Perceptions Index, it is fair to conclude that a small step was made, but it is not enough to catch up with the global leaders in law enforcement and public sector efficiency (Transparency International).

Figure 2: Global Competitiveness Index rankings over years 2006-2015



Source: Heritage Foundation, Transparency International, World Bank, World Economic Forum (2015)

The overall **competitive environment seems to be improving**. The Index of Economic Freedom reflects rapid improvements in business, labour market, and trade freedom. Following the World Economic Forum's recommendations, the V4 countries should **improve their infrastructure**, develop **better higher education** and training organizations, and **promote development of financial market and innovative behaviours**[1].

Apart from the already mentioned corruption, the most problematic factors (as reported by the World Economic Forum) include **red tape, tax regulation,** and **rates,** and **restrictive labor regulations** (Table 3).

Table 3: The most problematic factors for doing business

Czech Republic		Slovakia		Poland		Hungary	
							
Inefficient government bureaucracy	**18,6**	Inefficient government bureaucracy	**17**	Tax regulations	**23,2**	Policy instability	**15,1**
Corruption	**16,3**	Corruption	**16**	Restrictive labor regulations	**15,5**	Access to financing	**13,5**
Policy instability	**9,1**	Restrictive labor regulations	**15**	Inefficient government bureaucracy	**14,6**	Corruption	**13**
Restrictive labor regulations	**9**	Tax rates	**10**	Tax Rates	**11,2**	Tax regulations	**11**
Tax regulations	**8**	Tax regulations	**10**	Access to financing	**9,6**	Inefficient government bureaucracy	**10,3**
Inadequately educated workforce	**6,3**	Inadequate supply of infrastructure	**9,3**	Inadequate supply of infrastructure	**5,6**	Tax Rates	**10,1**
Tax Rates	**6,2**	Policy instability	**7,7**	Insufficient capacity to innovate	**4,3**	Inadequately educated workforce	**6,9**
Insufficient capacity to innovate	**5,9**	Inadequately educated workforce	**6,3**	Corruption	**3,4**	Poor work ethic in national labor force	**5,8**
Access to financing	**5,8**	Access to financing	**2,8**	Policy instability	**3,3**	Insufficient capacity to innovate	**4,3**
Poor work ethic in national labor force	**3,9**	Poor work ethic in national labor force	**2**	Inadequately educated workforce	**2,7**	Inadequate supply of infrastructure	**3**

Source: World Economic Forum

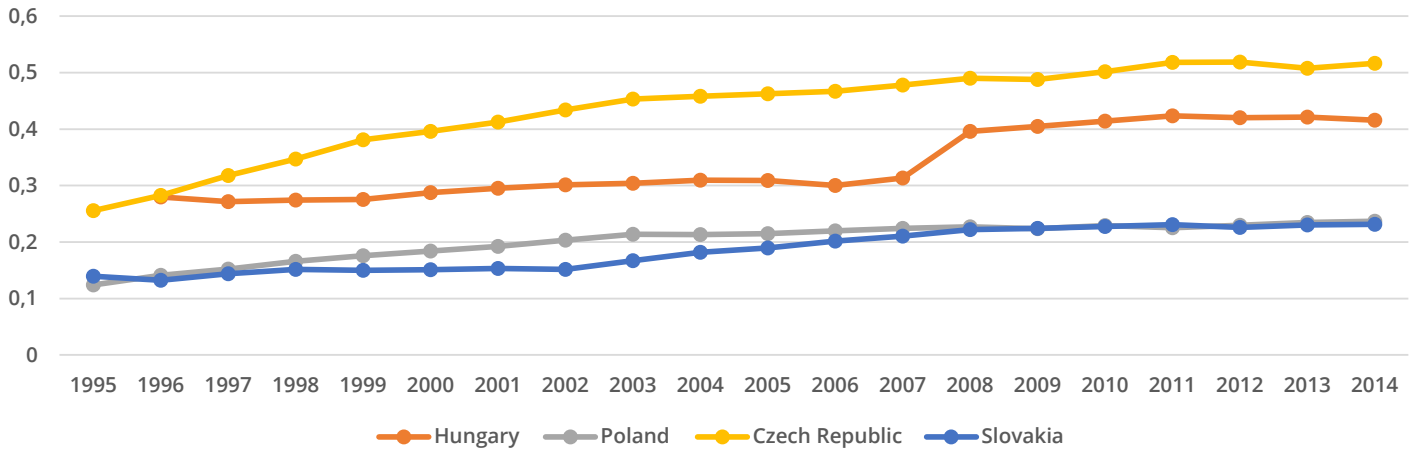
As we will argue in the following chapters, these factors, with **lacking infrastructure** and **inadequately educated** workforce, pose serious threats to our ability to become truly innovative economies and hence, may undermine our competitive position in the future.

1 The number of patent applications dropped significantly in the V4 region after the EU accession, but rebounded after the establishment of the European patent office (according to the EUROSTAT data available).

1.2 Entrepreneurial activity

In order to capture the development of the regional business activity over time, we calculated the rate of registered business entities per economically active population[2]. From the figure below, we may see that business activity grew significantly in all V4 countries (Figure 3).

Figure 3: Registered Entities per population 15-64 during years 1996-2014



Source: Central Statistical Office of Poland, Czech Statistical Office, Hungarian Central Statistical Office, Slovak Statistical Office, World Bank

Time required to start a business is another important indicator of entrepreneurial environment and is treated as an indirect measure of bureaucracy. During the last 20 years, all V4 countries were able to **decrease the number of days required to establish a business by over 100%.** The **costs of starting-up a business venture declined**, and regulatory norms concerning minimum paid-in capital required to start-up a business venture were relaxed. Law enforcement remains a challenge, with costs related therewith remaining at 1996 levels, and in Slovakia's case, increasing over the years (World Bank).

Table 4: Selected indicators representing entrepreneurial environment in V4 countries

Country	Czech Republic		Slovakia		Poland		Hungary	
Indicator								
Year	**1996**	**2014**	**1996**	**2014**	**1996**	**2014**	**1996**	**2014**
Registered Enterprises per population 15-64	**0,3**	**0,5**	**0,1**	**0,2**	**0,1**	**0,2**	**0,3**	**0,4**
Year	**2003**	**2015**	**2003**	**2015**	**2003**	**2015**	**2003**	**2015**
Time required to start a business (days)	**40**	**15**	**103**	**12**	**56**	**30**	**52**	**5**
Year	**2005**	**2015**	**2005**	**2015**	**2005**	**2015**	**2005**	**2015**
Minimum paid-in capital required to start a business (% of income per capita)	**39**	**0**	**41**	**19**	**220**	**11**	**80**	**48**
Cost to start a business (% of income per capita)	**10**	**7**	**5**	**2**	**20**	**12**	**22**	**7**
Cost to enforce a contract (% of claim)	**33**	**33**	**26**	**30**	**19**	**19**	**15**	**15**

Source: Central Statistical Office of Poland, Czech Statistical Office, Hungarian Central Statistical Office, Slovak Statistical Office, World Bank

2 Considering all limitations coming from registered subjects, which may not always be active in economy.

Table 5: Enterprises in V4 countries in 2014 according to size, employees and value added

Country	Czech Republic		Slovakia		Poland		Hungary	
Indicator								
Number of micro enterprises/proportion	**968 998**	**96,1%**	**375 780**	**95,8%**	**1 407 427**	**95,2%**	**497 947**	**94,5%**
Number of small enterprises/proportion	**31 850**	**3,2%**	**13 810**	**3,5%**	**52 676**	**3,6%**	**23 906**	**4,5%**
Number of medium-sized enterprises/proportion	**6 273**	**0,6%**	**2 213**	**0,6%**	**14 850**	**1,0%**	**4 064**	**0,8%**
Number of SMEs/proportion	**1 007 121**	**99,9%**	**391 803**	**99,9%**	**1 474 953**	**99,8%**	**525 917**	**99,8%**
Number of large enterprises/proportion	**1 406**	**0,1%**	**465**	**0,1%**	**2 940**	**0,2%**	**829**	**0,2%**
Number of employees/proportion micro	**1 132 769**	**32,1%**	**537 760**	**37,6%**	**3 007 504**	**36,5%**	**867 316**	**35,7%**
Number of employees/proportion small	**637 865**	**18,1%**	**263 387**	**18,4%**	**1 121 510**	**13,6%**	**447 932**	**18,4%**
Number of employees/proportion medium-sized	**645 056**	**18,6%**	**230 254**	**16,1%**	**1 550 098**	**18,8%**	**404 374**	**16,7%**
Number of employees/proportion SMEs	**2 424 690**	**68,8%**	**1 031 401**	**72,2%**	**5 679 112**	**68,8%**	**1 719 622**	**70,6%**
Number of employees/proportion large	**1 100 327**	**31,2%**	**397 534**	**27,8%**	**2 570 479**	**31,2%**	**708 457**	**29,2%**
Value added billion euros/proportion micro	**16**	**19,8%**	**10**	**29,8%**	**28**	**14,7%**	**9**	**18,5%**
Value added billion euros/proportion small	**12**	**14,5%**	**7**	**19,1%**	**27**	**14,4%**	**8**	**16,2%**
Value added billion euros/proportion medium-sized	**16**	**19,9%**	**6**	**15,8%**	**39**	**20,9%**	**9**	**19,2%**
Value added billion euros/proportion SMEs	**45**	**54,1%**	**23**	**64,6%**	**94**	**50,0%**	**25**	**53,9%**
Value added billion euros/proportion large	**38**	**45,9%**	**12**	**35,4%**	**94**	**50,0%**	**21**	**46,1%**

Source: Eurostat

Of all business entities, small and medium enterprises (SMEs) are perceived as the backbone of the economy. According to the European Commission, they represent about 99% of all businesses in the EU.[3] The SMEs handle about 67% of total EU private sector employment and add over 58% value on an EU-average. These characteristics are similar in Visegrad Group, regarding all but one indicator. Except for Slovakia, the value added by SMEs is below the European average in the V4 countries.

