The rise of Digital Challengers

How digitization can become the next growth engine for Central and Eastern Europe

Perspective on Romania
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Since McKinsey & Company opened its Bucharest office in 2007, it has become a valued and trusted advisor to the largest local companies and multinationals operating in Romania. We have supported our clients in addressing opportunities related to strategy, digital and advanced analytics, operational improvements or portfolio restructurings, organizational changes and sustainability initiatives.

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About the Digital Challengers research

This report is part of a wider research into the potential of the digital economy in Central and Eastern Europe. In our November 2018 report, “The rise of Digital Challengers: How digitization can become the next growth engine for Central and Eastern Europe” we cover the regional perspective, joined by additional country reports for Czech Republic, Hungary, Poland, Romania, and Slovakia.
This report constitutes a perspective on Romania as part of a wider research analyzing the opportunities presented by the digital economy in Central and Eastern Europe (CEE). Using new research of our own and an examination of published sources, we define the economic potential from accelerated digitization in the country. We consider Romania, alongside nine other markets in the region (Bulgaria, Croatia, the Czech Republic, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia), as a “Digital Challenger” demonstrating strong potential for growth in the “digital economy”, emulating the group of relatively small, highly digitized countries we refer to as “Digital Frontrunners”, namely Belgium, Denmark, Estonia, Finland, Ireland, Luxembourg, the Netherlands, Norway and Sweden.

Discussion about the opportunities and challenges of digitization has been ongoing for many years. We aim to provide a unique perspective: a comprehensive, fact-based analysis that, for the first time, attempts to quantify the size and growth rates of digital economy in Romania as well as the CEE region and provide realistic scenarios for the economic impact of digitization through 2025. This approach enables us to understand in a quantifiable and comparable way how the digital economy is evolving across countries and against the most relevant benchmarks. We provide primary insights on the level of digitization in individual sectors across Romania and the CEE region (Chapter 1).

Building on previous research conducted for Romania, a core part of the study is our investigation of the impact of digital transformation on the labor market (Chapter 2). Our discussion here covers both the shifts in society caused by the new technology and the increasingly accessible nature of the labor market as a result of the digital transformation. Following this, we turn to consider a comprehensive, yet prioritized list of digitization enablers for Romania, including the relative strengths of the country and key areas on which to focus going forward (Chapter 3). Our insights in this chapter are based on quantitative analysis and discussions with numerous market experts.

In the final chapters of our study, we look at the vital role of collaboration in CEE, emphasizing the importance of capturing regional scale effects, tackling common challenges and sharing best practices in matters related to stimulating digitization across the region (Chapter 4), and examine the implications for policy makers, companies and individuals (Chapter 5). This final section contains a list of actions for these stakeholders to capture the digital opportunity.

The ideas we present build on those outlined in our previous reports Digital Europe: Pushing the frontier, capturing the benefits; A future that works: Automation, employment, and productivity; as well as Digitally-enabled automation and artificial intelligence: Shaping the future of work in Europe’s digital front-runners. We would like to take this opportunity to thank the authors of these publications as well as the McKinsey Global Institute – in particular Jacques Bughin, Senior Partner in Brussels, and James Manyika, Senior Partner in San Francisco, for their expertise, insights, inspiration and guidance.

The work on this report was led by Jurica Novak, McKinsey’s Managing Partner in Central Europe, Daniel Spiridon, Managing Partner in Romania, with significant contributions by McKinsey Partners Marin Purta and Tomasz Marciniak, and Associate Partner Karol Ignatowicz in Poland. These individuals worked together with a team comprising the consultants Kasper Yearwood, Roxana Tuncanu and Stefan Socratescu, as well as Joanna Iszkowska, Milena Tkaczyk, Oana Ionuțiu and many others.

At the same time, we would also like to thank the many area experts from the public, private, and social sectors who provided insights, source data and helped advance our thinking. In particular, we would like to acknowledge the collaboration with Google on this research, including contribution of analytical inputs and insights leveraged in this report.
The rise of Digital Challengers

Roma尼亚 as a Digital Challenger

For Romania, the potential economic and developmental benefits of digitization can reach up to €42 billion in additional gross-domestic product (GDP) by 2025. This would lead to increased global competitiveness and prosperity for the country’s 20 million people and allow Romania to join the most digitally advanced economies in Europe.

1. SIMILARLY TO OTHER CEE MARKETS, THE CURRENT GROWTH ENGINES OF ROMANIA ARE LOSING MOMENTUM

Over the past 20 years, Romania has experienced rapid development (GDP per capita grew by 136 percent between 1996 and 2017), fueled by dynamic exports, investments from abroad, a growing workforce with labor-cost advantages, as well as funding from the European Union. Lately, however, many of these drivers are beginning to lose their momentum. Significantly undercapitalized compared with more advanced European economies, Romania is also experiencing a shrinking and increasingly more expensive workforce, with unemployment at record low levels (4.9 percent in 2017). There is a need for unlocking new sources of productivity growth in the country. To continue on its path to increased general societal prosperity, Romania needs to redefine its growth strategy.

2. DIGITIZATION COULD BE THE NEXT DRIVER OF SUSTAINED GROWTH FOR ROMANIA, WITH €42 BILLION OF INCREMENTAL GDP BY 2025 AT STAKE

Our analysis shows that accelerating digitization and converging toward a tech-driven economy have a big potential to unlock the new growth engine that Romania requires. In 2016, the digital economy already accounted for 6.9 percent of GDP, the equivalent of €12 billion. Accelerating digitization in the country to close the gap to Northern European economies could see this base expand by up to €42 billion by 2025. In this aspirational scenario, the digital economy in Romania would grow at 10 percent per year by 2025. This could mean an extra percentage point on GDP growth each year over the period, a 25 percent uplift on the projected baseline growth for the country. Without this acceleration, a “business as usual” scenario would see the digital economy in Romania expand by only €18 billion to reach €31 billion by 2025. In this scenario, Romania would remain a long way from the “digital frontier” represented by countries in Northern Europe.

3. ROMANIA IS WELL POSITIONED TO CAPTURE THE DIGITAL OPPORTUNITY

In this report we consider Romania to be one of ten Digital Challenger markets based in Central and Eastern Europe. These countries exhibit lower digitization rates than the so-called Digital Frontrunners (Belgium, Denmark, Estonia, Finland, Ireland, Luxembourg, the Netherlands, Norway, and Sweden) or E.L.I.G.5 markets (France, Germany, Italy, Spain, and United Kingdom). However, Romania has strong foundations on which to accelerate its digitization. The size of the digital economy in Romania (at 6.9 percent of GDP in 2016) is above the CEE average of 6.5 percent, however, there is a clear gap to Digital Frontrunner markets such as Sweden (8.0 percent). In per capita terms, however, the differences are more pronounced: at €604, Romania trails both the CEE and Digital Frontrunner averages (€746 and €3,276 respectively). At the same time, the digital economy in Romania gained significant momentum: between 2012 and 2016, it grew by 10.8 percent a year, almost four times as fast as in the EU Big 5. Additionally, high-quality digital infrastructure (including one of the highest penetration rates for ultra-fast broadband), as well as a legacy technology lock-in that is milder than in Western and Northern European countries, lend support to Romania’s Digital Challenger status. Relative to other CEE markets, the country exhibits higher digitization rates in the manufacturing as well as utilities and trade sectors. In many digitization-enabling areas, however, Romania performs close to or even below the CEE average, indicating room for improvement. This especially holds true in areas such as the startup ecosystem (with a significantly smaller number of startups per capita), basic digital skills among individuals, as well as the adoption of digital tools by companies.

4. THE GOVERNMENT, BUSINESS LEADERS, AND INDIVIDUALS ALL NEED TO ACT FOR A SUCCESSFUL TRANSITION

To achieve the aspirational digitization scenario, Romania will have to focus on all stakeholders. Companies will need to understand and embrace the opportunities in digitization, increasing their adoption of digital tools contributing to improved productivity, as well as enabling them to reach new customers and expand into global markets. Today, companies in Romania lag their Digital Challenger peers not only in terms of the adoption of these tools, but also, for instance, in the degree to which they provide training to develop or upgrade ICT skills of their personnel. Among others, the proportion of Romanian large companies that capture benefits of big data or use cloud computing tools would need to more than double to reach Digital Frontrunner levels. The public sector could also integrate technologies increasing efficiency, as well as improving the services provided for both companies and citizens. The uptake of online services among the general population remains much lower than both the CEE and Digital Frontrunner average. For individuals, investing in lifelong learning for upskilling and reskilling will be key to take advantage of new labor market opportunities. Taking Romania to Digital Frontrunner level would mean almost eight times more adult Romanians participating in trainings. Policy makers are called upon to promote the adoption of technology in both the public and private sectors. They can also support workers through reskilling and upskilling programs (especially given Romania’s low adult participation rate in education and training, trailing both the CEE and Digital Frontrunner average), and improve the ecosystem for startups and the opportunities for digital innovation.

