The rise of Digital Challengers

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

Perspective on Romania

Digital/McKinsey

The rise of Digital Challengers

—

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

—

Perspective on Romania

Jurica Novak
Daniel Spiridon
Marcin Purta
Tomasz Marciniak
Karol Ignatowicz
Kacper Rozenbaum
Kasper Yearwood

About McKinsey & Company

We are a global management consulting firm that serves a broad mix of private, public, and social sector institutions. We help our clients make significant and lasting improvements to their performance and realize their most important goals. We have built on nearly a century of experience and added a wide range of new skills and capabilities to create a firm that is uniquely equipped to this task. For example, our colleagues in McKinsey Digital & Analytics work together with clients to drive technology-enabled transformations. By combining the latest innovations with deep industry, functional, and technological expertise, we help clients capture value from data and succeed in the digital age. We are home to thousands of the world's most talented professionals across the fields of digital, analytics, and design. Our cross-functional teams enable clients to reinvent themselves through technology. From optimizing core technology and automating operations to building entirely new digital businesses, we work side-by-side with our clients to prepare them to survive and thrive in a rapidly changing world.

For more information, visit mckinsey.com.

About McKinsey & Company in Romania

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.

We combine McKinsey's global expertise with deep local insights to help our clients shape ambitious growth strategies and deliver breakthrough performance. Our experienced local team is comprised of a diverse mix of consultants and knowledgeable experts with top academic background and rich previous work experience.

We are honored to have shared the transformation and growth journey with industry leaders in banking and insurance, telecommunications, energy, consumer goods, and other sectors. In total, we have carried out more than 180 projects for our clients in Romania.

For more information, visit www.mckinsey.com/ro

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.

Czech Republic

Hungary

Poland

Romania

Slovakia

Contents

Preface

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 Marcin Purta and Tomasz Marciniak, and Associate Partner Karol Ignatowicz in Poland.

These individuals worked together with a team comprising the consultants Kasper Yearwood, Roxana Țurcanu and Ștefan Scorțescu, 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.

Romania 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 SIMILARILY 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 to represent 20 percent 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 a 12 percent share of GDP 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 EU Big 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 (9.0 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 count 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 Frontrunner 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 at intra- and inter-sectorial collaboration becomes even more crucial.■

România în rol de ‘Digital Challenger’

Pentru România, beneficiile economice potențiale ale digitalizării ar putea contribui cu 42 de miliarde de euro adiționale la Produsul Intern Brut 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 celor mai avansate economii ale Europei, din punct de vedere digital.

1 SIMILAR CU ALTE PIEȚE DIN EUROPA CENTRALĂ ȘI DE EST, MOTOARELE CURENTE DE CREȘTERE ECONOMICĂ A ROMÂNIEI SUNT ÎN DECELERARE

În ultimii 20 de ani, România a experimentat o dezvoltare rapidă (PIBul pe cap de locuitor a crescut cu 136 de procente între 1996 și 2017), alimentată de exporturi dinamice, investiții străine, o forță de muncă în creștere și competitivă la nivel de costuri, precum și de fondurile europene. Cu toate acestea, în ultimul timp, mulți dintre acești factori încep să piardă teren. Fiind semnificativ subcapitalizată în comparație cu economiile europene mai avansate, România se confruntă, de asemenea, cu scăderea și cu scumpirea forței de muncă, șomajul fiind la niveluri minime record (4.9% in 2017). Economia țării trebuie să se bazeze pe noi surse de creștere a productivității. Pentru a continua creșterea nivelului de trai al societății, România trebuie să-și redefinească strategia de creștere.

2 DIGITALIZAREA AR PUTEA FI URMĂTORUL MOTOR DE CREȘTERE DURABILĂ PENTRU ROMÂNIA, CU 42 MILIARDE EURO ÎN PLUS LA PIB PÂNĂ ÎN 2025

Analiza noastră arată că accelerarea digitalizării și convergența spre o economie bazată pe tehnologie au un potențial semnificativ de a alimenta noul motor de creștere de care România are nevoie. În 2016, economia digitală reprezenta deja 6.9% din PIB, echivalentul a 12 miliarde euro. Accelerarea digitalizării cu o apropiere de economiile din nordul Europei ar putea adăuga 42 miliarde euro până în 2025. În acest scenariu ambițios, economia digitală în România ar urma să reprezinte 20% din PIB până în 2025. Acest plus ar reprezenta 1 punct procentual suplimentar la creșterea anuală a PIB-ului, pe perioada menționată. Fără această accelerare, un scenariu „business as usual” ar lua în considerare o creștere a economiei digitale din România de doar 18 miliarde euro, ajungând la o cotă de 12% din PIB până în 2025. În acest scenariu, România ar rămâne încă departe de “frontiera digitală” reprezentată de țările din Europa de Nord.

3 ROMÂNIA ESTE ÎNTR-O POZIȚIE POTRIVITĂ PENTRU A BENEFICIA DE OPORTUNITATEA DIGITIZĂRII

În acest raport considerăm România ca una dintre cele zece piețe ’Digital Challenger’ din Europa Centrală și de Est. Aceste țări prezintă rate mai mici de digitalizare față de așa-numitele țări ’Digital Frontrunners’ (Belgia, Danemarca, Estonia, Finlanda, Irlanda, Luxemburg, Olanda, Norvegia și Suedia) sau piețele UE „Big 5” (Franța, Germania, Italia, Spania și Regatul Unit). România are însă o fundație puternică pe baza căreia poate să-și accelereze digitalizarea. Dimensiunea economiei digitale în România (6.9% din PIB în 2016) este peste media CEE de 6.5%, însă este clar decalată față de piețele ’Digital Frontrunners’, precum Suedia (9.0%). Diferențele sunt mai pronunțate pe cap de locuitor: Cu 604 euro pe cap de locuitor, România se află în urma mediei CEE, cât și a țărilor din ’Digital Frontrunners’, (746 euro, respectiv 3,276 euro). În același timp, economia digitală din România a câștigat un impuls semnificativ, între 2012 și 2016 crescând cu 10.8% pe an, aproape de patru ori mai rapid față de UE „Big 5”. În plus, infrastructura digitală de înaltă calitate (inclusiv una dintre cele mai ridicate rate de penetrare a internetului fix ultra-rapid) și o dependență față de tehnologii vechi mai scăzută față de Vestul și Nordul Europei, sprijină statutul României de ’Digital Challenger’.