1.3 Innovativeness

We chose several indicators to paint the picture of innovativeness in our economies. The highlighted information in Table 6 points to three main layers of innovative behaviour: the so-called **enablers** (light red) capture the main drivers of innovation performance external to the firm, the **firm activities** (light blue) capture the innovation efforts at the level of the firm, while the **outputs** (light green) capture the effects of firms' innovation activities.

According to the European Innovation Scoreboard's methodology, the V4 countries were described as **moderate innovators**. The innovation performance improved in our countries over the last 7 years, despite some fluctuations (especially for Poland, where the performance fell for 2012 and 2013 and rebounded in 2014). Most of the Visegrad Group countries are performing below the EU average for all dimensions. Poland is, particularly, weak, regarding the number of non-EU doctorate students and public-private co-publications. Hungary shares this characteristic. It also struggles to maintain the sales shares of new innovation and the number of SMEs with product or process innovations. Slovakia is relatively weak in license and patent revenues generated abroad (this indicator is down by 38%), and the non-R&D innovation expenditures are steadily declining. Czech Republic's weaknesses are its research systems and intellectual assets; however, performance has improved in these areas by 7.9% and 6.2%, respectively. A more pressing issue is a 30% decrease in venture capital investments, which might cause widening of the financing gap for innovative enterprises. Human resources are a relative strength, especially in regards to Slovakia and Czech Republic. Hungary is trying to catch up with R&D expenditures (11% growth), community trademarks (10% growth), and license and patent revenue from abroad (9.2% growth).

3 For an exact definition, please refer to: http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition/index_en.htm

The innovation efficiency ratio[4], which shows how much innovation output a country is getting for its inputs, indicates a huge disparity between the V4 countries, with Czech Republic taking the 11th spot among 141 economies, Poland being ranked at the 93rd place, and Hungary and Slovakia taking places somewhere between (35th and 48th place respectively).

Table 6: Selected indicators representing innovativeness in V4

	EU AVERAGE	PL	CZ	SK	HU
Current performance (2007-2014 growth rates)					
Innovation Efficiency Ratio	-	0,66 (93rd)	0,89 (11th)	0,76 (48th)	0,78 (35th)
Gross Domestic Expenditure on R&D = GERD (% 2014 GDP)	2.03	0.94	2	0.89	1.38
New doctorate graduates per 1000 population aged 25-34*	1.8 (2.6%)	0.6(-7%)	1.7 (6.4%)	2.4 (10.4%)	0.9 (3.7%)
Scientific publications among the top-10% most cited publications worldwide as % of total scientific publications of the country	11 (1.5%)	3.8 (3.2%)	5.6 (4.6%)	4.2 (6.7%)	5.3 (1.5%)
Non-EU doctorate students as a % of all doctorate students	25.5 (3.5%)	1.9 (-4.4%)	4.4 (4.3%)	1.5 (14.4%)	3 (-1.1%)
R&D expenditure in the public sector (% GDP)	0.72 (1.9%)	0.48 (3.8%)	0.87 (8.2%)	0.44 (7.2%)	0.41 (-2.5%)
Number of public-private co-authored research publications	50.3 (2.3%)	4.7 (8.7%)	25.1 (7.9%)	13.7 (8.7%)	26.8 (3.1%)
R&D expenditure in the business sector (% GDP)	1.29 (1.9%)	0.38 (12.2%)	1.03 (4.8%)	0.38 (8.8%)	0.98 (10.7%)
SME introducing product or process innovations (% of SMEs)	30.6 (-1.7%)	13.1 (-6.2%)	30.9 (-0.5%)	17.7 (-2.7%)	12.8 (-3.8%)
Employment in fast-growing enterprises in innovative sectors (% of total employment)	17.9 (0.5%)	19.3 (1.6%)	18.7 (1.9%)	19.2 (-0.1%)	19.1 (0.7%)
Employment in knowledge intensive activities (% of total employment)	13.8 (0.6%)	9.6 (0.9%)	12.9 (2.0%)	9.6 (-0.7%)	12.8 (0%)
Exports of medium and high-technology products as a share of total product exports	53 (-0.8%)	56.6 (-0.2%)	62.5 (0.2%)	63.6 (1.6%)	66.3 (-1.1%)
Knowledge-intensive services exports as % of total services exports	49.5 (0.7%)	26.6 (3.3%)	35.2 (-0.9%)	31.3 (9.2%)	28.8 (3.3%)
Cultural & creative services exports as % of total exports	-	1	0.6	0.4	1.5
Creative goods exports as % of total trade	-	3.9	10.1	10.5	6.2

** The average annual growth rates were calculated with a following formula: AAGR= ((Value end of period)/(Value beginning of period))^((1/(Number of years)))-1 where the number of years = 7*
Source: European Commission, Eurostat, Global Innovation Index

The V4 countries are moving up the ladder of the Bloomberg Innovation Index ("BII"). The BII assesses a country's innovativeness by measuring its R&D intensity[5], manufacturing value-added[6], High-tech density[7], tertiary efficiency[8], research personnel[9], and patents[10]. The Global Innovation Index also ranks the V4 economies among the top 50 innovative countries in the world.

One area in which we had the worst results were so-called "innovation linkages", depicting, among others, university/industry research collaboration and the state of cluster development in a country. Poland was the worst (102 out of 141 countries), while Hungary (83rd), Slovakia (69th), and Czech Republic (53rd) also have room for improvement. R&D does little good if it stays bottled up in the laboratory.

4 A ratio of the so-called Output Sub-Index score (provides information about outputs that are the results of innovative activities within the economy) over the Input Sub-Index score (is comprised of 5 input pillars that capture elements of national economy that enable innovative activities: institutions, human capital and research, infrastructure, market and business sophistication.

5 R&D expenditure as % GDP.

6 Measured as % GDP per capita.

7 Number of domestically domiciled high-tech public companies as a share of world's total high-tech public companies.

8 Total enrolment in tertiary education, regardless of age, as % the post-secondary cohort, % labor force with tertiary degrees, annual new science and engineering graduates as % total tertiary graduates and as % total workforce.

9 Professionals, including PH.D. students, engaged in R&D per 1mn population.

10 Resident patent filings per 1 mn population and per $100bn GDP, patent grants as a share of world total.

Table 7: Innovation indices

	POLAND	CZECH REPUBLIC	SLOVAKIA	HUNGARY
				
BLOOMBER INNOVATION INDEX 2016	**23RD**	**31ST**	**39TH**	**30TH**
GLOBAL INNOVATION INDEX 2015	**46TH**	**24TH**	**35TH**	**36TH**

Source: Bloomberg Innovation Index, Global Innovation Index, Cornell University (2015)

Conclusions

During the past 25 years, all V4 economies have gone through radical changes aimed to transform them into democratic, free market economies. Based on the statistical data presented above, it is fair to say that, on average, our societies are healthier, richer, and more educated. However, in assessing a country's prospects, one should not only look at rankings. A recent example of their misleading nature has been Egypt. In 2008, Egypt was ranked as the top reformer in the World Bank's Doing Business ranking. The country was praised for slashing the minimum capital requirements for companies and halving start-up time and cost. However, many of these reforms remain largely only on paper, with minimal contribution to living conditions of ordinary Egyptians. Having said this, we acknowledge the problems our economies are struggling with (especially the lack of governmental efficiency, regulatory burdens, and taxation), but our focus is on the ideas and solutions that might further contribute to the attractiveness of our region.

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2. THE FUTURE OF INFRASTRUCTURE

Tomasz Nisztuk, Piotr Krzemiński, Damian Szewczyk

2.1 Executive Summary

The current intensity of cooperation between V4 countries in infrastructure leaves unutilized potentials. V4 countries should take joint actions to intensify international passenger transport and trade. Apart from the actions taken, the Visegrad Group should focus on improving cross-border connections, establishing appropriate financial incentives, increasing competitiveness of collective transport, and developing transnational intermodal terminals.

1. **Improving cross-border connections.** V4 countries must focus on upgrading cross-border connections on TEN-T routes, creating a single pool of interoperable locomotives, and streamlining inefficient cross-border procedures. Upgrading cross-border connections on TEN-T routes requires coordinated investments in infrastructure. Creating a single pool of interoperable locomotives implies agreeing on the ownership structure of the rolling stock and clearing mechanisms. Joint purchases of such locomotives would enable reduction of delays caused by different traction voltages in V4 countries and avoiding parallel procurement. Streamlining procedures for rail freight services involves introducing trust based train handover procedures harmonized among all V4 countries and aligned with EU regulations, harmonizing operational and safety rules, and introducing mutual acceptance of train drivers.
2. **Establishing appropriate financial incentives.** Visegrad countries can increase subsidies of international connections between them or introduce mutual acceptance of legally granted discounts for students, pensioners, and other groups with lower purchasing power. Subsidizing international connections is subject to negotiations at the political level and does not motivate operators to increase efficiency of their offerings. Establishing mutual reimbursement of discounts would include negotiations on precise mechanisms of reimbursement and decisions on which groups should benefit from it.
3. **Increasing competitiveness of collective transport.** V4 countries can liberalize international rail connections between V4 countries and motivate operators to create more comprehensive travel offers. The liberalization, defined as choosing operator of each international connection in competitive tender, would enable choosing the most efficient operator in terms of cost efficiency, time of travel, and general quality (customer service, standard of rolling stock). Providers of cross-border collective transport services can create more comprehensive travel offers by extending sales channels and cross-selling. Governments of Visegrad should establish a forum for operators to share their experiences on how to expand operators' cross-border offers.
4. **Developing transnational intermodal terminals.** Intermodal terminals should be located in border areas near clusters of automotive, electronics, and household appliances manufacturers. Low-volume customers can also benefit from intermodal terminals by forming consortia. These terminals should offer block train services. Cross-border intermodal terminals offering block train services can enhance export from V4 countries to Western EU and, in long-term perspective, to Asia. This becomes especially important, given the background of China's efforts to develop connections to Europe through the New Silk Road and One Belt, One Road Initiatives. The Visegrad Group would benefit much more from cooperating on these initiatives than competing against each other.