5. ROMANIA’S COLLABORATION WITH OTHER CEE DIGITAL CHALLENGERS IS KEY

The countries of CEE, Romania included, can capture the full potential of digitization only by cooperating closely with each other. Four reasons underpin the benefits of acting together:

- Scale effects: As the CEE region, Digital Challengers represent €1.4 trillion in GDP – almost seven times the size of the Romanian economy. Enabling Romanian enterprises to seamlessly tap into this potential can reap significant benefits. Promoting digital solutions across the region can help reduce the cost of cross-border trade. For example, Romania could work with other CEE countries to abolish barriers for a true Digital Single Market such as geo-blocking and data localization practices.
- Common challenges: Romania faces the same challenges as many other CEE markets, importantly the “brain drain” and the need to reskill the workforce in the long term. Joint efforts across the region can help in finding and implementing the most effective solutions.
- Similar starting points: Romania, like other CEE countries exhibits high levels of market openness and similar levels of digitization, besides cultural and historic commonalities. This adds relevance to their shared experiences on what has worked well in digital investments and regulatory policy.
- Best practices: Romania has developed different strengths related to the digital economy compared to other CEE markets. Sharing best practices can accelerate digitization. Leveraging the strengths of neighboring countries could limit the risk of harmful competition and allow for the creation of centers of excellence. Also, this could encourage regional coordination and planning: instead of developing solutions in isolation, Romania could speed up the development of its digital economy by replicating successful strategies already tested elsewhere.

In the future, Romania along with other Digital Challengers could work together on digital projects and policy solutions across the region – all with the aim of facilitating digital transformation. Also, a pan-CEE coalition could help ensure that the digital interests of the countries in the region are heard at the European level.

6. TO CAPTURE THE DIGITAL OPPORTUNITY, THE TIME TO ACT IS NOW

We believe that for Romania to benefit fully from the digital transformation, the time to act is now. The sustained economic growth and tight labor market indicates that it is the time to identify future productivity drivers and take necessary actions. Embracing digitization will help tackle labor shortages and prepare the economy and the population for the upcoming transformation of the labor market: Our analysis shows that up to 54 percent of workplace activities in the country today could be automated by 2030 using technology that already exists. This creates both a productivity increase opportunity and challenges related to transitioning the labor market to new job pools. Indispensable to this is a wide-ranging reskilling and promotion of lifelong learning. A critical set of enablers will be further needed including funding, culture of innovation, supportive tech regulatory environment and tech R&D. All digital economy plans have emphasis on governance touching on policies, regulations and guiding principles required to support a digital economy. In order to materialize Romania’s digital potential, public-private as well as the intra- and inter-sectional collaboration becomes even more crucial.
Pentru România, beneficiile economice potențiale ale digitalizării ar putea contribui cu 42 de miliarde de euro suplimentare la Prodioul Intern Băt până în 2025. Acest lucru ar determina o mai mare competitivitate la nivel global și o mai mare prosperitate pentru cei 20 de milioane de locuitori ai țării, și ar permite României să se alăture celui mai avansat nivelul european, din punct de vedere digital.

SIMILAR CU ALTE PIEȚE DIN EUROPA CENTRALĂ ȘI DE EST, MOOTOARELE CURENȚE DE CREȘTERE ECONOMICĂ A ȚĂRII NOASTRE SUNT IN DECELERARE ÎN ULTIMII 20 DE ANI. România a experimentat o dezvoltare rapidă (PIB pe cap de locuitor cu crescere de 101% în 1990-2016) și o mai mare creștere a economiei digitale până în 2025. În acest scenariu, România ar rămâne o creștere a economiei digitale din România de doar un scenariu "business as usual" ar lua în considerare un punct procentual suplimentar la creșterea anuală a PIB-ului. 

Analiza noastră arată că accelerarea digitalizării și conștientizarea potențialelor eficienței și îmbunătățirii serviciilor oferite atât companiilor, cât și cetățenilor. Adoptarea serviciilor online în rândul populației rămâne mult mai scăzută, atât față de media CEE, cât și față de media 'Digital Frontrunners'. Pentru a continua procesul de digitalizare, România ar trebui să se confrune cu schimbarea pe măsură în care se evidențiază potențialul digital al României, colaborarea cu alte țări CEE și îmbunătățirea ecosistemului de startup-uri. 

DIGITALIZAREA AR PUTEA FI URMĂTORUL MOTOR DURABIL PENTRU ROMÂNIA, CU 42 MILIARDE DE EURO ÎN PLUS LA PIB PĂNĂ ÎN 2025. Analiza noastră arată că accelerarea digitalizării și convergența spre o economie bazată pe tehnologie ar putea contribui cu peste 42 de miliarde de euro suplimentare la PIB-ul în 2025. În acest scenariu, România ar rămâne o economie digitală puternică, în special în zone cum ar fi ecosistemul de startup-uri și servicii online în rândul populației, precum și în adoptarea instrumentelor digitale de către companii.

PRINCIPALELE CONSTATAȚI

1. **РОМÂNIA ESTE ÎNTÎNÞO POZIȚIE POTENȚIALĂ PENTRU O BENEFACTOARE A OPPORTUNITĂȚII DIGITALIZĂRII**

În acest raport considerăm România ca una dintre cele zece piețe "Digital Frontrunners" din Europa Centrală și de Est. Acestea țări prezintă rate mai mici de digitalizare față de așa-numitele țări "Digital Challengers" (Belgia, Danemarca, Estonia, Finlanda, Irlanda, Luxemburg, Olanda, Norvegia și Suedia) sau piețele UE, "Big 5" (Franța, Germania, Italia, Spания și Regatul Unit). România ar putea beneficia de utilizarea instrumentelor digitale care contribuie la îmbunătățirea productivității, acestea fiind mai bine orientate să-și redefinească strategia de creștere.

2. **REALIZAREA OPORTUNITĂȚII DIGITALE**

În această perspectivă, România ar trebui să se asume ca o economie digitală la un pas pentru a atinge nivelul de "Digital Challenger" și să-și redefinească strategia de creștere. 

3. **TREBUIE ACȚIONAT PENTRU REALIZAREA OPORTUNITĂȚII DIGITALE**

Creedem că pentru că România să se bazeze pe deshing din pe urma transformării digitale, această este un moment crucial pentru a acționa. Creșterea economice susținută și lipsa forței de muncă indică faptul că este timpul de a identifica factorii de creștere a productivității pentru viitor și de a le utiliza. România ar putea beneficia de adoptarea serviciilor online în rândul populației, îmbunătățirea ecosistemului de startup-uri și îmbunătățirea calității serviciilor online. 

4. **ПРINCIPALELE CONSTATATI ИМПОРТАНТНІСТІ**

1. **ЩО ПОМІГАє ТЕХНОЛОГІЧНОЙ РОЗВІТТЕНІСТІ І ЕФФЕКТИВНОСТІ**

Pentru a realiza scenariul optimist de digitalizare, a fost necesară contribuirea tuturor părților implicate. Companiile vor trebui să înțeleagă și să coordoneze eforturile lor pentru a atinge nivelul de "Digital Challenger" și să-și redefinească strategia de creștere. Acest lucru ar putea contribui la creșterea eficienței și îmbunătățirea serviciilor oferite atât companiilor, cât și cetățenilor. Adoptarea serviciilor online în rândul populației rămâne mult mai scăzută, atât față de media CEE, cât și față de media 'Digital Frontrunners'. Pentru a continua procesul de digitalizare, România ar trebui să se confrune cu schimbarea pe măsură în care se evidențiază potențialul digital al României, colaborarea cu alte țări CEE și îmbunătățirea ecosistemului de startup-uri. 

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INTRODUCTION

Romania and Digital Challengers at a glance

From the perspective of economy and digitization, three broad groups of countries have emerged in Europe over the last three decades. The first group is formed by relatively small, open economies with very high digitization rates. This so-called Digital Frontrunners group comprises Northern European and Benelux countries: Belgium, Denmark, Estonia, Finland, Ireland, Luxembourg, the Netherlands, Norway, and Sweden. The second group is composed of the five biggest economies in the EU (so-called EU Big 5) – France, Germany, Italy, Spain, and United Kingdom. Compared with the first group, these countries typically exhibit much lower market openness, relying more on their large internal markets, combined with lower, albeit still high, digitization rates. Finally, there are ten countries of Central Eastern Europe – Bulgaria, Croatia, Czech Republic, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia.

Romania has recorded significant economic growth since the 1990s. Gross domestic product (GDP) per capita grew by 136 percent between 1996 and 2017. The main growth drivers in this period were traditional industries, dynamic exports, investments from abroad, labor-cost advantages, and the inflow of EU funds. But now these drivers are beginning to lose their momentum. The Romanian economy is generally undercapitalized relative to more advanced European economies: the ratio of capital, measured as net assets per employee, is more than 67 percent lower here than in the five largest economies in the European Union (the “EU Big 5” of France, Germany, Italy, Spain, and the United Kingdom). Workforce costs are rising, and there are limited labor reserves left to plug into the economy, with unemployment in Romania at low levels: 4.9 percent in 2017, compared with 7.6 percent in the European Union. Additionally, the working hours in Romania are already above the EU average. Moreover, productivity lags behind Western Europe, and the inflow of EU funds to Romania is likely to weaken after 2020. As a result, Romania needs a new engine to continue its economic growth.
Our approach to measuring the digital economy in Romania

The term “digitization” is widely used by economists. Yet its precise meaning is a topic of much discussion, particularly when it comes to measuring its impact on economies. Consequently, uncertainty reigns about the scale of the digital economy in Romania and CEE. In this report on Romania, similarly to its CEE edition, we try to strike a balance between the various definitions of digitization when looking at the digital economy. We define it as the sum of three components:

1. The value of the information and communications technology (ICT) sector, measured as the spending of government and companies across all sectors on hardware, software, and telecommunications solutions.
2. The value of online consumer spending on digital equipment.
3. The value of the e-commerce market, measured as online purchases of goods and services by consumers.