În comparație cu alte piețe CEE, România are rate de digitalizare mai ridicate în industriile de prelucrare, utilități și comerț. În multe zone propice digitalizării, România se află însă la același nivel sau sub media CEE, indicând potențial de îmbunătățire. Acest lucru este valabil în special în zone cum ar fi ecosistemul de startup-uri (număr mult mai mic de startup-uri pe cap de locuitor), abilitățile digitale de bază ale populației, precum și în adoptarea instrumentelor digitale de către companii.

4 GUVERNUL, LIDERII MEDIULUI DE AFACERI ȘI FORȚA DE MUNCĂ TREBUIE SĂ ACȚIONEZE PENTRU O TRANZIȚIE DE SUCCES

Pentru a realiza scenariul optimist de digitalizare, România va avea nevoie de contribuția tuturor părților implicate. Companiile vor trebui să înțeleagă și să urmeze oportunitățile digitalizării, grăbind adoptarea instrumentelor digitale, care contribuie la îmbunătățirea productivității, și care le permit să ajungă la noi clienți și să se extindă pe piețele globale. Astăzi, companiile din România sunt în urma celor din țările ’Digital Frontrunners’, nu numai în ceea ce privește adoptarea acestor instrumente, dar și de exemplu, în dezvoltarea sau îmbunătățirea competențelor digitale ale personalului lor. Printre altele, proporția companiilor mari din România care capturează beneficiile „big data” sau utilizează instrumente de „cloud computing” ar trebui să se dubleze pentru a atinge nivelurile ’Digital Frontrunner’. De asemenea, sectorul public ar putea integra tehnologii pentru 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 forța de muncă, investiția în educație și recalificare pe tot parcursul vieții va fi cheia ce le va permite să profite de noi oportunități pe piața forței de muncă. Aproape de opt ori mai mulți români ar trebui să participe la cursuri de formare pentru a atinge nivelul ’Digital Frontrunners’. Legislatorii sunt încurajați să promoveze adoptarea tehnologiei atât în sectorul public, cât și în cel privat. Ei pot, de asemenea, sprijini angajații prin programe de recalificare și training (în special pentru că România are o rată scăzută de participare a adulților în programe de educație și formare, atât sub media CEE, cât și a celei din grupul ’Digital Frontrunners’) și îmbunătăți ecosistemul de startup-uri precum și oportunitățile de inovare digitală.

5 COLABORAREA ROMÂNIEI CU ALTE ȚĂRI CEE DIN GRUPUL ’DIGITAL CHALLENGERS’ ESTE CRUCIALĂ

Țările CEE, inclusiv România, pot beneficia de întregul potențial al digitalizării numai prin cooperare strânsă. Patru elemente evidențiază beneficiile acestei colaborări:

- **Efecte la scară largă:** Ca regiune,’Digital Challengers’ reprezintă aproape 1400 miliarde euro în termeni de PIB – aproape de șapte ori mai mult față de economia României. Participarea întreprinderilor românești la acest potențial poate genera beneficii semnificative. Promovarea soluțiilor digitale în întreaga regiune poate duce la reducerea costurilor comerțului transfrontalier. De exemplu, România ar putea colabora cu alte țări din CEE pentru a elimina barierele pentru o adevărată piață unică digitală, cum ar fi practicile de geo-blocare și localizarea datelor.
- **Provocări comune:** România se confruntă cu provocări similare multor piețe din CEE, precum “brain drain” și necesitatea de a recalifica forța de muncă pe termen lung. Eforturi comune în regiune pot duce la găsirea și implementarea celor mai eficiente soluții.
- **Puncte similare de start:** România pe lângă aspectele comune culturale și istorice ce o leagă de alte țări din CEE, are și niveluri înalte de deschidere a pieței și grade similare de digitalizare. Acest lucru e relevant pentru experiențele comune legate de ceea ce a funcționat bine în investițiile digitale și politica de reglementare.
- **Cele mai bune practici:** România a dezvoltat puncte forte diferite în ceea ce privește economia digitală față de alte piețe CEE. Schimbul de bune practici poate accelera digitalizarea. Folosirea punctelor forte ale țărilor vecine ar putea limita riscul de a dezvolta o competiție nesănătoasă și ar permite crearea de centre de excelență. De asemenea, acest lucru ar putea încuraja o bună coordonare și planificare regională; în loc să dezvolte soluții în izolare, România ar putea accelera dezvoltarea economiei sale digitale prin replicarea de strategii de succes deja testate în altă parte.

În viitor, România, alături de ceilalți ’Digital Challengers’, ar putea colabora în cadrul unor proiecte digitale și soluții de reglementare pentru întreaga regiune – toate cu scopul de a facilita transformarea digitală. De asemenea, o coaliție pan-CEE ar putea asigura vizibilitatea intereselor digitale ale țărilor din regiune la nivel european.