COMMENT

In the time of rising traffic demand, increasing road congestion and major climate changes, integrated transportation system development is considered to be a major challenge. Tackling this issues requires clear vision on how to balance and diversify future transportation capacity demand between different transport branches and implement infrastructural improvements.

Beyond any contestation transport is fundamental for the economy and the society. Internal and cross-border mobility is vital not only for the market to prosper, but equally for tourists to travel. Efficient transport systems stimulates economic growth and job creation. It is expected, that future prosperity of Europe will depend heavily on the ability to provide the opportunities for cost efficient transport within integrated, coherent transportation system.

In order to realize the vision of integrated European transportation system the countries of Visegrad require significant amounts of effort to improve the current state of infrastructure. The emphasis shall be put on removing physical and technical barriers, operational and administrative requirements optimization and providing sources of financing.

The new EU financial perspective provides V4 countries the opportunity to gain substantial resources to be invested in the infrastructure, with special emphasis put on the transportation. In order to provide the infrastructure with opportunities for sustainable development, ambitious construction programmes, financed substantially by EU must be supported with long-term maintenance financing programme.

Wojciech Zając, *former advisor to the Minister of Infrastructure and Development of the Republic of Poland*

2.2 Current state of the V4 infrastructure

This fourth and last section of our report presents our vision and possibilities for regional cooperation in terms of infrastructure development. There are common goals which create opportunities for joint development of infrastructure strategy within V4 Group.

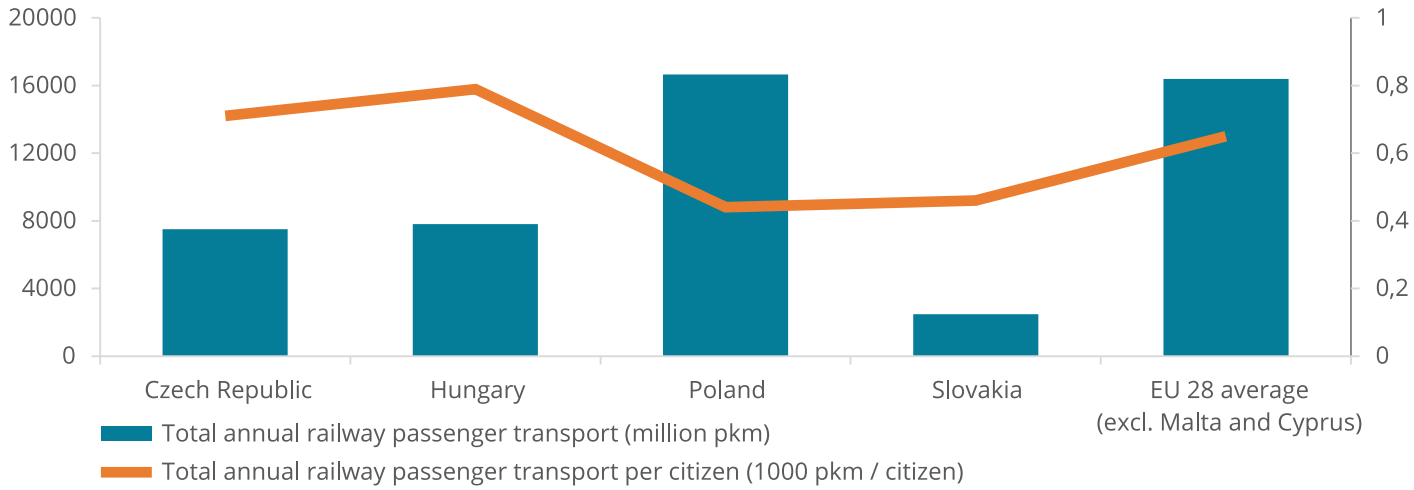
For this report, we have focused on transport infrastructure, defined as railways and roads infrastructure. We have tried to touch upon the not-so-obvious areas of cooperation, i.e. issues that have not been (fully) addressed yet. In these paragraphs, we present diagnoses of the main infrastructure challenges and highlight potential synergies for V4 countries. As in the previous chapters, our diagnosis is followed by relevant recommendations.

It is important to note, that we present the ideas which we believe are possible to implement; however, an in-depth analysis should follow to assess the feasibility of each individual proposal.

2.2.1 Domestic passenger transport and freight transport in V4 is intensive

Passengers in Czech Republic and Hungary travel more by train, compared to the EU average, whereas Polish and Slovak passengers travel less than the statistical EU citizen.

Figure 1: Passenger railway transport (EUROSTAT for 2013 or earlier depending on data availability)

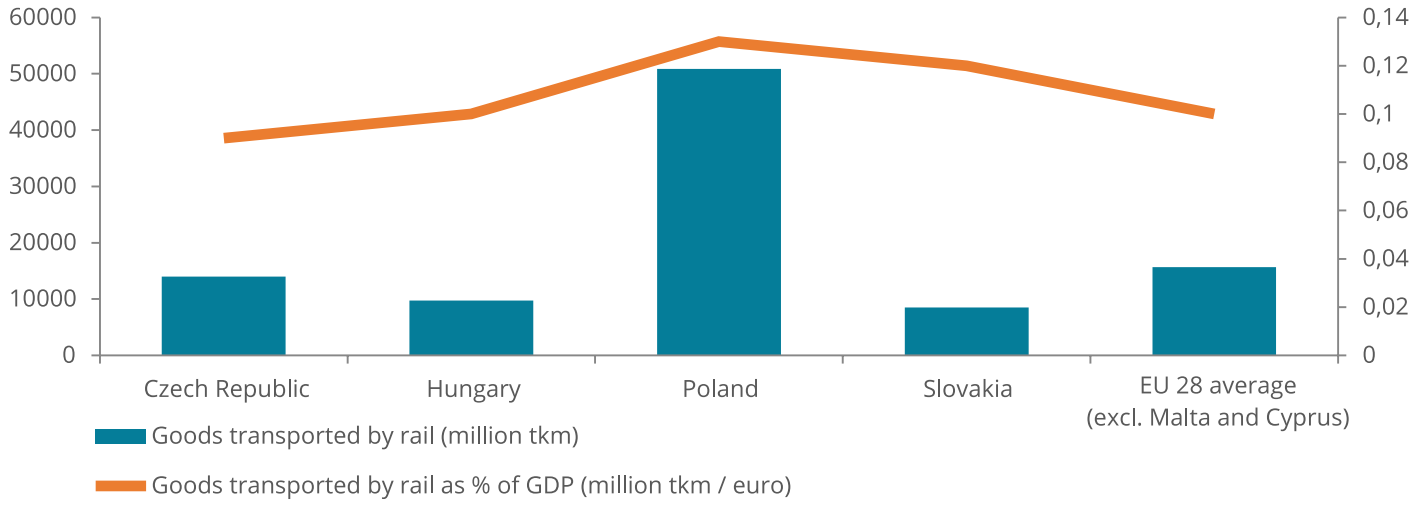


Polish passenger railway transport is the biggest among V4 members in terms of passenger kilometres (pkm) – Poland noted almost 17 bln pkm in 2013, i.e. almost 50% of traffic in V4. What is specific about that variable in V4 is that the other Group members are substantially below the EU28 average of 16.4 bln pkm. The opposite could be observed for passenger railway transport per citizen. The average citizen travels the most by rail in Hungary and the least in Poland. Both Hungarian and Czech Republic average passengers travel by rail more than the EU28 average passenger.

2.2.2 Economies of V4 countries depend highly on rail freight

When compared to the EU28 and V4, Polish freight transport depends highly on rail. Interestingly, the payload distance in Poland accounted for approximately 50 billion tonne-kilometres (tkm) - three times higher than both the EU28 and V4 average. Polish payload distance accounts for 61% of the V4 total. Poland is also the leader in terms of payload distance share compared to GDP, meaning that the Polish economy is substantially driven by railway transport sector, especially compared to other V4 countries and EU28. Similar relationship may be observed in Slovakia, which is slightly below Polish level. Both Czech Republic and Hungarian share of payload distance in GDP are close to EU28 average level.

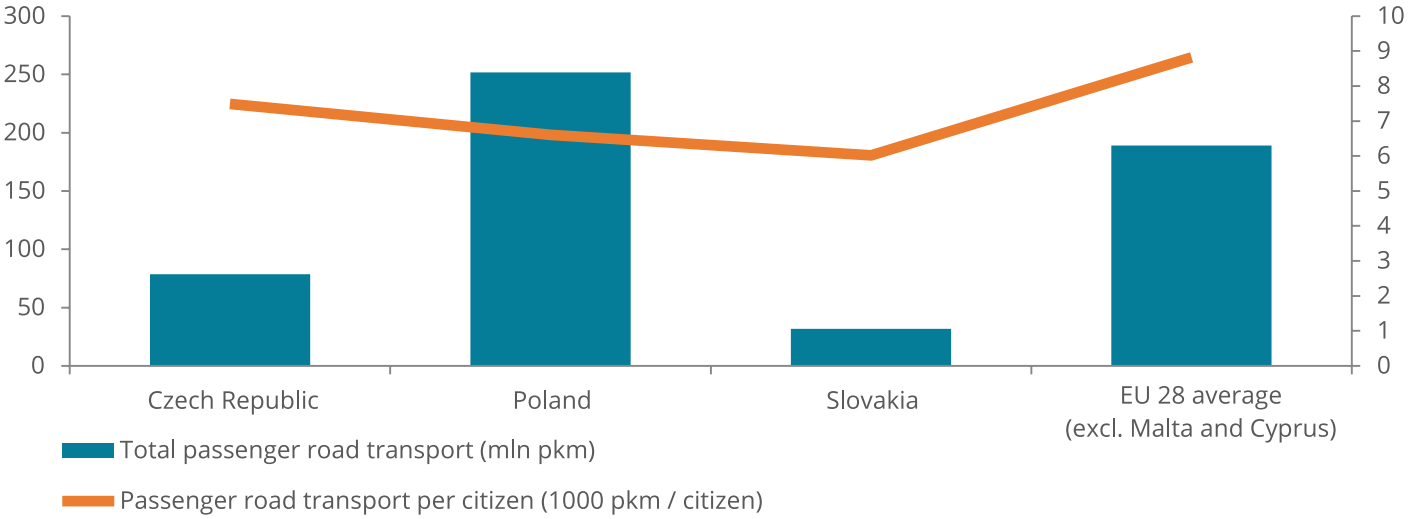
Figure 2: Freight railway transport (EUROSTAT 2013 or earlier depending on data availability)



2.2.3 Road passenger transport plays even more important role compared to rail passenger transport

Passenger road transport distance is high in Poland, (data for Hungary was unavailable). Poland notes approximately 250 billion pkm annually in road transport (which is more than 16 billion pkm in railway transport), while Slovakia only 5 billion pkm. The average Czech citizen travels annually the most by roads in V4, i.e., approx. 7000 km, while the Slovakian citizen the least - approx. 6000 km. These numbers are still below the EU28 average, which amounts to almost 9000 km per citizen. It has to be emphasized that it is only a statistical value, including all means of transport, i.e., motorcycles, cars, and buses.