As discussed in The rise of Digital Challengers (CEE perspective) report, we have chosen this definition for two main reasons. First, it is relatively comprehensive—broad than just the ICT sector, yet more concrete than, say, “all activities related to digital data.” Second, reliable data is available for each of the three areas it covers, so its total value can be easily calculated (see methodology appendix). This enables us to use a bottom-up modeling approach, drawing on data collected at the national level.

According to our analysis, the digital economy in Romania accounted for 6.9 percent of total GDP in 2016. This is above the CEE average and on a par with the EU Big 5 average, while clearly lagging Digital Frontrunners markets such as Sweden. In per capita terms, the differences are more pronounced. The digital GDP per capita in Romania is around one-sixth the size of the Digital Frontrunner average, and one-seventh that of Sweden.

Importantly, however, historical dynamics indicate a faster growth pace for the digital economy in Romania than in the EU Big 5. Romania is even catching up to Digital Frontrunner markets in this respect. This is a positive indicator—with enough extra effort, Romania may be able to maintain or even accelerate further the pace of growth of its digital economy to catch up to or even overtake some of the more digitally advanced economies.
CHAPTER 1: DIGITAL ECONOMY IN ROMANIA

Sector-level digitization in Romania

Before identifying potential levers for achieving accelerated growth in Romania, we should look at the manner in which digitization has already taken place around the world. An examination of global trends indicates that there is no standard route to achieving high rates of digitization. Most markets, including Digital Frontrunners, have digitized unevenly, with large variations between different sectors and individual companies. To understand which sectors drive digitization at a "macro" level, we need a multidimensional view. The McKinsey Global Institute (MGI) Industry Digitization Index offers such a perspective, assessing digitization at the level of individual sectors. It uses eight indicators to capture different ways in which companies are digitizing. All results at sector level are weighted for the economic size of the sector and compared with the global digital frontier, namely, the ICT sector in the United States.

MGI INDUSTRY DIGITIZATION INDEX

Digital-asset spending
- Hardware spending: Share of total expenditure spent on ICT hardware (e.g., computers, servers)
- Software and IT services spending: Share of total expenditure spent on software and IT services (e.g., enterprise resource planning software)
- Telecommunications spending: Share of total expenditure spent on telecommunications (e.g., broadband access, mobile data services)

Digital-asset spending per worker
- Hardware spending per worker: ICT hardware (e.g., computers, servers) expenditure per full-time-equivalent employee (FTE)
- Software and IT services spending per worker: Software (e.g., enterprise software licenses) and IT services expenditure per FTE
- Telecommunications spending per worker: Telecommunications (e.g., broadband access, mobile data services) expenditure per FTE

Digital-capital deepening
- Hardware assets per worker: ICT hardware assets (e.g., servers, computers) per FTE
- Software assets per worker: Software assets (e.g., workers' software licenses) per FTE

The digital economy of Romania has developed unevenly, with digital leaders, followers, and novices emerging at sector level. Going forward, the priority for each sector will be to catch up with counterparts in digitally more advanced countries.

Sector-level digital leaders, followers, and novices in Romania

% of GDP

Digital leaders

Digital followers

Digital novices

The digital economy of Romania has developed unevenly, with digital leaders, followers, and novices emerging at sector level. Going forward, the priority for each sector will be to catch up with counterparts in digitally more advanced countries.

Sector digitization in Romania compared with CEE, EU Big 5, and Digital Frontrunner benchmarks

Low: <3%
Average: ~3%–10%
High: >10%

Comparing Romania with Sweden (a Digital Frontrunner representative), the biggest gaps in terms of digitization are found for finance, transportation and warehousing, utilities, and professional services. The trade and government sectors exhibit the smallest but still significant gap.

SOURCE: McKinsey Global Institute
Digitization can be the next driver of sustained growth in Romania

Looking ahead, we see two potential trajectories for further digitization in Romania.

In the first, a “business as usual” scenario, the country maintains its historical growth rate for the digital economy. The digital economy expands by €18 billion to reach 12 percent of GDP by 2025. The gap to Digital Frontrunners (measured as the digital economy’s share of GDP) remains almost unchanged, and the gap to the most dynamic markets, such as Sweden, increases.

The second scenario is an “aspirational” perspective. Here, we estimate the value at stake from Romania closing the gap to Digital Frontrunners. This would see its digital economy growing by €42 billion to reach 20 percent of GDP by 2025, translating into an extra one percentage point of GDP growth each year, or a one-fourth increase in the projected growth rate. The additional €24 billion, on top of the €18 billion impact of maintaining the historical growth rate, comes from increased productivity from closing the gap to Digital Frontrunners in the digitization of public and private sectors.

To reach this amount and close sectoral digitization gaps, Romania needs to increase its ICT spending levels to those of Digital Frontrunner markets (as a share of sector GDP). Achieving this would require acceleration of the digital transformation, especially in the sectors that lag furthest behind their Digital Frontrunner benchmarks and at the same time account for a significant share of the Romanian economy. This includes sectors such as manufacturing, finance, and utilities.

Capturing this potential will depend on all stakeholders embracing digital technology in the coming years. For companies, it will mean taking advantage of solutions enabling growing sales through digital channels, including boosting their export capabilities. For both public and private organizations, it will mean improving operating efficiency by integrating automation and streamlining solutions. For individuals, it will mean investing in developing the skills needed in the digital economy.
CHAPTER 2: IMPACT ON ROMANIA’S LABOR MARKET

The potential for work automation in Romania

Increases in GDP in Romania over the past decade were associated with employment growth and rising productivity. However, negative demographic trends such as declining birthrates, emigration, and aging could hinder the future development of the country. Assuming future employment projections and productivity growth rates at historical levels, this could put at risk up to 10 percent of the GDP growth rate by 2030.8

One of the sources of productivity acceleration in the future may come in the form of automation technologies. Following the approach we outline in The rise of Digital Challengers (CEE perspective)9, we estimate that up to 50–54 percent of workplace activities today in Romania – the equivalent of up to 4.4 million jobs – could potentially be automated by 2030 using technology that already exists today.10 This is close to the potential for the entire region, which we have estimated at 49–51 percent.11

Without an acceleration in productivity growth, demographic trends might cut GDP growth in Romania by −10%

Simulated long-term impact of employment growth on GDP, compound annual growth rate, %

NOTE: Projection assuming historical productivity growth and projected changes in employment growth.

SOURCE: MGI; McKinsey analysis

<table>
<thead>
<tr>
<th>Activity</th>
<th>Automation potential, %</th>
<th>FTE million</th>
<th>Automation potential, %</th>
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<td>Predictable physical</td>
<td>75</td>
<td>1.01–1.09</td>
<td>Agriculture</td>
</tr>
<tr>
<td>Processing data</td>
<td>71</td>
<td>1.02–1.05</td>
<td>Manufacturing</td>
</tr>
<tr>
<td>Collecting data</td>
<td>65</td>
<td>0.59–0.62</td>
<td>Trade (retail and wholesale)</td>
</tr>
<tr>
<td>Unpredictable physical</td>
<td>39</td>
<td>0.32–0.37</td>
<td>Construction</td>
</tr>
<tr>
<td>Applying expertise</td>
<td>23</td>
<td>0.28–0.31</td>
<td>Transportation</td>
</tr>
<tr>
<td>Interacting with stakeholders</td>
<td>22</td>
<td>0.16–0.19</td>
<td>Public administration</td>
</tr>
<tr>
<td>Managing people</td>
<td>9</td>
<td>0.13–0.15</td>
<td>Healthcare</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.10–0.13</td>
<td>Accommodation and food</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.06–0.10</td>
<td>Education</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.06–0.09</td>
<td>Utilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.07–0.08</td>
<td>Professional services</td>
</tr>
</tbody>
</table>

TOTAL AUTOMATION POTENTIAL IN EQUIVALENT NUMBER OF JOBS

Simulated growth, 2018–2030

NOTE: Projection assuming historical productivity growth and projected changes in employment growth.

SOURCE: McKinsey Global Institute analysis
opportunities and challenges of work automation

automation can help de-bottleneck industries with big labor shortages

Automation brings new opportunities as well as concerns. Technology adoption can be a significant productivity contributor, leading to stronger economic development. In the labor market, this could manifest itself by enabling employees to focus on more value-adding activities; for example, doctors and nurses could spend more time with patients rather than on performing administrative tasks. Additionally, industries with the highest job vacancy rates could benefit from automation as the problem of the inadequate labor supply is mitigated. In recent years, relatively low unemployment rates and a growing number of job vacancies in Romania have created a favorable labor market situation for employees, and challenges for employers. Sectors such as manufacturing, transportation, agriculture, and trade – all areas with a high potential for automation – have in recent years faced the biggest labor shortages. Digitalization and the implementation of technology could help companies in these sectors overcome workforce-related barriers and achieve growth.