6 TREBUIE ACȚIONAT ACUM PENTRU REALIZAREA OPORTUNITĂȚII DIGITALE

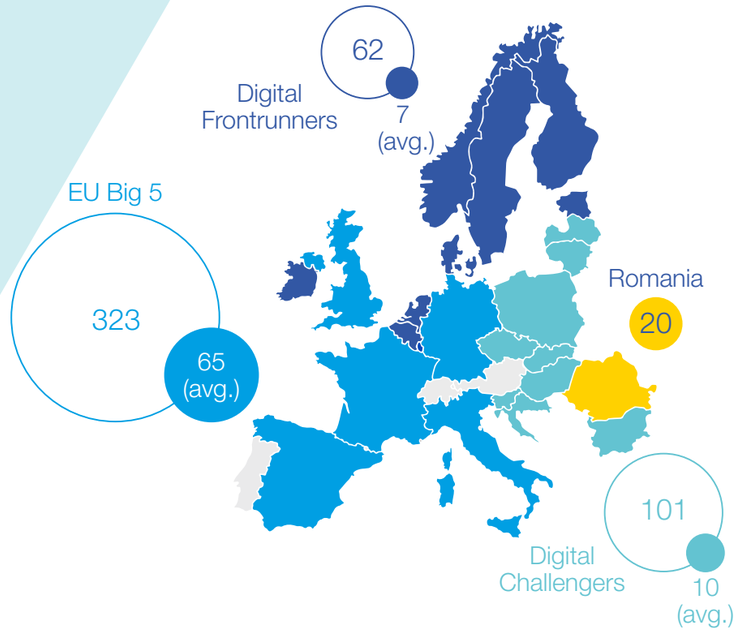
Credem că pentru ca România să beneficieze pe deplin de pe urma transformării digitale, acum este momentul pentru a acționa. Creșterea economică susținută și lipsa forței de muncă indică faptul că este timpul de a identifica factorii de creștere a productivității pentru viitor și de a lua măsurile necesare. Adoptarea digitalizării va contribui la combaterea lipsei de forță de muncă și la pregătirea economiei și a populației pentru viitoarea transformare a pieței muncii: analiza noastră arată că până la 54% din activități ar putea fi automatizate până în 2030, folosind tehnologie care există deja. Această situație creează pe de-o parte o oportunitate de creștere a productivității și pe de altă parte, provocări legate de tranziția pieței muncii către noi locuri de muncă. Indispensabil pentru acest lucru este o vastă recalificare și promovare a educației pe tot parcursul vieții. Un set important de factori suplimentari va fi necesar, incluzând finanțare, cultură a inovării, mediu legislativ propice dezvoltării tehnologiei și cercetare și dezvoltare tehnologică. Toate planurile de economie digitală pun accentul pe o structură clară de organizare în ce privește politicile, reglementările și principiile directoare necesare sprijinirii unei economii digitale. Pentru a materializa potențialul digital al României, colaborarea public-privată, precum și cea intra- și inter-sectorială devin și mai importante.■

Romania and Digital Challengers at a glance

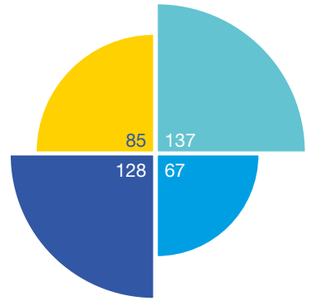
From the perspective of economy and digitization, three broad groups of countries have emerged in Europe over the last three decades. The first group is formed by relatively small, open economies with very high digitization rates. This so-called Digital Frontrunners group comprises Northern European and Benelux countries: Belgium, Denmark, Estonia, Finland, Ireland, Luxembourg, the Netherlands, Norway, and Sweden.[1] 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.■

REGIONAL POPULATION IN TOTAL VS. COUNTRY AVERAGE, 2017, MILLIONS

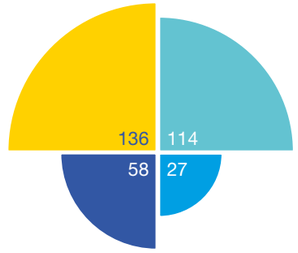


MARKET OPENNESS, 2017, TRADE AS % OF GDP

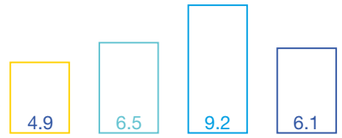


GDP COUNTRY AVERAGE, 2017, € trillion

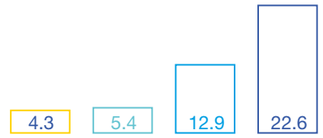
GDP PER CAPITA GROWTH 1996–2017, %



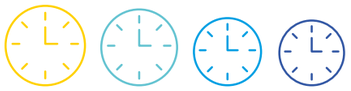
UNEMPLOYMENT, 2017, %



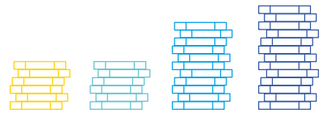
CAPITAL STOCK PER EMPLOYEE, 2016, € million



WORKING HOURS PER YEAR, 2017



PRODUCTIVITY, 2017, GDP per hour worked, €



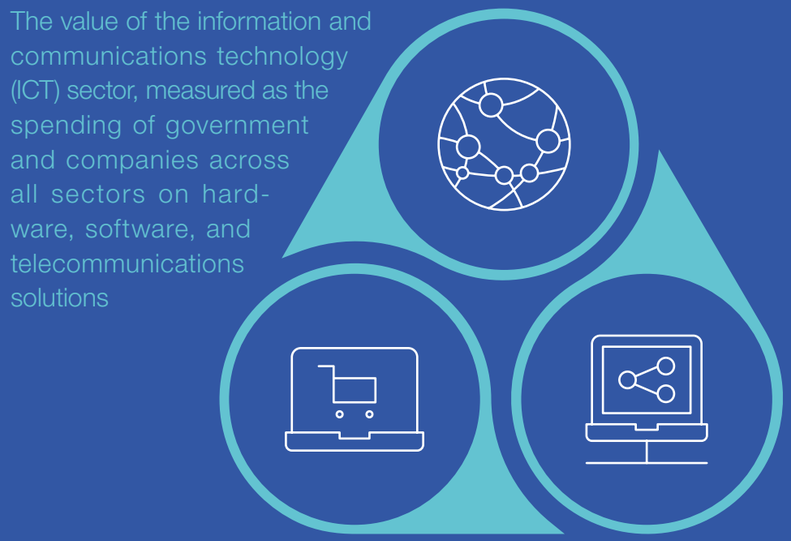
EU BIG 5: France, Germany, Italy, Spain, United Kingdom
Digital Frontrunners: Belgium, Denmark, Estonia, Finland, Ireland, Luxembourg, the Netherlands, Norway, Sweden
Digital Challengers: Bulgaria, Croatia, Czech Republic, Romania, Latvia, Lithuania, Romania, Romania, Romania, Slovenia