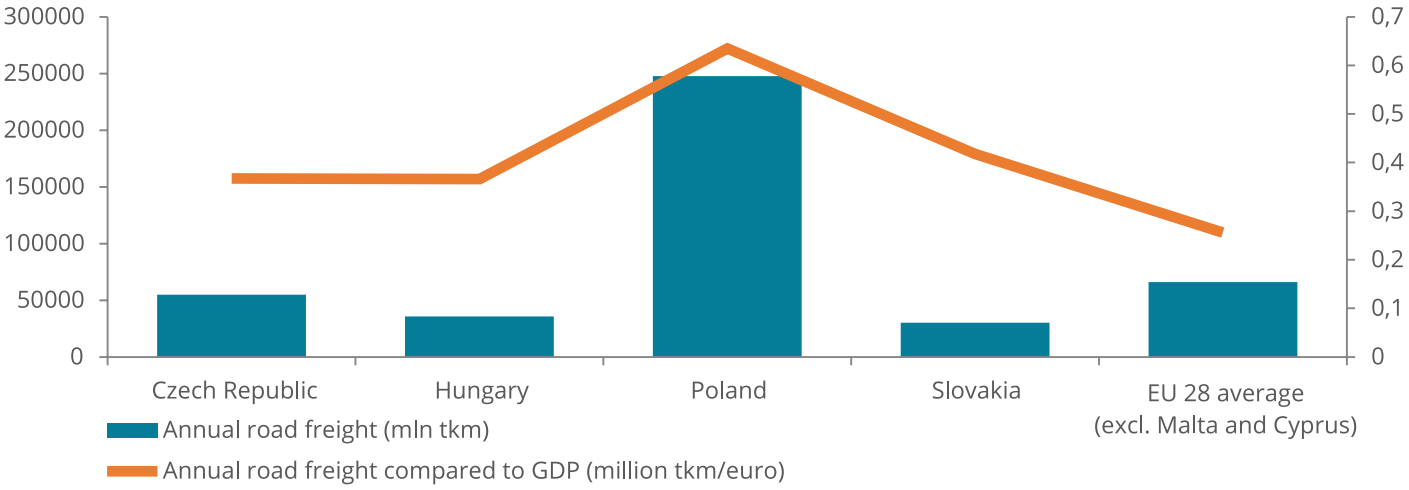
Figure 3: Passenger road transport (EUROSTAT 2013 or earlier depending on data availability)



2.2.4 Economies of V4 countries depend highly on road freight transport

Freight road transport is dominated by Poland, both in terms of payload distance and road transport share, compared to GDP. Annual road freight transport in Poland accounts for almost 70% of total annual road freight transport in V4. Even more interesting, all V4 countries are above EU28 average in road freight transport share in GDP. This means, all V4 economies are more dependent on road freight transport than the average EU economy.

Figure 4: Freight road transport (EUROSTAT 2013 or earlier depending on data availability)

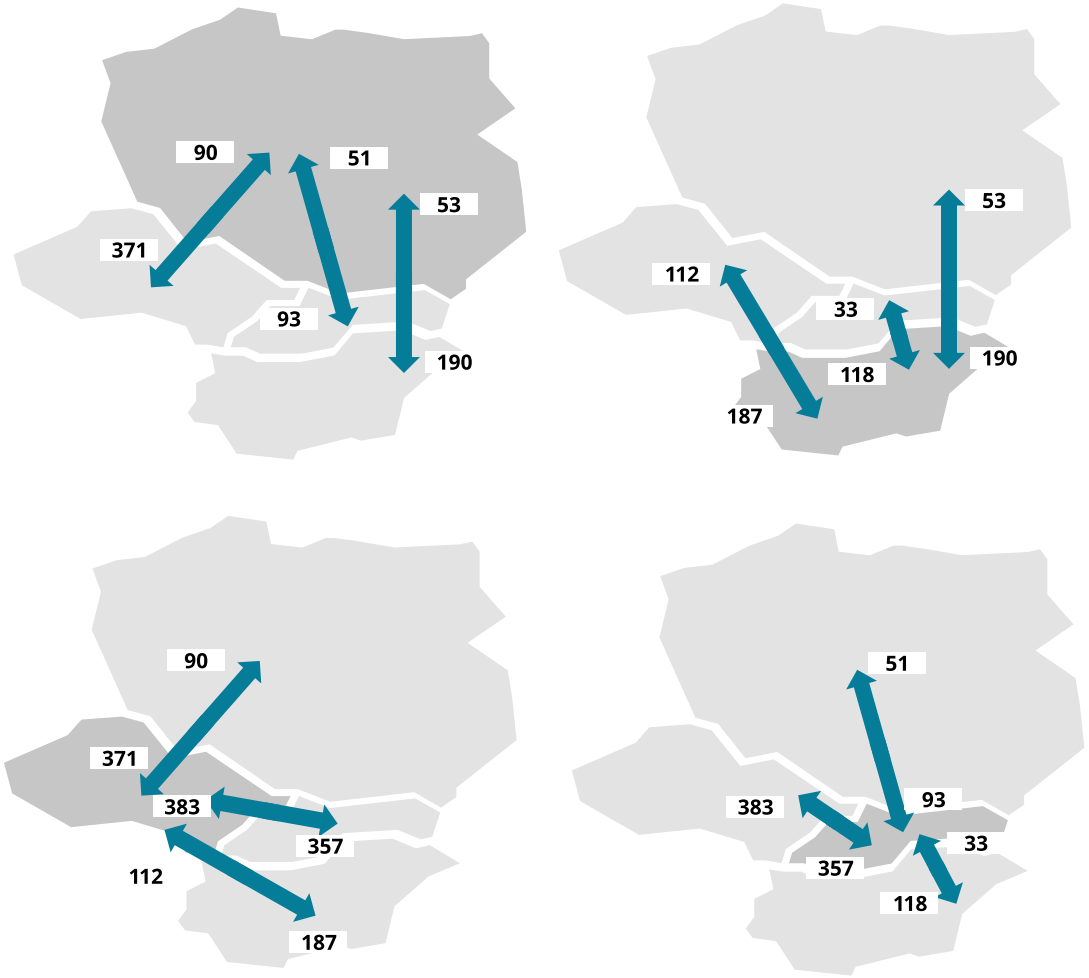


However, as we may see, **the international transport and freight among V4 countries is less intensive, compared to international flows of goods and passengers from V4 countries to outside partners.**

2.2.5 Cross border passenger transport between V4 countries is less intensive than with outside countries

The charts below present the passenger flows between V4 countries in 2012. The analysis of the numbers indicates that passenger flows between Czech Republic, Slovakia, and Hungary were more intensive and balanced, i.e., numbers of passengers leaving a country and visiting the country were comparable. Poland was the least popular destination among all V4 countries. It had the lowest number of total visits of passengers from other V4 states. The country has been the least popular destination for passengers from Czech Republic and Slovakia. Also, there was large imbalance between the number of Polish passengers visiting other V4 countries and the number of incoming passengers.

Figure 5: Tourism in the V4 countries in 2012 (1000 people)



Source: G. Gaal, M. Csete, A. Torok, Regional Development of the V4 Countries.