Industries with the highest job vacancy rates could benefit from automation, unlocking economic growth stifled by inadequate labor supply.

<table>
<thead>
<tr>
<th>Industries with highest job vacancy rates in Romania</th>
<th>Job vacancy rate, Q4 2017, %</th>
<th>Automation potential, % of worked hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance and insurance</td>
<td>1.9</td>
<td>0.4–41</td>
</tr>
<tr>
<td>Transportation and storage</td>
<td>1.4</td>
<td>59–66</td>
</tr>
<tr>
<td>Information and communication</td>
<td>1.3</td>
<td>64–66</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1.2</td>
<td>50–63</td>
</tr>
<tr>
<td>Utilities</td>
<td>1.1</td>
<td>47–66</td>
</tr>
<tr>
<td>Professional services</td>
<td>1.0</td>
<td>35–41</td>
</tr>
<tr>
<td>Wholesale and retail trade</td>
<td>0.7</td>
<td>50–53</td>
</tr>
<tr>
<td>Agriculture</td>
<td>0.5</td>
<td>32–56</td>
</tr>
</tbody>
</table>

SOURCE: Eurostat; McKinsey Global Institute analysis

skilled shifts and the potential for a labor market mismatch

Skill shifts have accompanied the introduction of new technology in the workplace since at least the Industrial Revolution. The adoption of digital technology, automation, and artificial intelligence will mark an acceleration over the shifts of even the recent past.

The McKinsey Global Institute has developed a model for the skill shifts that will likely take place in the workplace. Looking at Western European countries, most of which have a similar or slightly lower automation potential compared to Romania, the strongest growth in demand will occur for technological skills, which constitute the smallest skill category today in terms of hours worked. Demand is expected to rise by around 50 percent here, representing 17 percent of hours worked in 2030.

Demand will grow for both basic and advanced technological skills. Occupations requiring advanced technological skills include data scientists, IT professionals, programmers, engineers, technology designers, advanced-technology maintenance workers, and scientific researchers. The McKinsey Global Institute model suggests that time spent on these skills will grow rapidly as companies realize their automation potential. Advanced technological skills will be critical for digitizing the economy in Romania, but people with these skills will still be a minority. At the same time, all employees will need to develop basic digital skills, as workers will be required to use online applications or other technological tools in their day-to-day work.

When looking at the current level of digital skill proficiency in Romania, however, we can see a clear gap relative to citizens in Digital Frontrunner markets. This includes basic skills, as well as advanced digital skills. Importantly, the older the age group, the bigger the gap, especially when it comes to advanced skills. This indicates a strong need for promoting lifelong learning among the citizens of Romania, which we explore in Chapter 3 as a key enabler for digitization in the country.

People in Romania are less likely to exhibit advanced digital skills than in Digital Frontrunner countries across all age groups:

- Digital skills by age group, % of population
  - Digital Frontrunners
  - Romania
  - Relative gap to Digital Frontrunners

NOTE: Advanced digital skills: example metrics investigated include analysis and data collection using digital tools, the use of online tools such as banking or e-commerce, use of online communication, etc.

SOURCE: Eurostat; McKinsey analysis
CHAPTER 2: IMPACT ON ROMANIA’S LABOR MARKET

Opportunities and challenges of work automation

ROMANIA’S BIGGEST SECTORS ARE THE ONES WITH THE LARGEST LIKELIHOOD FOR A FUTURE LABOR MARKET MISMATCH

Progressing digitization of the economy will accelerate the demand for people who understand how to work with technology and are able to innovate in the workplace. The need for new digital talent will be particularly great in sectors where the potential for automation is high and the current penetration of technology is low. These industries may experience the biggest “workforce mismatch” in the future.

We distinguish four groups of sectors in Romania with differing levels of need with regard to digitization:

- **Big sectors with the greatest likely need for workforce reskilling.** The biggest labor pools in Romania are found in manufacturing, agriculture, and trade. These sectors also display a mismatch, with low current digitization rates and high future automation potential. Given that these sectors are responsible for almost 50 percent of the labor population in Romania, this creates a strong exposure for the region’s labor market stability, and should constitute a priority area for reskilling efforts in the future.

- **Smaller sectors with a great likely need for reskilling.** Utilities, mining, transportation, and accommodation are the sectors in Romania displaying a similar mismatch in terms of low current digitization rates and high future automation potential. While these sectors also will have to significantly update their skill base, they are significantly smaller in terms of their share in the total labor population of Romania.

- **Romania’s most digitized sectors showing relatively lower potential for automation.** Telecommunication services were the first to undergo digital transformation and are now the leaders of technology adoption in Romania. They have already started attracting the digital talent they need and we estimate that their further automation potential is relatively low.

- **Sectors with low digitization and low automation potential must prepare for an evolution.** Sectors such as education, healthcare, arts, and finance are not facing a drastic change in the form of a high automation potential. Nevertheless, given their low starting point in terms of digitization, they should prepare to adopt more technology and not underestimate the effort required.

Sectors with low current digitization rates and high automation potential in Romania are likely to experience the greatest need for workforce reskilling in the future.

NEW TECHNOLOGY CAN HELP ACTIVATE ROMANIA’S LABOR FORCE

Compared with Digital Frontrunner benchmarks, Romania could have up to 2.0 million people in untapped labor reserves due to lower activity rates.

In The rise of Digital Challengers (CEE perspective) report, we have also explored the ways in which digitization will affect individuals beyond the potential for automation. Among the many potential benefits that technology brings to individuals in their daily lives, the rise of platforms enabling flexible working solutions may also contribute to an increased activation of the workforce. Similarly as in other CEE markets, despite a high job vacancy rate, the economic activity level in Romania falls behind benchmarks. Assuming benchmark activity levels of one of the most active labor markets in Europe – Sweden – Romania has around 2 million people forming untapped labor reserves. In the whole population of Romania there are 16 percent fewer active people than in Sweden. The highest gap can be observed among young (45 percent) and elderly (38 percent) people. The participation of women of maternal as well as middle age also falls short by 18 to 22 percent.

Supporting new marketplaces for independent work, which empower people to find new forms of flexible employment, can be one way of increasing the activity rates in Romania and the wider CEE region.
Key enablers for further digitization in Romania

Several areas remain where Romania has to make improvements in order to fully tap its digital potential. We identify multiple “key enablers” for digitization where closing the gap to Digital Frontrunners would have a major positive impact on the digital economy of Romania, along five dimensions:

- **Hard infrastructure**, including development of fixed broadband and 4G coverage
- **Talent**, including stimulating the growth of the ICT specialist population and lifelong learning among Romania’s population
- **Soft infrastructure**, including the adoption of digital tools and skills among the Romanian general population, Romania based enterprises, and the public sector
- **Legal, political, and business environment** in the context of supporting growth in the digital economy
- **Innovation** in the form of fostering the country’s entrepreneurship culture

**Hard infrastructure**

- **Continuous improvement of Romania’s physical digital infrastructure**
- **Ensure a strong pipeline for Romania’s ICT specialist talent**

**Talent**

- **Increase the adoption of digital tools by Romania’s small, medium, and large enterprises**

**Soft infrastructure**

- **Increase the adoption of digital skills and take-up of internet services by Romania’s general population**
- **Develop, implement, and promote e-government solutions in Romania’s public sectors**

**Legal, political, and business environment**

- **Continue stimulating Romania’s already vibrant and emerging digital ecosystem**

**Innovation**

- **Improve Romania’s ICT regulatory environment to ensure investment attractiveness**
- **Foster entrepreneurship in Romania to stimulate the startup ecosystem**

**CHAPTER 3: KEY ENABLERS OF DIGITIZATION IN ROMANIA**

**Continuously improve Romania’s physical digital infrastructure**

With regards to physical digital infrastructure, Romanian telecommunication companies invested continuously in their respective networks. The country is a European leader in terms of the share of ultra-fast broadband subscriptions in the country. However, there is room for improvement in terms of 4G and fixed broadband coverage – going forward, continuous improvements will be needed in the country in this area.

| **Household covered by the standard fixed broadband (availability), % of the households** |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| CZ | LV | LT | SI | HU | PL | SK | RO | BG | Average | Romania |
| 94 | 98 | 93 | 96 | 98 | 95 | 87 | 89 | 99 | 88 | 95 | −4% | 98 | −10% |

While in terms of standard fixed broadband coverage, the difference is not large between Romania and Digital Frontrunners, there is some room for improvement.

In terms of 4G coverage, Romania trails Digital Frontrunners and is below the CEE average.

| **Share of populated areas covered by 4G, %** |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| CZ | LV | LT | SI | HU | PL | SK | RO | BG | Average |
| 99 | 97 | 98 | 98 | 96 | 92 | 91 | 82 | 73 | 72 | 72 | −27% | 98 | −11% |

In a synthetic score of broadband prices developed for the DESI index, the price index in Romania is comparable to that of Digital Frontrunners and Digital Challengers.

| **Share of ultrafast broadband subscriptions ≥100 Mbps, %** |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| CZ | LV | LT | SI | HU | PL | SK | RO | BG | Average |
| 16 | 15 | 15 | 13 | 13 | 11 | 7 | 1 | 7 | 2 | 10 | −24% | 24 | 60% |

Romania is a European leader in the share of ultrafast broadband subscriptions in the country.
**Ensure a strong pipeline for Romania’s ICT specialist talent**

The digital readiness of the overall population is highly dependent on the educational system performance in any given country. In order to capture the performance of the Romanian primary and secondary school system, we investigate recent PISA test results as well as the Science, Technology, Engineering, and Mathematics (STEM) graduate talent pool. We then look at how these translate into a ICT specialist pool in the labor force.