SOURCE: World Bank

Our approach to measuring the digital economy in Romania

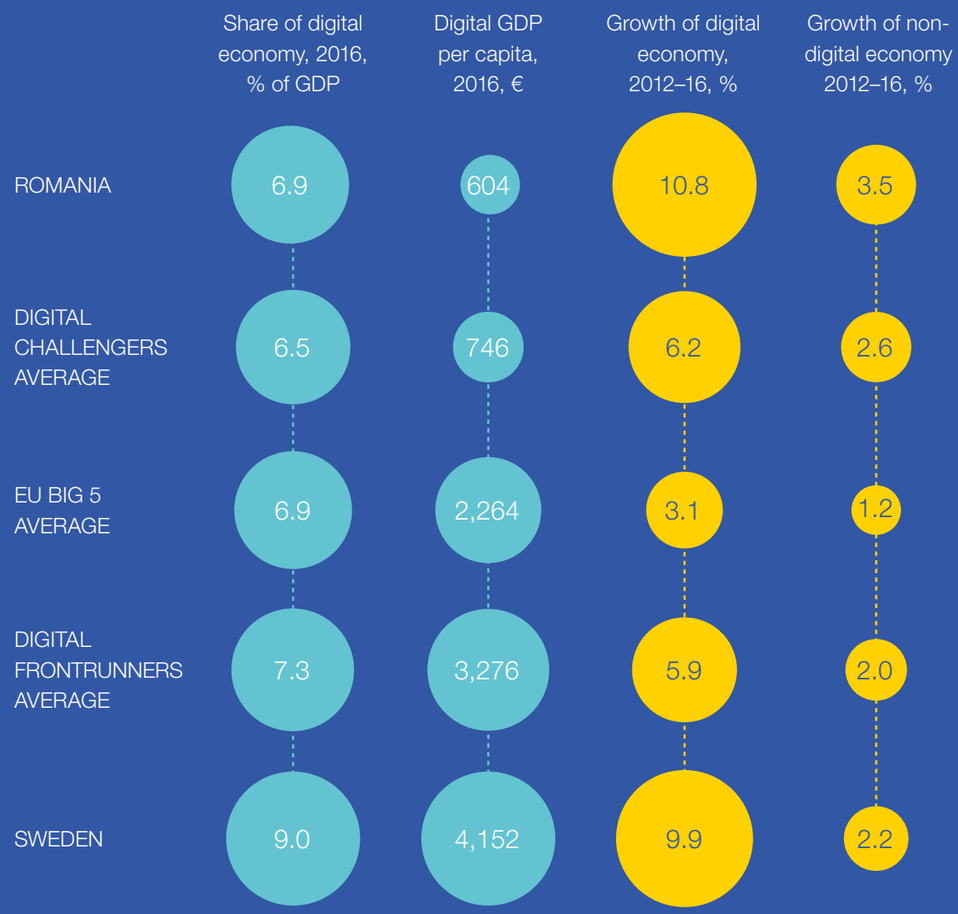
The term “digitization” is widely used by economists. Yet its precise meaning is a topic of much discussion, particularly when it comes to measuring its impact on economies.[2] Consequently, uncertainty reigns about the scale of the digital economy in Romania and CEE.

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:



As discussed in *The rise of Digital Challengers* (CEE perspective) report,[3] we have chosen this definition for two main reasons. First, it is relatively comprehensive – broader 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.

The size and growth of the digital economy in Romania



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.

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.[4] 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.[5]

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

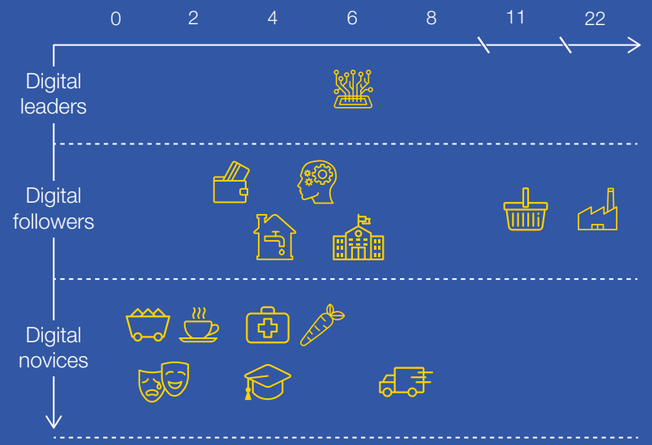
Digital-capital deepening

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

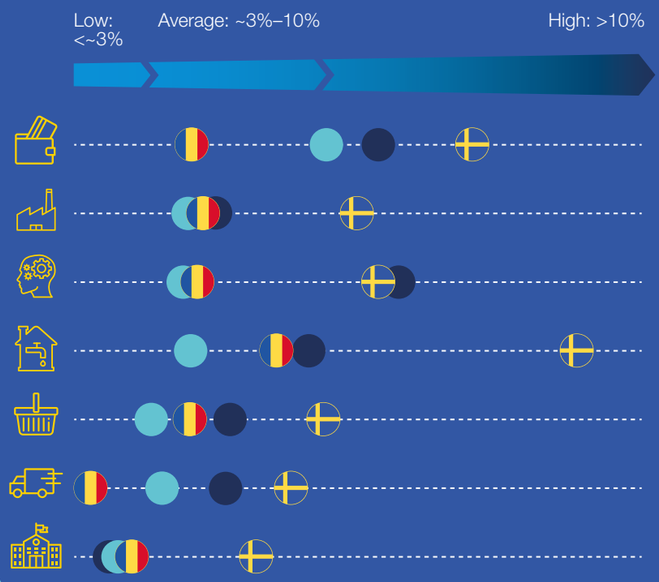
Sector-level digital leaders, followers, and novices in Romania

% of GDP



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



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 goverment 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.