Comparing passenger flows between the V4 and other countries, one can conclude that passenger flows here are more intensive. Passenger flows between V4 countries and Germany can serve as an example. In 2012, Poles generated 2 million overnight stays in Germany, Czechs 900 thousand, Slovaks 300 thousand, and Hungarians 714 thousand.[11]

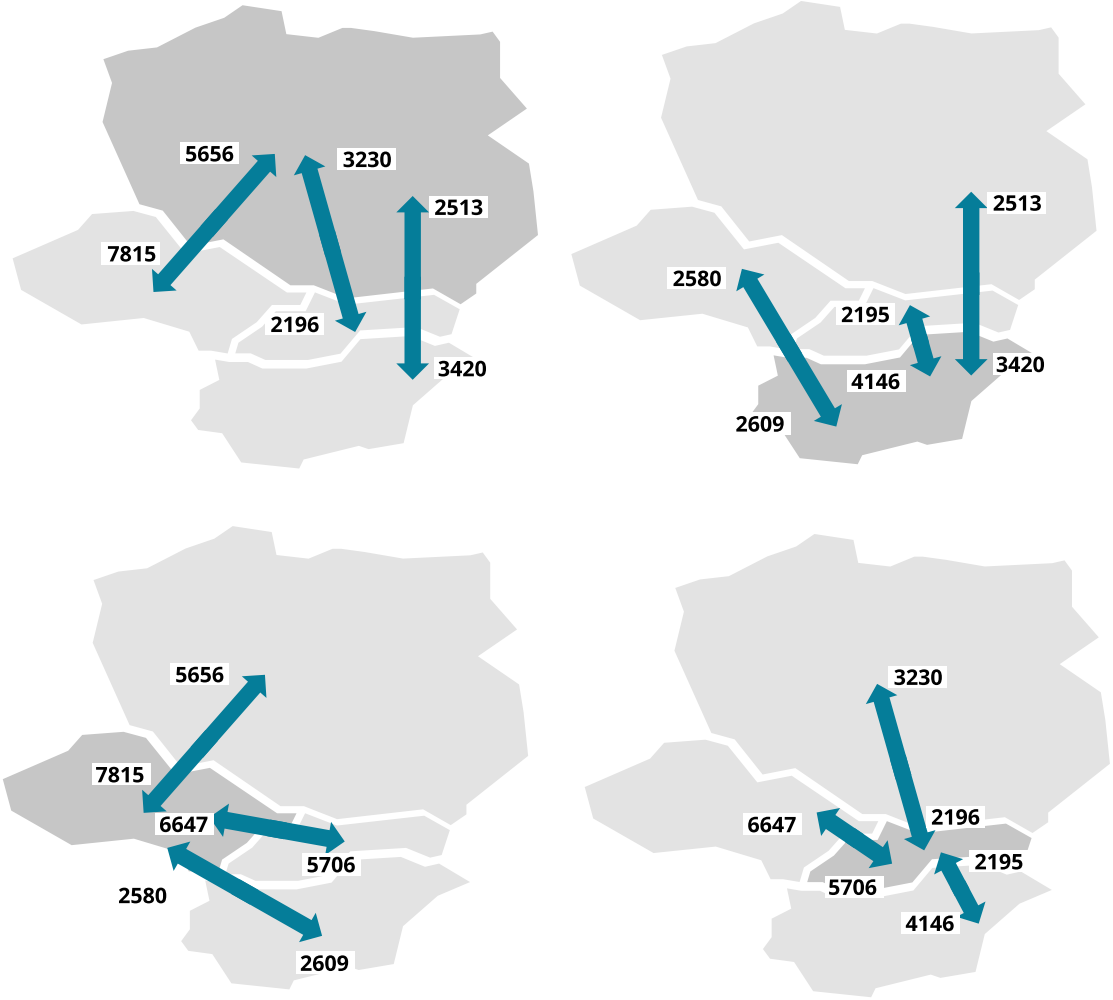
2.2.6 Cross-border trade between V4 countries is also less intensive compared to trade with outside partners

In 2012, the export and import trade with Germany was EUR 66bn, with the Czech Republic, EUR 69bn in Poland, EUR 38bn in Hungary, and EUR 20bn in Slovakia. Poland has the most intensive relation with Russia (EUR 29bn), but the other countries are also significant. The Czech Republic, Poland, and Hungary have similar traffic with China, and this is just higher than the traffic within the V4 countries.

11 German National Tourism Board, Incoming Tourism Germany

Hungarian trade with other V4 countries amounted to EUR 18bn in 2012, which was almost half of the value traded with Germany. Value of trade between Poland and V4 countries was equivalent to 36% of trade with Germany. Czech Republic's exchanged of goods with the Visegrad Group was worth 47% of its trade with Germany. Only with Slovakia, the trade with V4 countries was more intensive than with Germany and has reached 121% of this country's trade with Germany.

Figure 6: Foreign trade between V4 countries in 2012 (EUR million)



Source: G. Gaal, M. Csete, A. Torok, Regional Development of the V4 Countries.

2.3 Major factors behind the current state

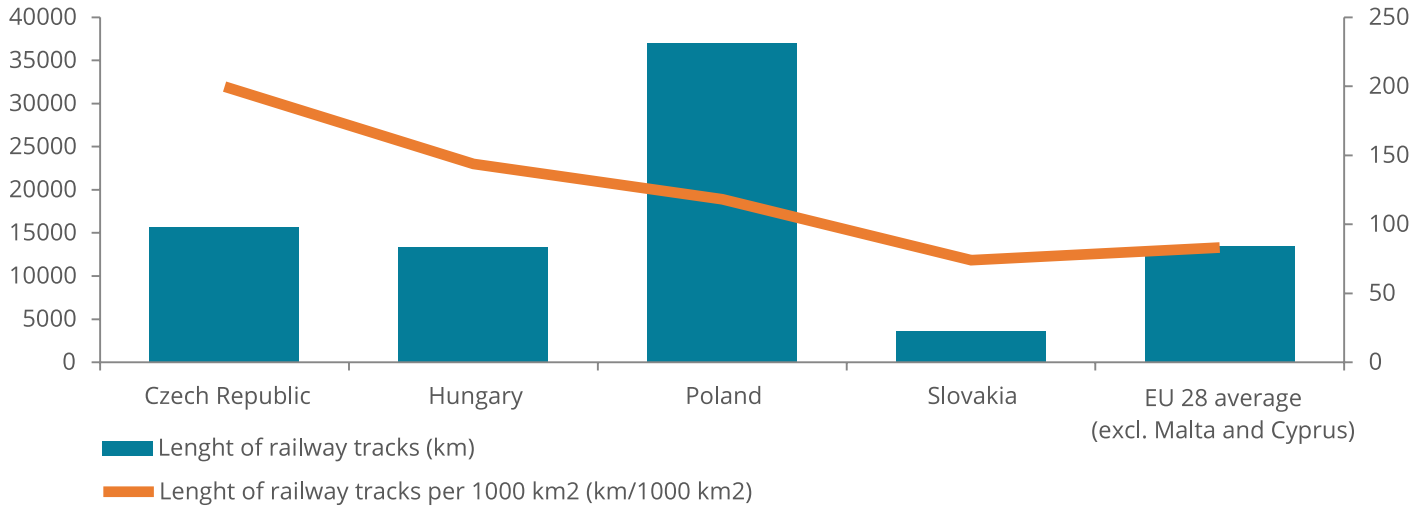
The low level of cross-border passenger transport and trade between V4 countries lies in the **poor state of the local infrastructure.**

2.3.1 Rail infrastructure of V4 countries is relatively better developed compared to other EU countries in terms of length of railway tracks

The length of railway tracks in V4 is dominated by Poland with almost 37 000 km of lines, representing 53% of all V4 railway tracks. It has to be emphasised that the total length of tracks does not present the full picture, since V4 countries' area varies significantly. In terms of railway tracks density, the Czech Republic is the leader, with almost 200 km of tracks per 1000 km2.

The Visegrad Group resembles the railway track density of EU28, however, with Poland exceeding EU28 average nearly three times, and Slovakia having nearly three times less kilometres of railway tracks per 1000 km² than EU28.

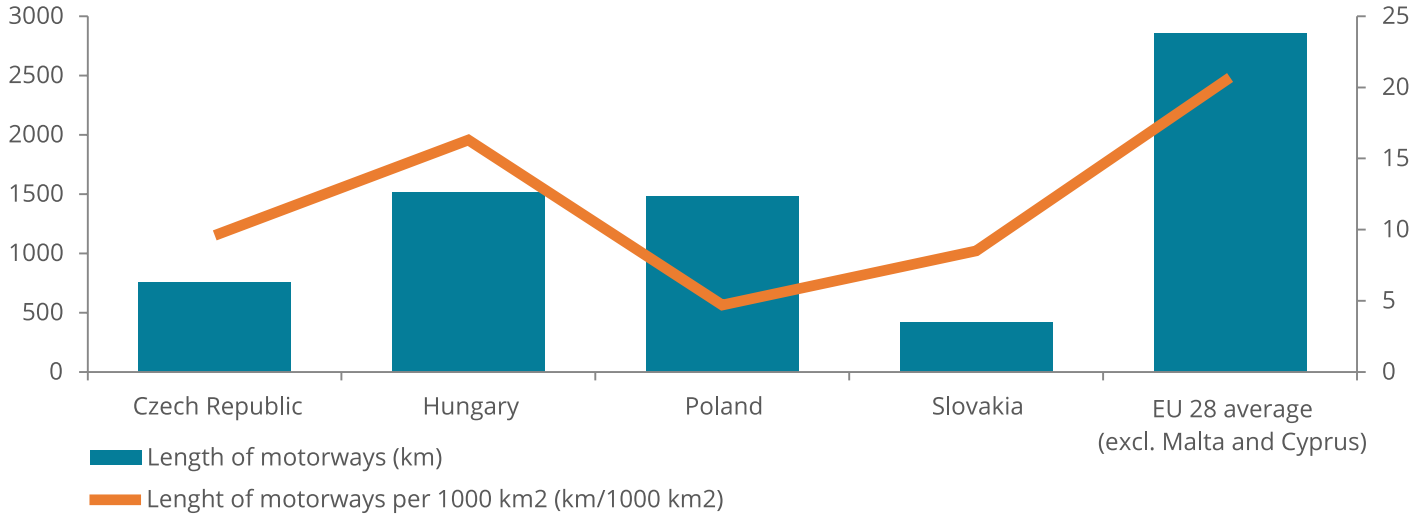
Figure 7: Length of railway tracks (EUROSTAT 2013 or earlier depending on data availability)



2.3.2 Road infrastructure is less developed in V4 countries compared to the EU average

There are much more similarities in V4 in terms of road transport than in railway transport. The total length of motorways is the highest in Hungary (1515 km) and the lowest in Slovakia (419 km). The EU28 average of motorways' length is much higher than in every V4 country. The same can be observed for another variable – motorways' density. In that case Hungary is the leader again, while Poland is at the very end of V4.