**PRIMARY, SECONDARY, AND TERTIARY EDUCATION**

<table>
<thead>
<tr>
<th>Risk scores, average across Math, Science and Reading</th>
<th>Number of STEM graduates per 100,000 inhabitants, 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Romania</td>
<td>437</td>
</tr>
<tr>
<td>Average for Digital Challengers</td>
<td>476</td>
</tr>
<tr>
<td>Average for Digital Frontrunners</td>
<td>606</td>
</tr>
</tbody>
</table>

Looking at the quality of Romania’s primary and secondary education system, we see a sizeable gap compared to the CEE and Digital Frontrunner average. PISA test results in Romania are trailing benchmarks across all dimensions (Reading, Math, Science Literacy).

Furthermore, looking at tertiary education – the relative size of the STEM graduate talent pool in Romania also trails the CEE and Digital Frontrunner average. This is a crucial gap for Romania to close, if the country wishes to close the gaps in the share of ICT specialists in the country’s labor market. When looking at Digital Frontrunners, ICT specialists constitute a two-and-a-half times larger share in the labor force compared to Romania on average.

**LABOR MARKET**

<table>
<thead>
<tr>
<th>Average for Digital Frontrunners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of ICT specialists in employment, % of the employed population, 2016</td>
</tr>
<tr>
<td>Adult participation rate in education and training in the last 12 months, % of 25-64</td>
</tr>
<tr>
<td>Enterprises that provided training to develop/upgrade ICT skills of their personnel, % of enterprises, 2017</td>
</tr>
</tbody>
</table>

Finally, the already available workforce is not trained/re-trained toward ICT skills, hence also cannot compensate for lower amount of specialists and graduates.

**SALES OVERALL**

<table>
<thead>
<tr>
<th>Digital Frontrunners, average</th>
<th>Digital Challengers, average</th>
<th>Romania</th>
</tr>
</thead>
<tbody>
<tr>
<td>... using social media for branding and marketing, 2017</td>
<td>56%</td>
<td>25%</td>
</tr>
<tr>
<td>... selling online, 2017</td>
<td>21%</td>
<td>18%</td>
</tr>
<tr>
<td>... participating in cross-border e-commerce sales (within the EU), 2017</td>
<td>43%</td>
<td>35%</td>
</tr>
<tr>
<td>... participating in cross-border e-commerce sales outside the EU, 2017</td>
<td>9%</td>
<td>25%</td>
</tr>
</tbody>
</table>

**DIGITIZATION ENABLERS**

**DIGITIZATION ENABLER 1**

Regional Averages, Large Companies vs. Small and Medium-size Enterprises (SMEs)

**OPERATIONS OPTIMIZATION**

<table>
<thead>
<tr>
<th>Digital Frontrunners, average</th>
<th>Digital Challengers, average</th>
<th>Romania</th>
</tr>
</thead>
<tbody>
<tr>
<td>... analyzing big data, 2016</td>
<td>12%</td>
<td>37%</td>
</tr>
<tr>
<td>... sending e-Invoices suitable for automated processing in B2B, 2016</td>
<td>32%</td>
<td>32%</td>
</tr>
<tr>
<td>... utilizing cloud computing tools, 2016</td>
<td>35%</td>
<td>35%</td>
</tr>
<tr>
<td>... using software solutions like customer relationship management (CRM) systems, 2017</td>
<td>36%</td>
<td>36%</td>
</tr>
</tbody>
</table>

In terms of leveraging digital tools to connect with customers in real time, we see gaps across all enterprises in Romania in the share of companies leveraging the internet for online advertising, including the use of social media for branding and marketing. In terms of adjusting their business models to leverage digital tools for revenue growth, small and medium-size enterprises (SMEs), as well as large ones, trail Digital Frontrunners in Romania. We see a significantly smaller share of enterprises in the country engaging in online sales, as well as cross-border e-commerce. Gaps can be also seen in proxy metrics measuring the degree to which businesses streamline and automate their processes.

Finally, a significantly smaller share of both SMEs and large enterprises in Romania leverage cloud computing tools or digital solutions for analyzing big data.
The rise of Digital Challengers

Increase the adoption of digital skills and take-up of internet services by Romania’s general population

We consider the widespread adoption of digital skills among the general population a key enabler for digitization in Romania. It is an area where Digital Frontrunners excel, with clear gaps for Romania to close. Take-up of internet services is also clearly lower in Romania compared to Digital Frontrunners – closing this gap in terms of demand and supply of products and services available online will be an important driver for the growth of e-commerce in the region.

**Basic digital skills – % of population aged 16–74 (2017)**

- with at least basic digital skills
  - Romania: 49%
- using the internet in the last 12 months
  - Romania: 47%

**Advanced digital skills – % of population aged 16–74 (2017)**

- with above basic digital skills
  - Romania: 10%
- who have written a computer program
  - Romania: 2%

**E-GOVERNMENT PENETRATION AND UPTAKE**

Uptake: Individuals accessing public services online, % of individuals aged 16–74

Penetration: Government Digitization Index

- Digital Challengers
- Digital Frontrunners
- EU Big 5
- Romania

On average, Digital Frontrunners lead the way in both penetration of digitization in the public sector and uptake of public digital services by society. Close to 80 percent of the population in these countries access public services online.

Among Digital Challengers, Romania exhibits the lowest penetration and uptake rates for government services. Latvia and Lithuania are the leaders in the CEE region in this area, with Slovenia, the Czech Republic and Slovakia in the middle of the spectrum.

Develop, implement, and promote e-government solutions in Romania's public sector

Digitizing public services has various benefits for citizens, businesses, and the government itself. Digital government services can significantly reduce the administrative burden on citizens and firms. It also increases transparency about decisions and thus reduces the risk of corruption. Whilst, as we saw in Chapter 1, the public sector in Romania exhibits relatively high rates of spending on software, hardware and telecommunication solutions compared to the CEE average (translating into a relatively high digitization score) – this has not yet translated into a high availability and uptake of e-government solutions.

**Develop, implement, and promote e-government solutions in Romania's public sector**

- Increase the adoption of digital skills and take-up of internet services by Romania’s general population
- Develop, implement, and promote e-government solutions in Romania’s public sector
- Increase the adoption of digital skills and take-up of internet services by Romania’s general population

**DIGITAL TOOLS AND SKILLS PERSPECTIVE**

**Basic digital skills – % of population aged 16–74 (2017)**

- with at least basic digital skills
  - Romania: 49%
- using the internet in the last 12 months
  - Romania: 47%

**Advanced digital skills – % of population aged 16–74 (2017)**

- with above basic digital skills
  - Romania: 10%
- who have written a computer program
  - Romania: 2%

**THERE IS A WORLDWIDE TRENDS TOWARDS DIGITALIZATION**

- Digital Challengers
- Digital Frontrunners
- EU Big 5
- Romania

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Continue stimulating Romania’s already vibrant and emerging digital ecosystem

As we have explored in Chapter 1, even though Romania lags Digital Frontrunner markets such as Sweden in terms of the size of its digital economy, it has over the past few years experienced rapid growth. In addition, we see a proliferation of initiatives supporting early stage startups (accelerators, co-working spaces, hackathons), as well as regional tech conferences (ICEE fest, Techsylvania, How to Web, etc.) that provide a forum for idea sharing and collaboration. The strong growth in certain sectors (e.g., automotive, cybersecurity) provides a fertile ground for further digitization, with a potential aspiration of building regional hubs in these areas. In this context, many digital success stories have emerged in the country, which we explore below across four select areas. Stimulating the further growth of this ecosystem will be key for Romania to continue on its digitization journey – it may also lead to positive ripple effects. For example, attractive work places directly connected to the digital economy can help keep local talent in the country, or even attract back specialists who have left previously.

There is a growing number of success stories in Romania’s digital landscape that are captivating both on local talent and on foreign investments. UPPath provides one of the most widely used robotic process automation tools enabling digitization across a wide range of industries. BitDefender is one of the world’s major cybersecurity companies, focusing on anti-virus software and serving governments, enterprises of all sizes as well as private individuals, on plus development technology such as booking tools and systems for the travel and tourism industries, including major airlines and travel agencies from 45 countries. CleverFile is one of two ride hailing services in Romania that connect hundreds of taxi drivers to users.

Large foreign corporations from traditional industries are also jumping on Romania’s digital landscape. Banks with or without local presence, have chosen Bucharest for the IT development hubs. De’Longhi holds a co-innovation lab in Bucharest with a university in the e-commerce space. The City of Bucharest launched a new public services platform where citizens can access and pay taxes, register their businesses, file complaints, and request municipal services online.