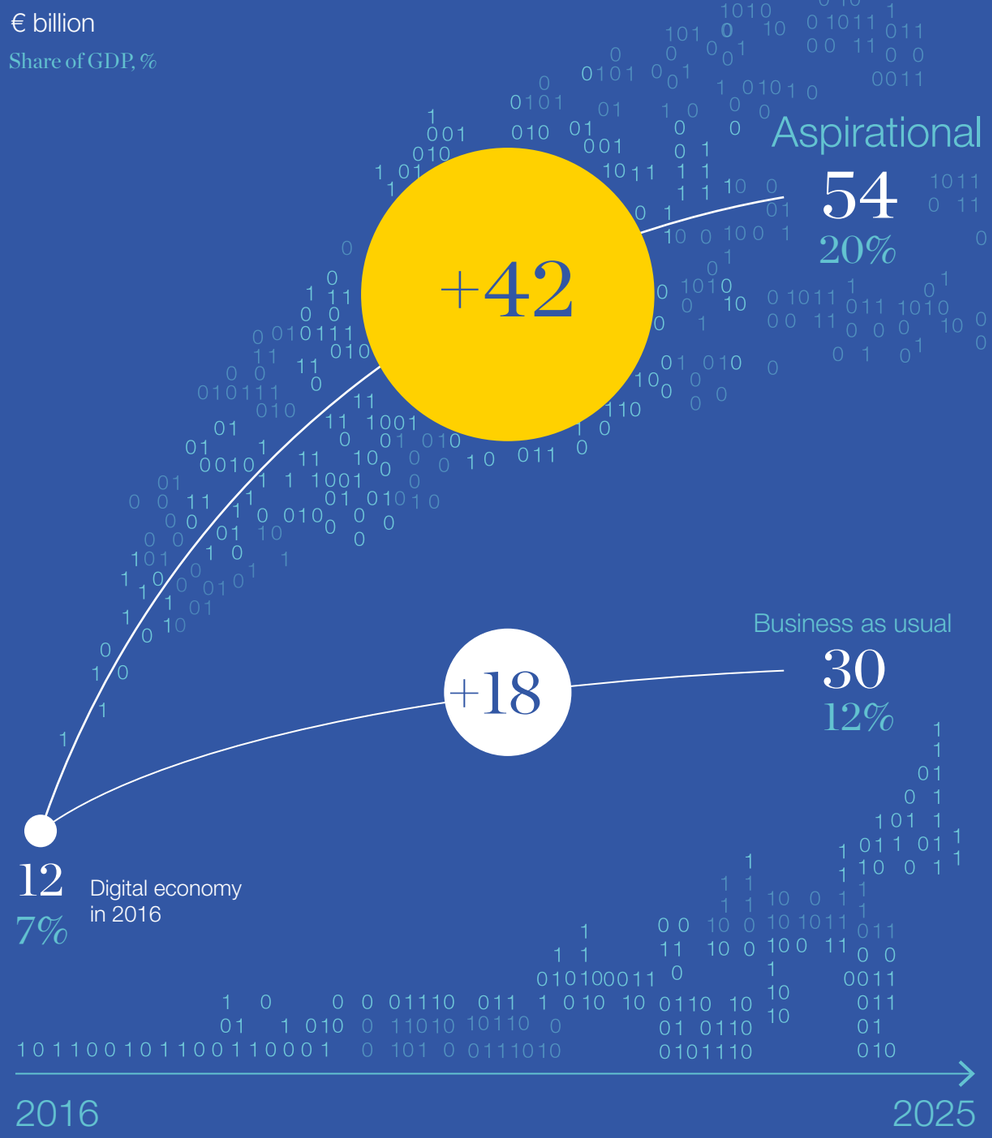
In the first, a "business as usual" scenario, the country maintains its historical growth rate for the digital economy. The digital economy expands by €18 billion to reach 12 percent of GDP by 2025. The gap to Digital Frontrunners (measured as the digital economy's share of GDP) remains almost unchanged, 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,[6] 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.■

We see two trajectories for Romania to grow its digital economy: a business-as-usual scenario bringing an additional €18 billion of GDP, or an aspirational scenario with €42 billion of GDP at stake[7]



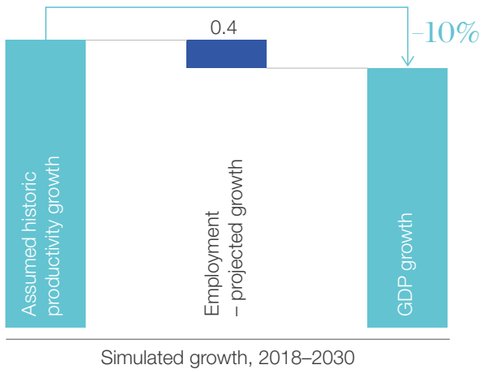
The potential for work automation in Romania

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]

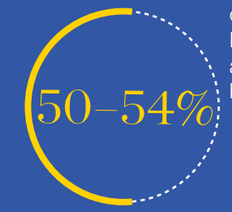
One of the sources of productivity acceleration in the future may come in the form of automation technologies. Following the approach we outline in The rise of Digital Challengers (CEE perspective)[9], we estimate that up to 50–54 percent of workplace activities today in Romania – the equivalent of up 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 accelaration 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, %



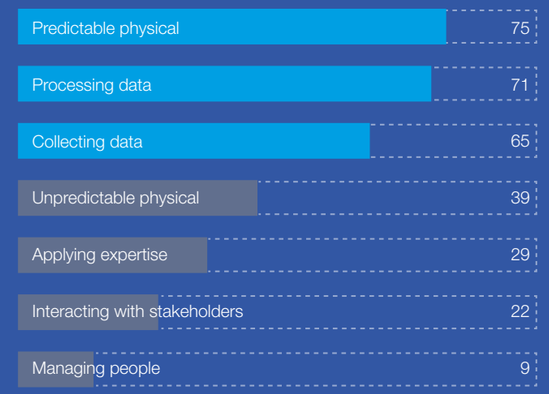
NOTE: Projection assuming historical productivity growth and projected changes in employment growth.
SOURCE: MGI; McKinsey analysis