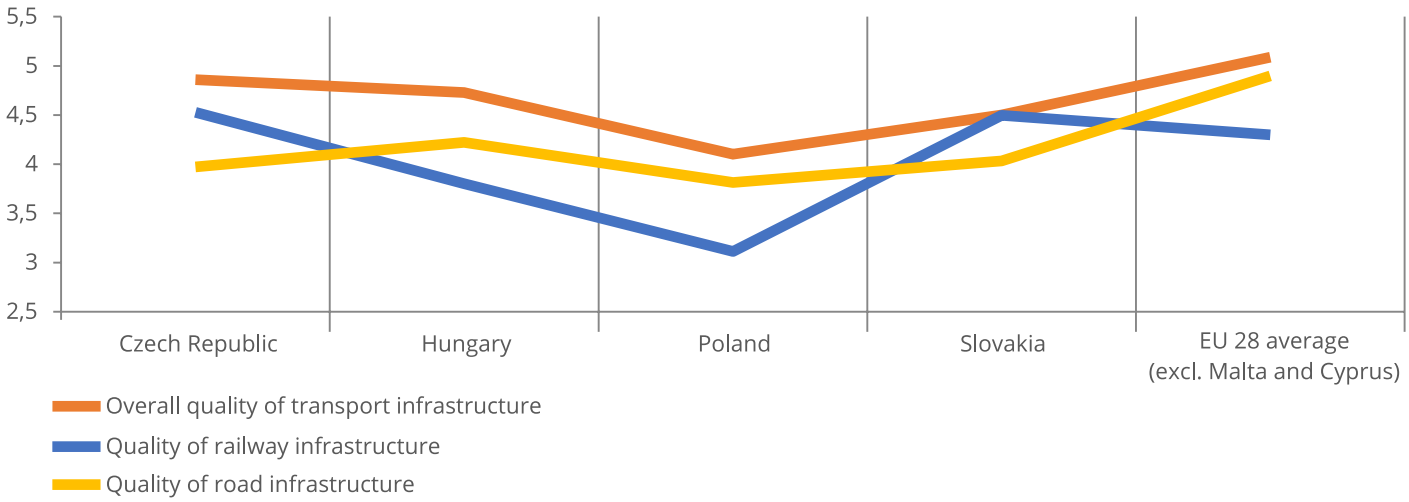
Figure 8: Length of motorways (EUROSTAT 2013 or earlier depending on data availability)



2.3.3 Overall quality of transport infrastructure in V4 countries is poor

The quality of infrastructure has been measured by The World Economic Forum as a part of Global Competitiveness Index. The results, as of 2014-2015, in general for transport infrastructure and separately for roads and railways are presented below for V4 and EU28. The first conclusion is that Poland's infrastructure has the lowest quality when compared to both V4 and EU28. The second conclusion is, overall, V4 infrastructure quality is still below EU28 level. Only two V4 members, Slovakia and Czech Republic, are close to EU28 thresholds in terms of railroad infrastructure.

Figure 9: Quality of infrastructure (1-7 (best); The World Economic Forum 2014-2015 or earlier depending on data availability)



2.3.4 Overall quality of cross-border infrastructure is also poor

Regarding the road network, it can be stated that the East-West connections are more developed than the North-South.[12] Interesting numbers can be found in the field of border crossings. Traffic must travel more to the nearest border crossing at the internal V4 borders (Table 1) than in the case of the external V4 borders (Table 2)

Table 1: Border crossings between V4 countries (2012)

Border	Length [km]	Number of land border crossings	Average distance between border crossings [km]
Czech Republic – Slovakia	**252**	**22**	**11,45**
Poland – Czech Republic	**762**	**36**	**21,17**
Slovakia – Hungary	**515**	**26**	**19,81**
Poland - Slovakia	**444**	**19**	**23,37**

Source: G. Gaal, M.Csete, A. Torok, Regional Development of the Transportation Systems of the V4 Countries

Table 2: Border crossings at the external borders of the V4 countries

Border	Length [km]	Number of land crossings	Average length between border crossings [km]
Hungarian – Austrian	**366**	**22**	**16,64**
Slovakian – Austrian	**91**	**8**	**11,38**
Czech – Austrian	**362**	**26**	**13,92**
Czech – German	**646**	**46**	**14,04**
Polish – German	**456**	**36**	**12,67**
Polish – Ukrainian	**526**	**12**	**43,83**
Hungarian - Romanian	**443**	**15**	**29,53**

Source: G. Gaal, M.Csete, A. Torok, Regional Development of the Transportation Systems of the V4 Countries

12 G. Gaal, M.Csete, A. Torok, Regional Development of the Transportation Systems of the V4 Countries.

2.4 Solution enhancing integration of V4 countries can be the TEN-T corridors

2.4.1 There will be 2 TEN-T corridors in the V4 area

Trans-European Transport Networks (TEN-T) are a plan set of transport networks (road, rail, air, and water) in the EU. The main goal of this project is to provide integrated and intermodal long-distance, high-speed routes across the EU. The V4 members are also a part of it within the two corridors Baltic – Adriatic (Poland, Czech Republic, Slovakia) and Rhein-Danube (Czech Republic, Slovakia, Hungary).

The Baltic-Adriatic corridor is 2400 km long and will connect the Baltic ports in Poland with the ports of the Adriatic Sea, through industrialized areas between Southern Poland (Upper Silesia), Vienna and Bratislava, the Eastern Alpine region, and Northern Italy. It starts at the harbours of Gdansk and Gdynia, connecting via strong economic centres, like Warsaw, Vienna, and Venice, to Trieste and Ravenna. The corridor has branches from Szczecin to Katowice, from Graz via Udine to Trieste, and via Ljubljana to Trieste/Koper. The corridor will provide better access to Baltic and Adriatic seaports for the economic centres in Poland, the Czech Republic, Slovakia, and Austria. Detailed map of the Corridor is presented below.

Figure 3. TEN-T Baltic Adriatic corridor

Source: www.ec.europa.eu

The Rhein-Danube corridor will provide the main east-west link between continental European countries, connecting France, Germany, Austria, Czech Republic, Slovakia, Hungary, Romania, and Bulgaria all along the Main and Danube rivers to the Black Sea by improving (high speed) rail and inland waterway interconnections. The details of this corridor are presented below.

Figure 4. TEN-T Rhein-Danube corridor

Source: www.ec.europa.eu

2.4.2 V4 countries can cooperate on the improvement of cross-border connections

To succeed with development of the TEN-T corridors, cooperation between the V4 countries is required. For both corridors, the main issues lie in upgrading the cross-border connections and inefficient cross border procedures.

On the V4 part of the Baltic-Adriatic corridor, the multimodal cross-border connections between Vienna, Bratislava, Ostrava, and Katowice must be upgraded. For the Rhein-Danube corridor, the major issues and missing links remain: cross-border rail interconnections between Germany, France, Austria, and Czech Republic, development of rail (probably high-speed), and development of inland waterways transport.

All V4 countries have planned investments in the cross-border sections, which aim at upgrading technical parameters of the infrastructure, such as maximum speed, length of the train, maximum pressure on tracks, etc.

Actions have also been taken to coordinate activities of all Visegrad governments. On June 24th, 2014, the Prime ministers of V4 countries signed the Memorandum of Understanding in Budapest, concerning the Roadmap for Determining the Future Development of the Transport Networks of the Visegrad Group Countries. This document constitutes a foundation for cooperation and joint coordination of V4 countries' activities in infrastructure investments. Another institution that helps to coordinate these activities is the Presidency of the V4 Group. The role of the presiding country is to present high-level program of the tenure. As part of the program, the presiding country arranges expert meetings to exchange experiences, mobilizes governments to work out joint position on infrastructure topics discussed at the EU level, and coordinates actions to obtain financing from CEF. These actions must be assessed positively; however, we see more areas for cooperation.

One of the key issues in context of cross-border connections is different voltage of railway traction in different countries. Traction in Poland has 3 kV. Czech Republic and Slovakia are split into parts with 3 kV and 25 kV. Hungary is entirely covered with 25 kV voltage traction.[13] As of now, different voltage of traction forces rail operators to use different locomotives for different countries. This lengthens travel time and increases costs – the operators often must borrow locomotives from the national operator of the specific country and are charged commercial rates for this service. An alternative would be a multi-traction locomotive, or a so-called interoperable locomotive, which can use tractions with different voltages. However, these locomotives are considerably more expensive - they cost 10-15% more than traditional ones. Technical maintenance and repairs are also much costlier. Therefore, operators would only invest in these locomotives if the time savings over locomotive change at the border can justify it. From the point of view of the train operator, it is not relevant which company provides the traction service with the multisystem locomotive, as long as a competitive price is offered. Therefore, the national railway companies of V4 countries could create **a pool of multi-system locomotives that could be deployed, based on the demand, instead of creating competition for traction services by parallel procurement of the locomotives.** Joint purchase of such locomotives, thanks to larger scale of order, would enable negotiation of lower prices for locomotives and more favourable maintenance conditions.

Delays on borders between V4 countries also results from cross-border procedures for passenger and freight trains. The time needed for cross-border procedures is linked to several factors, including:

- Level of interoperability: If traction is different across the border (electric/diesel), a change of locomotive is required. Similarly, if the electrification and signalling/safety systems are different on either side of the border and no multisystem locomotives are available, locomotives must be changed.
- Technical wagon inspection (e.g. breaks) are carried out to ensure the condition of the wagons entering a country conform to national regulations.
- Documents concerning the train and the cargo are exchanged. If not done electronically, it will add to the time needed for border procedures.
- Even when multi-system locomotives are available, the lack of mutual acceptance of drivers may prevent the same locomotive from travelling across the border, hence, border-crossing is delayed.

Transit times for rail freight services can be reduced considerably by **introducing trust based train handover procedures, harmonized among all V4 countries and aligned with EU regulations.** These should be based on mutual agreements between train operators from Poland, Czech Republic, Slovakia, and Hungary, in which the technical handover procedure is only carried out by one operator, while the other operator (or operators) 'trusts' the technical checks already carried out. Such agreements would comprise references to the mutual acceptance of rolling stock. Railway companies would have to accept any technical inspections or checks on rolling stock carried out by railway undertakings with agreements of mutual confidence to speed up the border dispatching procedures. A rail operator may also carry out the technical inspection of rolling stock in one of its hinterland terminals.