Romania’s e-commerce companies are present across the value chain. General e-commerce players such as eBay, magento, are present in many European countries (e.g., France, Spain, Italy, Germany). For example, Lidl Digital is an e-commerce player developing software solutions, while Frisbo deals with warehousing, packing, delivery and other logistics. Payment processing is facilitated by providers such as PayPay and ePays. Smart Bill provides integrated billing and ERP services, while Frisbo takes care of warehousing, packing, delivery and other logistics.

Multiple Romanian software development companies are becoming regional powerhouses, some of them focusing on innovation and others on scale and volume. Several are ranked among Europe’s fastest growing companies, including Inforce, Tremend, Accesa. Others (for example Qualitance and Softvision) can help keep local talent in the country, or even attract back specialists who have left previously.

In terms of a clear implementation plan for utilizing ICTs to their country’s overall competitiveness (importance of ICTs to government vision), Romania also lags Digital Frontrunners. The same can be said of government purchasing decisions fostering innovation, as well as the promotion of the use of information and communications technologies. Finally, the protection of intellectual property also is deemed weaker in Romania than in Digital Frontrunner markets.

The digitization of trade can be expected to magnify the importance of formal and informal institutional factors for comparative advantage. The ability of countries to enforce contracts, and to ensure data privacy and pro-ICT regulations will grow in importance. Robust protection of intellectual-property (IP) rights will be particularly important, since technology patents often represent a large portion of assets for technology enterprises, a source of their competitive strength.

The rise of Digital Challengers
The rise of Digital Challengers

Foster entrepreneurship in Romania to stimulate the startup ecosystem

Here we look at the state of the ecosystem for startups in Romania compared to Digital Frontrunners. Our focus is on five areas: the entrepreneurial talent base, the startup community, early-stage startups, growth-phase startups, and enterprises having achieved significant scale. Digital Challengers have a large entrepreneurial talent pool, but their entrepreneurial environment and capabilities could be improved, and there are gaps in funding.

Romania is on par with the Digital Challenger average in Global Entrepreneurship Index, which ranks countries in terms of entrepreneurial attitudes, abilities and aspirations of the local population. However, Romania still trails behind Digital Frontrunners in this area. This can also be seen in the number of startups in the country compared to Digital Frontrunner markets. Romania has only 28 startups per million citizens, compared to 58 in the CEE region on average and 215 among Digital Frontrunner markets.

STARTUP FUNDING IN CEE, 2017

Gap in VC investment, and VC exits as share of GDP (relative gaps between Romania and the CEE region to the EU average)

Beyond the aspect of entrepreneurship, financing is also a factor. Controlling for GDP size, VC investments, and VC exits in Romania are significantly behind Digital Frontrunners.

ANALYSIS: WHAT IS THE IMPACT OF STARTUPS ON THE ECONOMY

Startups contribute to the economy in three ways: they increase innovation, enable the development of large-scale enterprises, and they create jobs. Innovation is a major long-term driver of economic growth. For historical reasons, Digital Challengers have fewer large-scale private enterprises than Digital Frontrunners. However, this gap is closing, thanks to digitization.

European startups are oriented toward international markets. On average, they generate 55 percent of their revenue outside their domestic markets. Digitization allows startups to replicate digital assets and reach a global consumer base (see examples on the left of two fast-growing startups from CEE that have become global in scale). Although only 34 of the 1,000 fastest-growing firms in Europe are from Digital Challenger countries, 90 percent of them are digital natives (based on the Financial Times’ 1000 Europe’s Fastest Growing Companies 2018 ranking).

EXAMPLES OF HOW DIGITAL STARTUPS CAN REACH SIGNIFICANT SCALE: COMPARISON WITH TRADITIONAL INDUSTRY FIRMS

Annual revenue, € million

<table>
<thead>
<tr>
<th>Country</th>
<th>Total VC investment, % of GDP</th>
<th>Total VC exits, % of GDP</th>
<th>Number of startups per million citizens, 2018</th>
<th>% of Young SMEs in TOTAL EMPLOYMENT</th>
<th>% of Young SMEs in NEW JOB CREATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poland</td>
<td>0.0002</td>
<td>0.0001</td>
<td>28</td>
<td>16%</td>
<td>41%</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>0.0013</td>
<td>0.0011</td>
<td>58</td>
<td>16%</td>
<td>41%</td>
</tr>
</tbody>
</table>

SOURCE: Eurostat; Global Entrepreneurship and Development Institute; Foundedx; Dealroom; Angel.co; Invest Europe; Pitchbook

% OF YOUNG SMEs IN TOTAL EMPLOYMENT

NOTE: Young SMEs: companies with less than 250 employees and operating for no longer than 5 years

SOURCE: European Startup Monitor; European Commission; Financial Times
CHAPTER 4: COLLABORATION WITH OTHER CEE COUNTRIES IS KEY

Four arguments for the benefit of collaboration between Digital Challengers

A SCALE EFFECTS
Together, Digital Challengers represent €1.4 trillion in GDP, making them the equivalent of the twelfth-largest economy in the world.

B SIMILAR STARTING POINTS
The countries of CEE have high levels of market openness and similar levels of digitization. While Romania trails other Digital Challengers and Frontrunners in this respect, it is still more reliant on trade than EU Big 5 markets.

C BEST PRACTICES
Each CEE country has developed digitally in different areas, so sharing best practices can accelerate digitization.

Leveraging the strengths of neighboring countries could limit the risk of harmful competition and allow for the creation of centers of excellence. Also, this could encourage regional coordination and planning: instead of developing solutions in isolation, Romania could speed up the development of its digital economy by replicating successful strategies already tested elsewhere. See also our The Rise of Digital Challengers (CEE perspective) report, where we quote multiple success stories related to stimulating the digital economy across the CEE region.

D COMMON CHALLENGES
The region’s countries share some of the same challenges, including “brain drain,” the need to improve and standardize ICT-related solutions, and a long-term need to reskill the workforce.

Brain drain is a common issue for most CEE markets. Compared with Digital Frontrunners, Romania exhibits a six times higher emigration rate among individuals with higher education.

The rise of Digital Challengers: Digitization as the next growth engine for Central and Eastern Europe

SOURCE: World Bank

NOTE: Digital Frontrunner figure not including Luxembourg (strong outlier with a 424 percent result)

NOTE: Other common challenges explored in our CEE report The rise of Digital Challengers: How digitization can become the next growth engine for Central and Eastern Europe

SOURCE: OECD
CHAPTER 5: IMPLICATIONS FOR POLICY MAKERS, BUSINESS LEADERS, AND INDIVIDUALS IN ROMANIA

Build skill sets for the future

KEY FACTS ABOUT ROMANIA

- Romania has a large future need for workforce reskilling: up to 54 percent of workplace activities could potentially be automated by 2030, using technology that already exists.

- Romania’s general population lags Digital Frontrunners in basic and advanced digital skills – the older the age group, the bigger the gap.

- Despite a large STEM graduate talent pool, the share of ICT specialists in the Romanian labor force (1.9 percent) lags Digital Frontrunner average (4.8 percent).

- The adult participation rate in training in Romania (7 percent of people aged 25–64), is significantly lower than the Digital Frontrunner average (54 percent).

- The emigration rate for well-educated members of the population in Romania is six times higher than the average for Digital Frontrunners.

Implications for policy makers

- Develop a wide-ranging reskilling strategy
  - Diagnose the state of the current workforce, and forecast the necessary shift in skill sets for the future, e.g., develop a labor market model, identify sector shifts, understand the gap between current and future skills.

- Ensure standard digital infrastructure, integrate digital tools and resources in schools (e.g., online courses, virtual reality, gamification), and equip teachers with the necessary skills.

- Update youth education
  - Create an ecosystem that helps adults reskill and upskill: build motivation to learn among adults, offer practical training and/or incentives, provide support during the transition period, and assist in job-seeking.

- Actively counteract talent leakage
  - Keep ICT specialists from leaving the country, e.g., encourage universities to collaborate with the private sector to provide high-quality internships as part of degree programs or immediately after graduation, stimulate the startup ecosystem to attract local talent to seek tech-related jobs locally.

- Promote lifelong learning and mid-career training
  - Promote specialization in STEM subjects to build an ICT talent base, focusing especially on enabling women to study technology in order to close the gender gap.

- Leverage independent work platforms
  - The Romanian talent pool abroad is significant given the high emigration rate among individuals with higher education, and should be tapped in more through dedicated programs and incentives, in order to support growth of the digital economy.

- Attract additional ICT specialists from around the globe, e.g., work with the private sector to determine the demand for highly skilled workers and simplify the migration process for such individuals.

- Carry out research to understand the size and growth of the gig and independent-work economy.

- Consider updating policies supporting the gig economy and worker protection initiatives.
CHAPTER 5: IMPLICATIONS FOR POLICY MAKERS, BUSINESS LEADERS, AND INDIVIDUALS IN ROMANIA

Support technology adoption

KEY FACTS ABOUT ROMANIA

Romania trails Digital Frontrunners in the European Commission’s Government Digitization Index, which, among others, measures the availability of key e-government solutions, such as electronic identification (eID), digital documentation, electronic authentication changes, and digital post in communication with citizens and businesses.