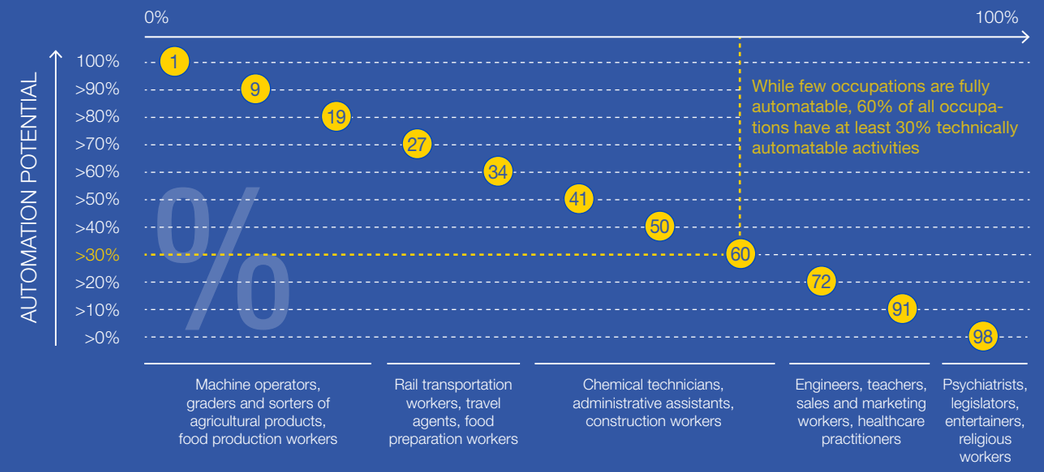
of working time in Romania is spent on activities that could be automated

equivalent number of jobs that could be automated in Romania

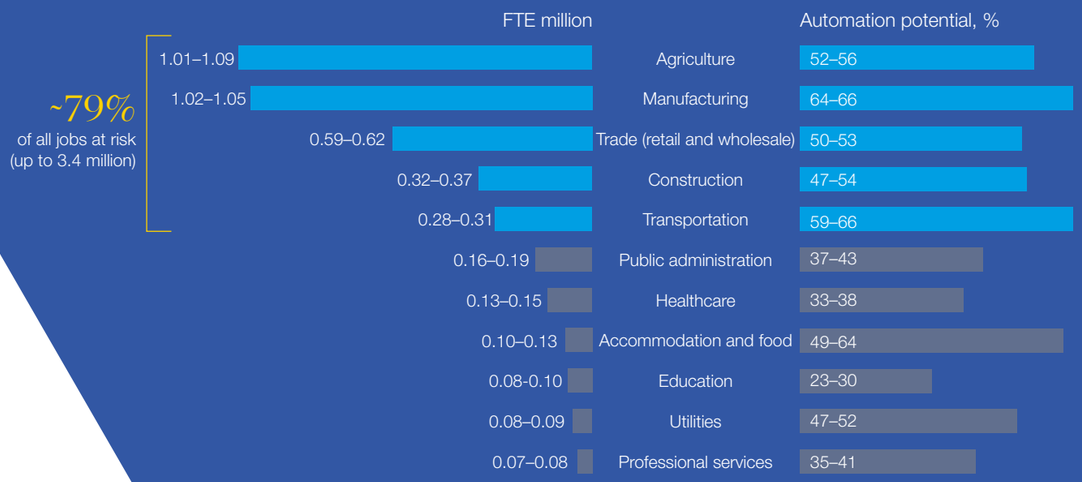
% OF ACTIVITY THAT COULD BE AUTOMATED



SHARE OF OCCUPATION TYPES WITH GIVEN AUTOMATION POTENTIAL, % of 820 occupation types



TOTAL AUTOMATION POTENTIAL IN EQUIVALENT NUMBER OF JOBS



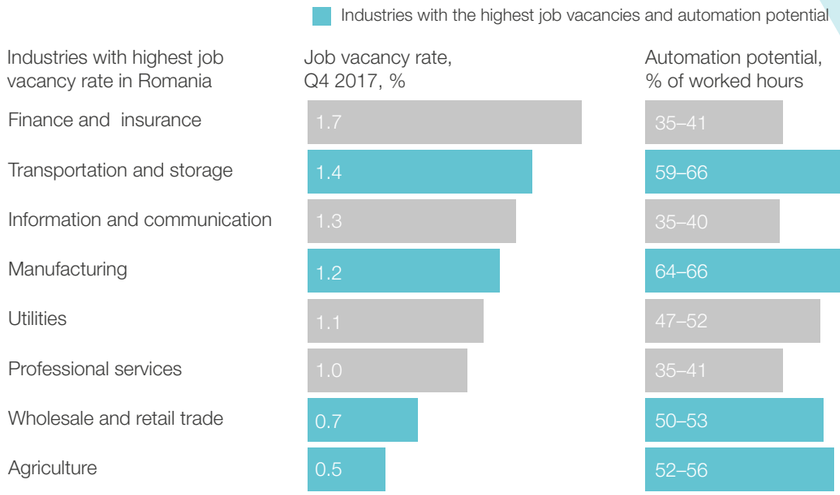
SOURCE: McKinsey Global Institute analysis

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. Digitization 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.



SOURCE: Eurostat; McKinsey Global Institute analysis

SKILL SHIFTS AND THE POTENTIAL FOR A LABOR MARKET MISMATCH

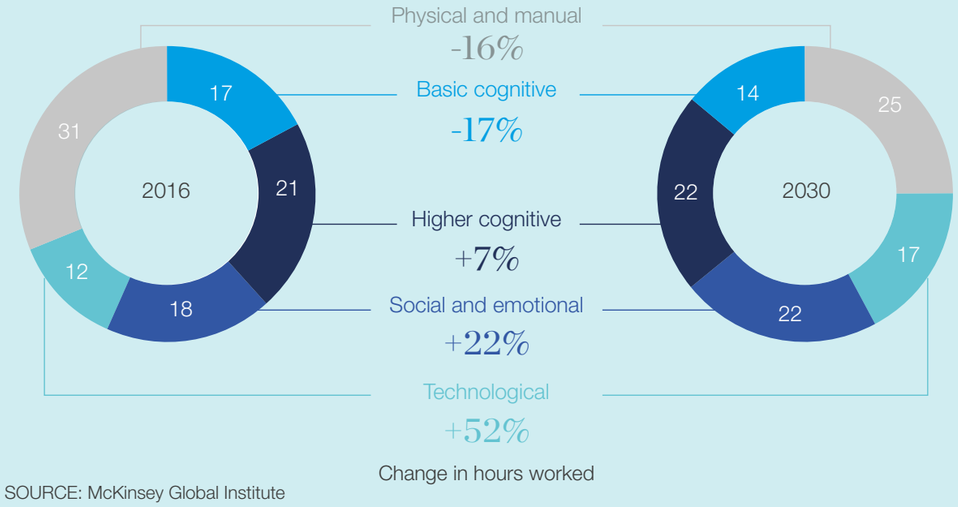
Skill shifts have accompanied the introduction of new technology in the workplace since at least the Industrial Revolution. The adoption of digital technology, automation, and artificial intelligence will mark an acceleration over the shifts of even the recent past.