Cross-border procedures could be further simplified by **harmonising operational and safety rules.** This way, procedures to change, e.g. tail signal lamp, breaking sheet, and wagon list could be avoided. The transport of hazardous goods could also be speeded up by **carrying out the detailed inspection only at the origin and the destination** of the train. The establishment of **cross-border operation centres** can further enhance cross-border procedures by taking responsibility for cross-border traffic management, quality management, and real-time information to customers.

Mutual acceptance of train drivers could speed up cross-border procedures, as the same train personnel can drive the train for the entire length of the route. The mutual acceptance will be facilitated through the harmonised train driving licences introduced in the EU by Commission Regulation (EU) No 36/2010. As not all train drivers will automatically receive the licence accepted all over the EU, train

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operators must invest in the training of their train drivers, so more of them could get this new licence. To enhance the process of obtaining new licences by train drivers, **rail operators of V4 countries could launch joint training programs** to share experiences and teaching resources.

2.4.3 V4 countries can work on establishing appropriate financing and increasing competitiveness of collective transport to enhance cross-border transport between them

Until 1989, cross-border passenger services between V4 countries for road transport were monopolized by state-owned operators and subsidized. With the move towards market economy, road transport markets have been liberalized, which resulted in a large influx of private operators and cancelling of state subsidies. Nowadays, the market of cross-border transport passenger services between V4 countries is dominated by private organizations, and the service is fully commercial; no discounts for social groups with lower purchasing power (students, pensioners, etc.) are legally granted.

Passenger services for rail transport are partially subsidized. Long distance intercity connections, with exception of a few routes, are realized by national monopolies, such as PKP Intercity in Poland, ČD in Czech Republic, ZSSK in Slovakia, and MÁV-START Zrt in Hungary. Regional cross-border connections are realized by regional carriers. Discounts for social groups with lower purchasing power are legally granted only within the country where the person lives or is studying. Apart from legal passenger discounts, most of the cross-border connections are subsidized, as attendance is too low to offer them as a commercial service. These subsidies concern only domestic sections of the international connections.

Comparing road to rail passenger transport services, road transport operators, despite no subsidy, offer highly competitive rates and more convenient time slots and routes. To **convince more passengers to travel between V4 countries**, governments can commit to three actions: subsidizing cross-border collective transport, increasing efficiency of cross-border rail transport, and creating more comprehensive travel offers.

Subsidies for cross-border collective transport can take the form of **simple increase of subsidies** to international rail connections or introduction of subsidies to road connections. Such solutions, however, are subject to negotiations at the political level and do not motivate operators to increase efficiency of their offerings. Therefore, its' usefulness would require in-depth analysis of benefits and costs.

V4 countries can also introduce **mutual acceptance of legally granted discounts for students, pensioners, and other groups with lower purchasing power.** Thanks to this solution, the mentioned groups would benefit from their discounts on the entire route, not only on the domestic part of the route. On the financing side, **governments would have to repay each other's liabilities.** So, e.g. a Czech pensioner, travelling from Prague to Warsaw by train would pay for the ticket price minus his respective discount, which would create liability of Czech government to the Polish government equivalent to the lost revenue (i.e., amount of money the Czech pensioner is not paying while travelling on the Polish part of the route, because he has his discount). Reverse scenario would work if a Polish pensioner would like to travel by train from Warsaw to Prague.

This example only presents general idea of mutual acceptance of discounts. Precise mechanism of reimbursement and decision on which groups should benefit from it would be subject to detailed analysis and negotiation to reach a compromise, acceptable to all parties involved. At this stage, **we recommend excluding from the process the staff of railway companies, who enjoy excessive discounts.** Granting them identical discounts outside of their home country would enable them to travel to V4 countries nearly for free and would create excessive liabilities for the governments. It is also worth mentioning that mutual acceptance of discounts **can be attractive in the context of ageing populations** of V4 countries, which will cause growing number of pensioners who could benefit from this solution.

Increased efficiency of cross-border rail transport can result from liberalization of international connections between V4 countries. Liberalization, defined as choosing operator of each international connection in competitive tender, would enable choosing the most efficient operator in terms of cost efficiency, time of travel, and general quality (customer service, standard of rolling stock). Origin of the company, in this model, should play no role. Even in the competitive tender, state monopolies have the highest chance to continue realizing the service due to their current expertise and government support. Still, the sole fact that state monopolies would be challenged by competition would cause efforts to improve quality of their services.

Liberalization of rail passenger transport and freight in V4 countries has been enforced by the EU since early 2000s; however, by April 2016, state-owned monopolies were still dominating. In the passenger segment, Arriva-PCC was the first new rail market entrant into the passenger transport market in the V4. It has been transporting around three million people per annum in northern Poland, since 2007. The short term goal of Arriva-PCC was to expand further in Poland and enter the Czech Republic. However, by April 2016, this goal has not been accomplished.[14] A similar case has been observed in Slovakia, where in January 2011, ZSSK lost its monopoly on subsidised passenger transport, as RegioJet was awarded a contract to operate Bratislava - Dunajská Streda -Komárno services. However, the general notion for passenger rail transport in V4 countries is that none of the private passenger rail operators gained significant market share. International passenger rail connections in Poland were supposed to be open since 2015/2016 rail schedule[15]; however, by 2016, no significant competition for state monopolies was present.

Liberalization of freight markets has been more intensive. The freight companies (PKP Cargo, ŽSSK Cargo, ČD Cargo, Rail Cargo Hungaria) have functioned independently from the former incumbent companies since 2001-2007.[16] Gradually, new, privately owned organizations, entered the market and have been active on international routes. Nevertheless, in freight markets, state monopolies sustained dominant market share.

Creating more comprehensive travel offers means providers of cross-border collective transport services must work on creating new sales channels and cross-selling. These offers could be combined with offers of touristic destinations (e.g. promotions offering tickets combining a rail ticket and entrance fee or local public transport). **Governments of V4 countries should establish a forum for operators to share their experiences.**

2.4.4 V4 countries can also cooperate on using combined transport and block trains to enhance export to non-V4 countries

Combined Transport is a system of transporting goods in one transportation unit (large container, swap body, a rollable container) or on a road vehicle, which also makes use of rail or water transport. It involves the transportation of a load in one transportation unit, using several types of transportation, and only the combined-transport transportation unit is re-loaded, not the goods, themselves. The term, inter-modal transport, means freight transport during which the truck, trailer, semi-trailer, removable swap body, or a container uses roads for the initial and/or final leg of the trip, and in the remaining sector, is transported, with the towing vehicle, or without it, by rail, via a water route, or by sea.[17]

A unit train, also called a block train or a trainload service, is a train in which all cars (wagons) carry the same or diversified commodity and are shipped from the same origin to the same destination, without being split up or stored en route. This saves time and money, the hassle, delays, and confusion associated with assembling and disassembling trains at rail yards near the origin and destination. It also enables railways to compete more effectively with road and internal waterway transport systems. However, unit trains are economical only for high-volume customers. Since unit trains often carry only one commodity, cars are all of the same type, and sometimes, the cars are all identical, apart from

14 A. Kelemen-Erdős, Measuring Railway Market Attractiveness: Evidence from the Visegrad Countries
15 http://kurierkolejowy.eu/aktualnosci/10008/kto-zdobedzie-polaczenia-miedzynarodowe.html
16 A. Kelemen-Erdős, Measuring Railway Market Attractiveness: Evidence from the Visegrad Countries
17 http://www.mdcr.cz/en/Railway+Transport/Combined+Transport/default.htm

possible variations in livery.[18] In terms of payment, the customer pays for the entire capacity of the train; therefore, risk of low utilization of the train is on his side. Therefore, for uniform goods, it is essential to generate regular high-volume shipments, whereas manufacturers of different goods, willing to use the block train service, can form consortia to cumulate their volume.

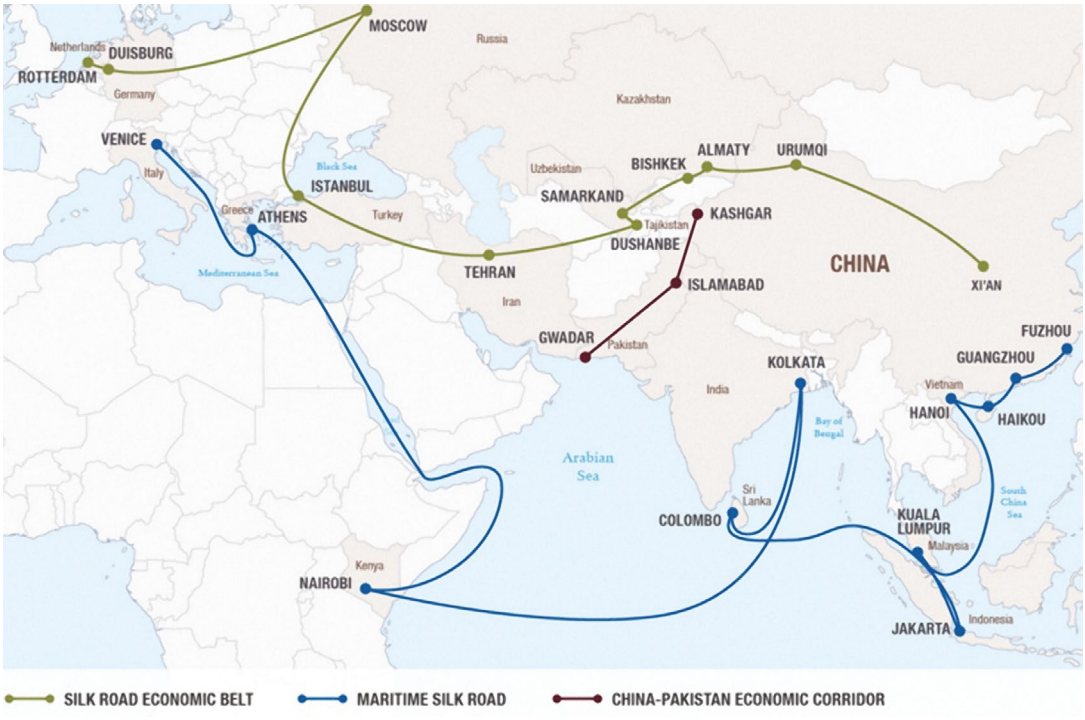
V4 countries can benefit from the two described business solutions by building multimodal transport terminals near to trans-border economic centers. As trans-border economic centers, we understand regions comprising territories of at least two V4 countries are characterized by intensive economic activity on both sides of the border. As a trans-border economic center could serve, e.g. automotive clusters in Polish Silesia region, the Czech Republic, and Slovakia, V4 countries, in this case Poland, Slovakia, and Czech Republic, could commit to building a multimodal transport terminal, which would serve the local automotive factories. Cars would get from factories to the terminal, where the shipments would be consolidated and sent to the customers. Thanks to joint orders, car manufacturers could use the block train service and benefit from lower rates.