At the same time, take-up of e-government services is low, with less than 9 percent of citizens aged 16–74 accessing public services online, compared with three out of four Digital Frontrunner citizens.

The adoption of digital tools and skills by companies in Romania is much lower than in Digital Frontrunners. Only 8 percent of companies in Romania exhibit a very high or high adoption rate for digital tools, compared with the CEE average of 16 percent and Digital Frontrunner average of 35 percent.

Implications for policy makers

Ensure strong support from the government to drive digitization, e.g., set up a dedicated task force/ministry charged with tackling regulatory barriers to new business models and stimulating growth of the digital economy.

Speed up the development of online public services, e.g., promote integrated online public-service platforms and online signatures. Examples of progress in Romania in this area include the creation of PCU – a nationwide platform for formal interactions with public administrations, e-licitatie.ro – a digital public acquisition system, ghiseul.ro – a platform that allows citizens to view and pay their taxes as well as identify themselves online.

Support the adoption of online public services, e.g., launch educational campaigns, promote online solutions during offline interactions, decrease adoption barriers by creating simple user interfaces. An initiative to simplify and digitize government processes is maisimplu.gov.ro, where citizens are encouraged to recommend changes and can also track implementation.

Develop digital skills among public-sector employees.

Digitize back-end government processes, focusing on the most labor-intensive and expensive processes first.

Unleash big data capabilities by standardizing government data and opening it up (for instance, in the form of virtual data repositories) to third-party collaborators (researchers, businesses, startups, etc.) so they can build applications on top of it.

Invest in Internet of Things (IoT) infrastructure in the public sector, e.g., support smart city and human health solutions strongly leveraging public data and resources.

Promote the benefits of digital transformation, focusing on SMEs and major sectors that lag a long way behind.

Create incentives for companies, especially SMEs, to use digital tools, e.g., make business-to-government interactions digital by default.

Leverage external funding, e.g., from the EU, to finance the most promising initiatives supporting the development of the digital economy. As an example from the private sector, Gapminder.vc is a very active venture capital fund, with part of the funding coming from the EU.
CHAPTER 5: IMPLICATIONS FOR POLICY MAKERS,
BUSINESS LEADERS, AND INDIVIDUALS IN ROMANIA

Improve the ecosystem for startups

KEY FACTS ABOUT ROMANIA

- Romania trails both the CEE and Digital Frontrunner averages in entrepreneurship level (see Chapter 3).
- The number of startups per million citizens in Romania, at 28, is less than half the average of 58 for the CEE region – and far behind the Digital Frontrunner average of 215.
- As a share of GDP, venture capital investments in Romania are one-fifteenth of the average investment levels in the European Union.

Implications for policy makers

- Embed entrepreneurship in formal education, especially in STEM subjects, while promoting it as an alternative to regular career paths.
- Link entrepreneurial education to startups, accelerators, incubators, and business angels.
- Expand the entrepreneurial talent pool by attracting talent from outside the region.

- Position startup hubs high on municipal governments’ agendas, and actively communicate the importance of startups. This should include support of local programs and initiatives related to digitization in other regions and cities beyond the main hubs in Bucharest and Cluj (e.g., Iasi, Timisoara, Sibiu, Brasov, Constanta).
- Create physical startup clusters where they can cooperate at scale, e.g., Station F in Paris, Blk 71 in Singapore.
- Support the creation of testing grounds for new business models, e.g., implement regulatory sandboxes enabling entrepreneurs to try out their innovations in real market conditions.

- Simplify business angel investing, e.g., with standardized, easily available forms and corporations with low capital requirements.
- Provide additional incentives for business angels and serial entrepreneurs, e.g., tax breaks.
- Simplify procedures for obtaining and reporting public/European Union funds. Romania is running the Start-up Nation program that provides funds worth up to €43 thousand to new companies, with some prioritization for companies with IT-related activities or requiring IT investments.
CHAPTER 5: IMPLICATIONS FOR POLICY MAKERS, BUSINESS LEADERS AND INDIVIDUALS IN ROMANIA

Strengthen cross-border digital collaboration

KEY FACTS ABOUT ROMANIA

Romania can only capture the full potential of digitalization by cooperating closely with other CEE economies. Four reasons underpin the benefits of acting together:

- **Similar starting points**: Romania, like other CEE markets, exhibits high levels of market openness and similar levels of digitization, besides cultural and historic commonalities.
- **Scale effects**: As the CEE region, Digital Challengers represent €1.4 trillion in GDP – almost seven times the size of the Romanian economy.
- **Common challenges**: Romania faces the same challenges as many other CEE markets, importantly the “brain drain” and need to reskill the workforce in the long-term.
- **Best practices**: Romania has developed digitally in different areas compared to other CEE markets – sharing best practices can accelerate digitization.

See also our regional perspective report for more details on already-established forms of cooperation between Digital Challenger and Digital Frontrunner markets.

Implications for policy makers

- **Create a strong digital pillar within regional collaboration platforms**: e.g., 3SI, V4, B9.
- **Ensure standardized, flexible digital-policies solutions across the region**.
- **Implement cross-border projects facilitating the digitization of the region**.
- **Cooperate in the management of social change as a result of changes in the labor market**.
- **Establish a coalition favoring pro-digital legislative measures at the European level, strengthening the voice of individual countries in EU policy discussions**.
- **Establish a coalition favoring pro-digital legislative measures at the European level, strengthening the voice of individual countries in EU policy discussions**.
- **Facilitate the sharing of best practices and experience in the region – disseminate what has worked well regarding regulatory policy and investment**.
- **Cooperate to abolish barriers to the full functioning of the Digital Single Market such as geo-blocking, unjustified data localization practices, regulatory barriers**.
- **Support the standardization and free flow of cross-border nonpersonal data in the public sector, as well as the technological interoperability of digital infrastructures, e.g., 5G networks**.
- **Establish common security models and cybersecurity standards**.
- **Facilitate cross-border digital infrastructure projects that close the gaps across the region, e.g., fiber optics, 5G technology, strategic e-commerce logistics centers, complementary energy infrastructures**.
- **Establish common platforms for cross-border public-sector services, including cross-border integration of eID systems, increasing their effectiveness and reducing administrative burdens for enterprises. An example of cross-border collaboration in this space is the Nordic Council’s efforts to integrate electronic authentication systems**.
- **Strengthen cross-border industry cooperation over research and education supporting joint technology initiatives such as autonomous transportation, smart cities, human health solutions. An example of cross-border collaboration here is the Franco-German alliance in artificial intelligence**.
- **Implement cross-border projects facilitating the digitization of the region**.
- **Improve cross-border freedom of movement, skills accreditation, and worker safeguard procedures**.
- **Join forces to tackle talent pool issues such as the brain drain and the need for more ICT and digital skills at all educational levels, e.g., initiate a joint promotional effort marketing the region as a digital hub to attract talent and investments**.
Implications for business leaders

- Anticipate and, if necessary, prepare for the impact of digital disruption on demand for company’s product, e.g., unbundle and tailor a product or turn it into a service.
- Anticipate and, if necessary, prepare for how digital disruption will change supply in the market, e.g., analyze the possibility of new, online players and anticipate changes in the value-chain structure caused by automation.
- Investigate the potential for forming strategic alliances with innovative organizations and enterprises changing the face of the market (e.g., startups) to create new competences in your organization.
- Leverage social media and online advertising to connect with customers in real time, in a targeted and measurable way.
- Use the Internet to increase revenue growth capabilities by utilizing e-commerce, e.g., build an online presence for the organization, develop own e-commerce platform, or make use of a multi-vendor e-commerce platform.
- Streamline and automate internal operations where possible, implementing, e.g., e-invoicing suitable for automated processing, resource management software tools, focusing on the most labor-intensive, expensive processes first.
- Leverage the power of big data and cloud computing for improved decision making and process optimization.
- Build cybersecurity capabilities to ensure competitive dynamics and customer trust.
- Put more focus on assessing candidates’ skills, e.g., through open competitions, games, hackathons.
- Develop a talent pipeline to shift from reactive to proactive recruiting, e.g., offer workshops and apprenticeships to help candidates build the desired skills.
- Leverage contractors or freelancers to fill talent gaps, using digital platforms to optimize the search effort.
- Enable reskilling and upskilling opportunities, e.g., provide practical in-house training, offer financial support, create opportunities for formal and informal knowledge sharing.
- Start the change from the top, fostering understanding and conviction among employees on the benefits of digital: ensure that leadership and middle management act as role models in terms of their use of digital tools.
- Support employees in developing their skills and knowledge, e.g., encourage employees to cultivate their curiosity about creating opportunities in combining emerging technologies with innovative services, implement reinforcement mechanisms.
- Prioritize agility and learning over forecasting and planning.
- Form strong digital collaborations within trade associations, focusing particularly on SMEs.

Romanian enterprises trail Digital Frontrunner peers in terms of digitization, looking at the share of enterprises (selected examples):

- Using social media for branding and marketing (SME gap: -46 percent, large enterprise gap: -40 percent)
- Selling online (SME gap: -62 percent, large enterprise gap: -60 percent)
- Participating in cross-border e-commerce sales within the European Union (SME gap: -79 percent, large enterprise gap: -80 percent)
- Analyzing big data (SME gap: -15 percent, large enterprise gap: -51 percent)
- Using software solutions such as Customer Relationship Management systems (SME gap: -64 percent, large enterprise gap: -52 percent).