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.

Demand for technological skills could grow by around 50 percent, and for social and emotional skills by around 20 percent.[12]

Skills used, by category, Western Europe, all sectors, 2016–2030, % of total hours worked

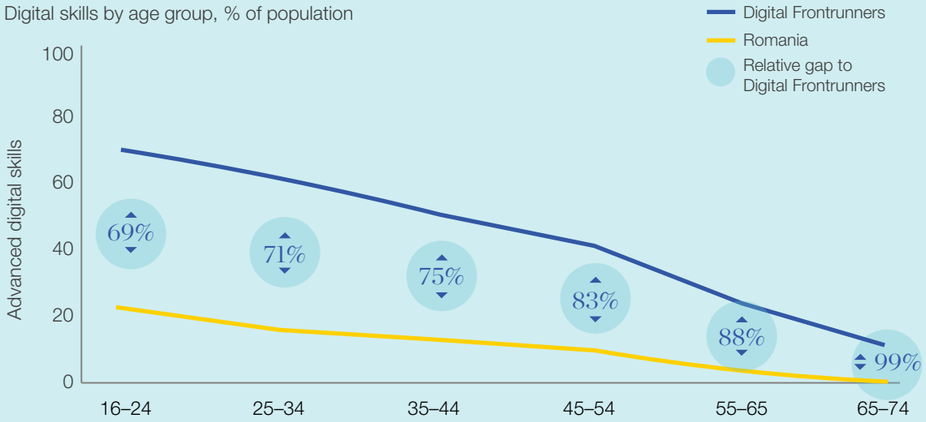


SOURCE: McKinsey Global Institute

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 life-long 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



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

Opportunities and challenges of work automation

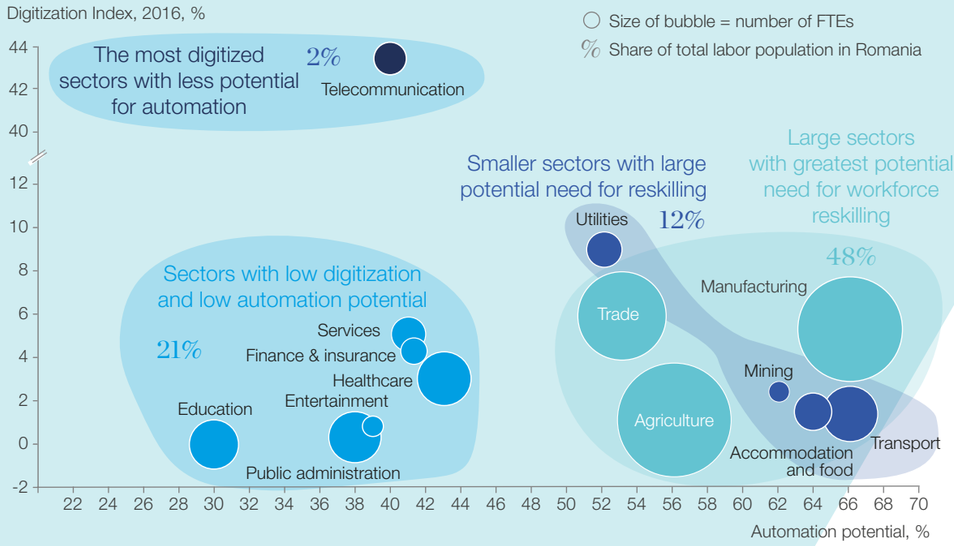
ROMANIA'S BIGGEST SECTORS ARE THE ONES WITH THE LARGEST LIKELIHOOD FOR A FUTURE LABOR MARKET MISMATCH

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.

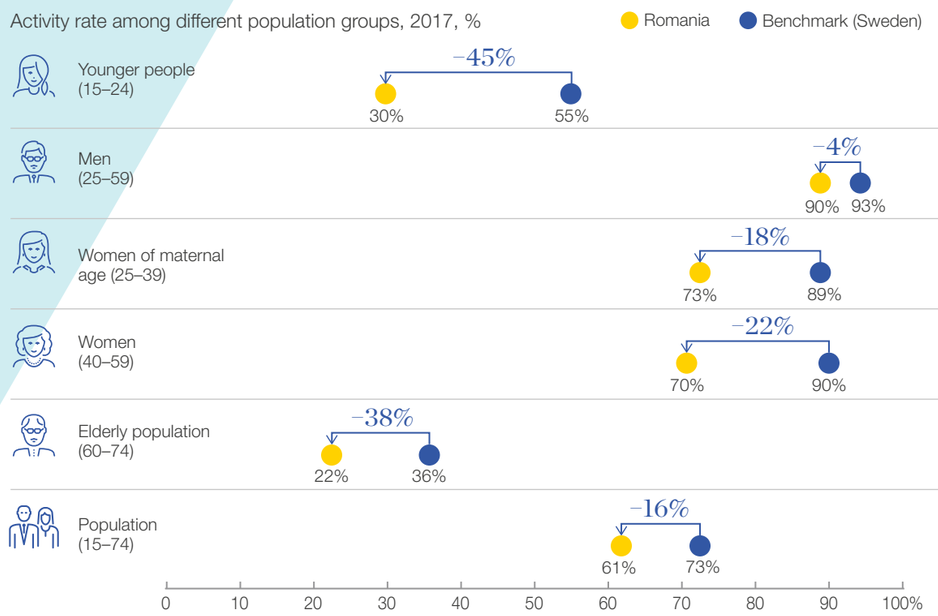
Sectors with low current digitization rates and high automation potential in Romania are likely to experience the greatest need for workforce reskilling in the future.