Other industries that might benefit from this idea might be factories producing electronics and household appliances in Poland, the Czech Republic, Slovakia, and Hungary and mining industries in Poland and the Czech Republic. Potentially, even single factories from niche industries could benefit from this solution. Rail operators could create flexible offers, where they would take risk of train utilization on their shoulders. Or, if the operators would only offer the block train service, small factories could form consortia with other large volume clients. Multimodal transport and block trains could enhance export from V4 countries to Western EU and, in long-term perspective, to Asia. Western EU countries are the main export partners of V4 members, whereas international trade with Asia has been receiving growing publicity due to Silk Road Economic Belt.

In 2013, Chinese President Xi Jinping proposed an initiative of jointly building the Silk Road Economic Belt, which attracted attention from all over the world. This project is aimed at boosting the trade between Asia, Europe, and Africa based on policy coordination, facilities connectivity, unimpeded trade, and financial integration. The V4 countries may benefit from its existence, since they are on the route of the Belt. Since the project has no official framework and path, it is important to observe the situation and join any initiative or mechanism leading to Silk Road development. V4 and its leaders may play an important role by, i.e. promoting the idea at the EU level or creating financial and operational mechanisms in V4 countries to cooperate with Asian partners. The unofficial Silk Road Economic Belt map is presented below.

Figure 5. Proposed routes of the Silk Road Economic Belt

Source: Xinhua



18 https://en.wikipedia.org/wiki/Unit_train

3. AUTHORS

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Team Leader Finance

Born in Poland, raised in Germany, Damian understood early on in his life about the benefits of cross-cultural cooperation. His career path led him through some of the world's financial centres, including London, Frankfurt, Moscow, Shanghai and Singapore. For his studies in CEMS International Management and International Business he has chosen Cambridge, Berlin, Warsaw and Hong Kong.

As alumni of the Academy of the Leaders of the Capital Market, the American Institute of Political and Economic Systems in Prague and Visegrad School of Political Science, he is largely engaged in Central Europe's integration. He organised the Central and Eastern Europe Capital Markets Leaders Forum in Warsaw and contributes to the public debate on the region's development in finance, education and entrepreneurship through publications and comments in media. In his free time Damian is a passionate football and rugby player and a dedicated passport stamp collector.

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Paweł has two years of experience in project and structured finance with the biggest bank in the CEE. He is also involved in matters relating to infrastructure and energy investments. Prior to his role at the bank he gathered experience in at legal firms, providing capital market related services.

He graduated from the Faculty of Law at the University of Warsaw (with distinction) and pursues his second degree at the Warsaw School of Economics. He also studied at the University of Zurich and completed the German Law School organised by the University of Bonn.

In his spare time Paweł develops non-governmental and charity projects. He leads the Infrastructure Team at the Young Reforming Poland and is a member of the board at Weimar Triangle Association. Paweł also helps developing several projects of the Lesław Paga Foundation, including the Capital Market Leaders Academy. He also enjoys reading books and playing basketball.

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Damian has 5 year experience both in private and public sectors. He is currently engaged in FinTech and Venture Capital sectors developing an international private bank. Previously he has been working an investment professional in Polish State Railways Group (transport and real estates), Credit Suisse and Bastion Group (investment banking).

Besides business he is engaged in a number of pro bono initiatives concentrated on capital markets education in Leslaw Paga Foundation through participation in Capital Market Leaders Academy and CEE Capital Market Leaders Forum as an originator and project manager. He is also a member of the Board in "The Young Reforming Poland" association dealing with public policy issues as an expert for energy, infrastructure and capital markets.

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Dominik is a passionate of analysing varying businesses from financial and strategic perspective. He started his career while pursuing two bachelor faculties at Poznan University of Economics, namely: Strategic Management and Finance & Accounting. During his studies he completed a one year internship in the Valuation and M&A department of Polish branch of international advisory firm Grant Thornton. After exploiting opportunities in Poznan he decided to move to Warsaw, where he completed summer internship at Innova Capital – one of the leading Private Equity firms in the CEE region. The internship sparked his interests in the Private Equity industry, in which he decided to specialize in his further academic endeavours. Currently Dominik is pursuing his two-year master's degree in Finance & Investments at Copenhagen Business School. This year, he will also join Deutsche Bank, as a Summer Analyst at Investment Banking Department in London. In his spare time Dominik enjoys traveling, cinematography and ethnic music.

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Sebastian has over three years of experience in corporate finance. Currently he works as an Analyst in the Investment Banking Division of a leading bank in CEE. Previously engaged in the venture capital sector, the capital market and research on the financial institution regulations. He is an alumnus of the Capital Market Leaders Academy.

Systematically uses professional and academic background to leverage various charity and social projects. He is a member of the innovation policy team in The Young Reforming Poland association. While studying he was the vice chairman of the leading student project in the field of monetary policy in Poland. His passion to share knowledge with others caused him to develop an educational project which aims to increase awareness of economics and finance, especially among young people.

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Petra was born in Slovakia, but moved to Prague, Czech Republic, where she is already living for 6 years. She finished bachelor's degree in economics at University of Economics in Prague and is currently finishing master's degree in Law at Charles University. During her studies she participated in different student NGO projects as a project manager or financial director. She is interested in business and investments and is working for small czecho-slovak investment company as a financial analyst engaged not only in analysis, but also in many legal questions targeting the ongoing business. Her hobbies are fitness, weight lifting and travelling.

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Zsombor was born in Budapest, Hungary. He has a strong interest towards entrepreneurship and capital markets, he has launched his first business as a high-school student. Currently he studies Finance MSc at Corvinus University of Budapest after his BA in Applied Economics. His engagement in student life was topped by serving as the Chief Financial Officer, Member of Directorate at Heller Farkas College of Advanced Financial Studies. He has done several internships in various industries. His most recent internship was at Morgan Stanley's Budapest-based securitized products structuring team where he had focused on residential mortgage backed securities. He still has his business interests in IT/real estate. His scientific achievements include student papers in the topics of SMEs, behavioral finance, FDI or energy. In his free time he likes orienteering, sailing and natural photography.

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Joanna is a lawyer, currently on the last year of Advocates' Training at Warsaw Bar of Advocates. Joanna is scholar of double scholarship of the Rector of the University of Rzeszow for the best students and double scholarship of Lesław A. Paga Foundation in programs Academy of Energy and Academy of Analysis and Media. Joanna is also an alumni of Florence School of Regulation, a Programme Specialised Training Course on Regulation of Gas Markets. Joanna gained experience about the Polish and EU regulations during her work for Polish Energy Regulatory Office, law firms, Polish Power Exchange as well as during course in Florence School of Regulation. Currently Joanna works at Tax & Legal Department at PwC Poland where provides tax and regulatory consulting for energy and oil&gas companies. As an alumni of Lesław A. Paga Foundation she was co-author of numerous publications regarding energy sector and tax law. Joanna is passionate of energy sector and new technologies.

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Although, during studies he never considered working in rail industry, after graduation he became Business Assistant to the CFO of Polish Intercity Railways and became passionate about railways. As Assistant he helped to coordinate implementation of high-speed railways in Poland and supported CFO in daily activities. Currently works as analyst at EY.

Tomasz took part in multiple extracurricular activities such as Youth Reforming Poland. He has reached the finals of EY Financial Challenger, the most prestigious transaction advisory competition in Poland and is a scholar of the Capital Markets Leaders Academy, prestigious fellowship program for young high-potentials. Privately passionate about travelling and mountaineering. Occasionally Tomasz publishes columns on railways, Warsaw and travelling.

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Ondřej was born in the Czech Republic. Currently he is a doctoral student at the University of Economics in Prague, Faculty of Business Administration, Department of Entrepreneurship. He is interested in entrepreneurship and evaluation of impacts of entrepreneurial policies. Previously he obtained master degree in economic policy at the same University. Ondřej also studies a master degree in Entrepreneurship at Linnaeus University in Sweden. Ondřej is not only theoretically interested in entrepreneurship, he has been also engaged in his own business activity focused on data analysis and econometrics tutoring since 2013. To his hobbies belong sport, geocaching and playing chess.

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Piotr is currently an entrepreneur, running a family business in Bydgoszcz, Poland. Since 2011 he has been working both in private and public sectors. Among others, he took part in consulting projects in PwC, advised Polish Minister of Infrastructure on road, railway and aviation regulations, and co-managed the market analysis department in Polish State Railways. He graduated from ESCP Europe Business School (MSc) and Poznan University of Economics (BA). Piotr is also engaged in numerous non-profit initiatives such as Lesław Paga Foundation, Civil Development Forum, Youth Reforming Poland association and Toastmasters International. He is passionate about mountain trekking, exotic travels and public speaking.

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