In terms of providing formal employee training for ICT skill development, the share of companies conducting such activities (at 4 percent) is significantly lower than the Digital Frontrunner average (at 29 percent).
THE GROWTH ENGINE OF CENTRAL AND EASTERN EUROPE IS LOSING MOMENTUM

All stakeholders need to act for a successful transition

Digitization can be the answer to this challenge

Collaboration between CEE digital challengers is key

The countries in CEE are uniquely positioned to capture this opportunity

Why is digitization key for CEE?

How to capture the potential?

1. THE GROWTH ENGINE OF CENTRAL AND EASTERN EUROPE IS LOSING MOMENTUM

Productivity lags behind Europe

CEE Digital Challengers: 31

EU Big 5: 53

Digital Frontrunners: 64

CEE has historically low unemployment and working hours above EU average

6.5

9.2

6.1

1791

1592

1573

0.8

0.7

1.7

54

13.0

22.6

Economy in CEE is undercapitalized and the gap is closing very slowly

17.9

5.4

1.7

0.8

0.7

0.7

DIGITIZATION CAN BE THE ANSWER TO THIS CHALLENGE

Aspirational scenario would translate into an extra 1 percentage point on GDP growth each year through 2025 in CEE

Digital economy in 2016, € billion

Business as usual

Digital-economy growth scenarios for Digital Challengers

6% of GDP

9% of GDP

2016

2025

76

136

+200

+60

16% of GDP

9% of GDP

276

136

2025

2016

THE COUNTRIES IN CEE ARE UNIQUELY POSITIONED TO CAPTURE THIS OPPORTUNITY

Despite a lower size of the digital economy, Digital Challengers can build on a strong historical growth momentum

Digital Challengers have the necessary fundamentals in place for further digitization:

- Good primary and secondary education
- A large STEM and ICT graduate talent pool
- High-quality, affordable digital infrastructure
- A milder legacy technology lock-in
- An already-emerging, vibrant digital ecosystem

1.0

1.0

1.0

1.0

1.0

Implications for policy makers

- Build skills sets for the future, including updating youth education, promoting lifelong learning, and countering brain drain
- Support technology adoption by the public sector
- Support technology adoption by companies
- Strengthen regional cross-border digital collaboration
- Improve the ecosystem for startups

Implications for business leaders

- Adapt business model to meet the demands of the digital economy
- Use digital tools for revenue growth, including boosting your export capabilities
- Use digital tools to improve the bottom line
- Invest in human capital and prepare talent strategies for the future, including an updated approach to recruiting and actively driving reskilling and upskilling
- Form strong digital collaborations within industry associations
- Embrace a pro-digital organizational culture

Implications for individuals

- Prepare for the advent of the digital economy by investing in lifelong learning to improve skills sets and taking advantage of digital tools in all aspects of life

4.0

2.7

2.6

0.3

0.3

0.3

WHY IS DIGITIZATION KEY FOR CEE? HOW TO CAPTURE THE POTENTIAL?

Chapter 6: Recap of key messages for the CEE region

The rise of Digital Challengers

The region’s countries face similar challenges, importantly the “brain drain” and the need to reskill the workforce

Together, Digital Challengers represent €1.4 trillion in GDP, making them the equivalent of the 12th largest economy in the world

The Fourth Industrial Revolution will transform the economy and labor market, requiring an immediate response

The global rules of the digital game are crystalizing; to compete, Digital Challengers need to develop a clear digital agenda

Implications for policy makers

Implications for business leaders

Implications for individuals

Similar starting points

Best practices

Scale effects

Common challenges

The countries of CEE have high levels of market openness and similar levels of digitization

The region's countries are similar in terms of size and economic structure

The economic growth potential is high in all CEE countries

The region’s countries face similar challenges, importantly the “brain drain” and the need to reskill the workforce

The Fourth Industrial Revolution will transform the economy and labor market, requiring an immediate response

The global rules of the digital game are crystalizing; to compete, Digital Challengers need to develop a clear digital agenda

The rise of Digital Challengers
Methodology appendix

All calculations were performed using real values for GDP, the value of e-commerce and consumer offline spending. We used a fixed exchange rate from 2016 for all years analyzed.

Digitization index
One of the goals of the Digitization Index is to show the level of digital penetration across sectors by indicating the gap between the “digital frontier” (the most advanced digital sector) and the other parts of the economy. The Digitization Index presents a view across sectors of how corporations invest in ICT (a proxy for ICT spending), calculated as the value of the ICT sector less consumer spending on communication services and equipment, and how they digitize their internal processes. It uses eight indicators to capture different ways in which companies are digitizing. For instance, digital assets include spending on computers, software and telecom equipment and the stock of ICT assets. Workforce, on the other hand, is calculated on a per-worker spending basis. We measure this by aggregating digitization scores across sectors, which is easily comparable between European countries against the United States. To calculate the digitization scores, the Digitization Index is weighted for the economic size of the sector, to measure the distance of each sector from the global digital frontier, namely the ICT sector in the United States. This sector was chosen as the global digital frontier as previous MGI research14 shows that it is the most digitized sector in the world across comparable groups of metrics.

The digital economy
Definitions on the size of the digital economy vary significantly in terms of their scope. On one end of the spectrum, it is often defined simply as the value of the ICT sector.15 On the other end of the spectrum, institutions such as the IMF uses definitions on the size of the digital economy that are often defined simply as the value of the ICT sector.15 On the one end of the spectrum, institutions such as the IMF uses definitions on the size of the digital economy that are often defined simply as the value of the ICT sector.15 On the other hand, is calculated on a per-worker spending basis. We measure this by aggregating digitization scores across sectors, which is easily comparable between European countries against the United States. To calculate the digitization scores, the Digitization Index is weighted for the economic size of the sector, to measure the distance of each sector from the global digital frontier, namely the ICT sector in the United States. This sector was chosen as the global digital frontier as previous MGI research14 shows that it is the most digitized sector in the world across comparable groups of metrics.

Impact scenarios

Baseline growth
In the basic scenario for 2025, we assume that the digital economy continues growing at the historical growth rate for 2012-2016.

E-commerce and offline spending
In the acceleration scenario for 2025, we assume fixed growth of e-commerce and consumer offline spending based on the historical weighted-average growth trend for the CEE region between 2012-2016.

Digitization potential in the public and private sectors
We assume that the Digitization Index in CEE will reach the level found in the Digital Frontier runner Sweden. We use Sweden as a benchmark because of its digital maturity and its inspiring digital growth in recent years. To assess the potential impact, we first analyze productivity and digitization levels in CEE. We then calculate the digitization potential in CEE based on the Swedish sectors’ productivity rates, incorporating digitization multipliers. Finally, we estimate the potential productivity growth in the CEE economy caused by traditional ICT growth vs. the productivity baseline for each country.

Internet of Things, Big Data and artificial intelligence use cases
We assess how the Internet of Things (IoT) can create value by analyzing more than 150 IoT use cases across the global economy. Based on our prioritization, we examine the 57 of these use cases that promise to bring the highest value. We use bottom-up modeling to assess the potential benefits that these use cases can generate, including productivity improvements, time savings and improved asset utilization. We also include an approximate economic value for reduced disease, accidents and deaths.

Automation potential
To understand the impact of automation on the labor market, the McKinsey Global Institute analyzed around 800 different occupations and more than 2,000 work activities. Each of the activities was assigned a combination of 18 predefined performance capabilities (for example, fine motor skills, sensory perception, natural language understanding). Its automation potential based on technologies available today was then estimated. By aggregating the automation potential of activities and their share in total working hours, we can estimate the potential for each occupation and industry.

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Endnotes


2 On the one hand, some experts put forward a narrow definition of digital economy limited to online platforms and the activities on these platforms, focusing purely on the Internet and Communication Technologies (ICT) sector. On the other, broader definitions include all activities that use digital data – following this logic, the digital economy could constitute a major part of most industries, ranging from agriculture and arts to research & development. See for example: International Monetary Fund Staff Report, Measuring the Digital Economy, February 2018.


4 McKinsey Global Institute, Digital America: A tale of the haves and have-mores, December 2015.

5 This sector was chosen as the global digital frontier (i.e. the most digitized sector) by previous MGI research. For more information, see McKinsey Global Institute, Digital America: A tale of the haves and have-mores, December 2015.


7 Productivity growth captured by increase of traditional ICT usage (software, hardware, telecommunications) to the level of Sweden (in terms of its share of sectoral GDP), treated as a Digital Frontrunner benchmark.

8 McKinsey analysis based on data from the Total Economy Database by The Conference Board – for the purpose of the exercise, assuming historical productivity growth (2.6%).


10 Ibid.


12 Based on difference between hours worked per type of skill in 2016 and forecast hours worked in 2030. Numbers may not sum due to rounding. Western Europe: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom.

13 PISA: Programme for International Student Assessment (OECD).

14 McKinsey Global Institute, Digital America: A tale of the haves and have-mores, December 2015.


16 International Monetary Fund Staff Report, Measuring the Digital Economy, February 2018.
The rise of Digital Challengers