SOURCE: McKinsey Global Institute; Eurostat; McKinsey analysis

NEW TECHNOLOGY CAN HELP ACTIVATE ROMANIA'S LABOR FORCE

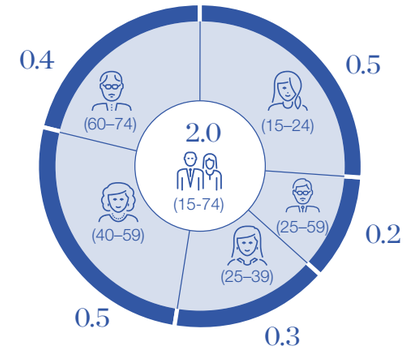
Compared with Digital Frontrunner benchmarks, Romania could have up to 2.0 million people in untapped labor reserves due to lower activity rates



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 work force. 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 precent) 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.■

Romania labor reserves compared with activity rate of Sweden, million people, 2017



NOTE: Activity rate = share of population, both employed and unemployed, that constitutes the labor supply.
SOURCE: Eurostat, McKinsey analysis

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

8 key enablers of digitization for Romania

1. Continuously improve Romania's physical digital infrastructure
2. Ensure a strong pipeline for Romania's ICT specialist talent
3. Increase the adoption of digital tools by Romania's small, medium, and large enterprises
4. Increase the adoption of digital skills and take-up of internet services by Romania's general population
5. Develop, implement, and promote e-government solutions in Romania's public sectors
6. Continue stimulating Romania's already vibrant and emerging digital ecosystem
7. Improve Romania's ICT regulatory environment to ensure investment attractiveness
8. Foster entrepreneurship in Romania to stimulate the startup ecosystem

Hard infrastructure

Talent

Soft infrastructure

Legal, political, and business environment

Innovation

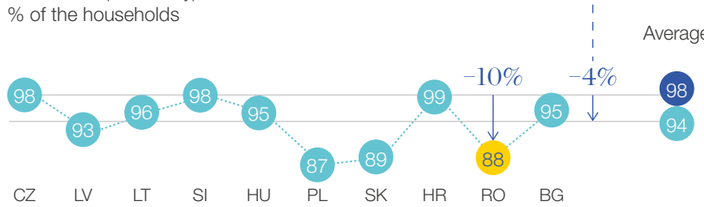
1 DIGITIZATION ENABLER

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.

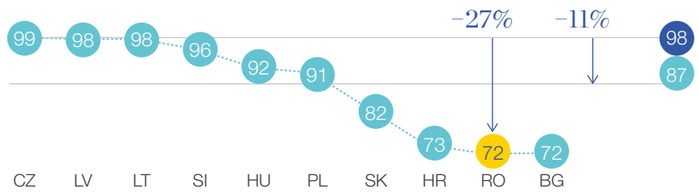
Digital Challengers · Digital Frontrunners · Romania

Household covered by the standard fixed broadband (availability), % of the households



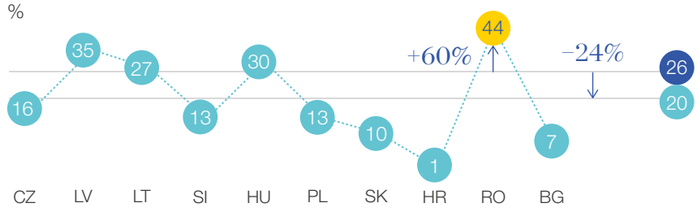
While in terms of standard fixed broadband coverage, the difference is not large between Romania and Digital Frontrunners, there is some room for improvement.

Share of populated areas covered by 4G, %



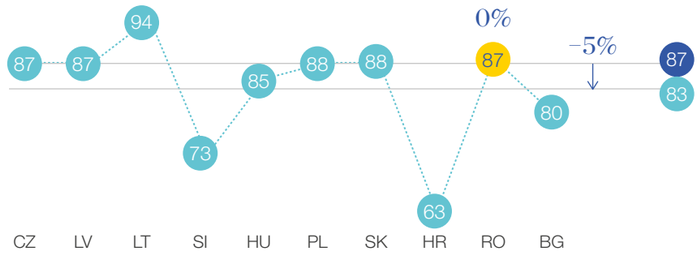
In terms of 4G coverage, Romania trails Digital Frontrunners and is below the CEE average.

Share of ultrafast broadband subscriptions ≥100 Mbps, %



Romania is a European leader in the share of ultrafast broadband subscriptions in the country.

Price index of broadband price, synthetic score



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.

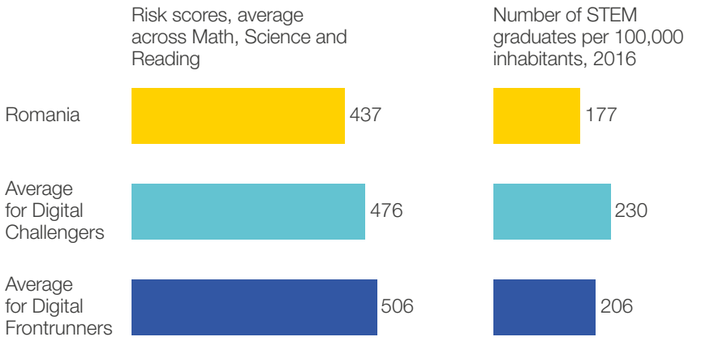
SOURCE: DESI 2018

2 DIGITIZATION ENABLER

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[13] 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.

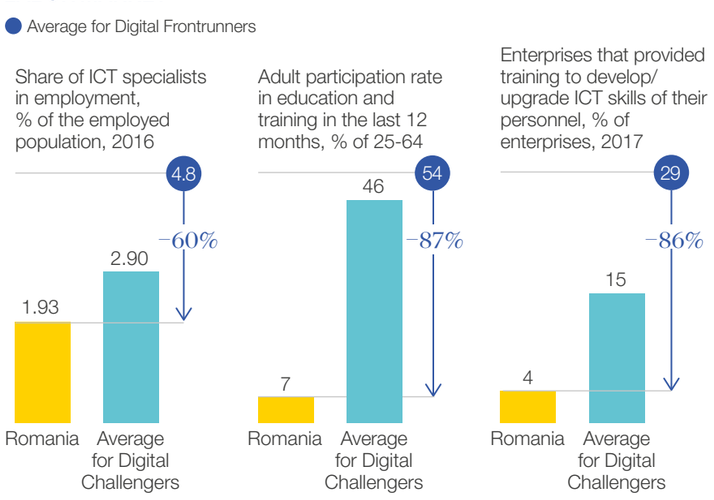
PRIMARY, SECONDARY, AND TERTIARY EDUCATION



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



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

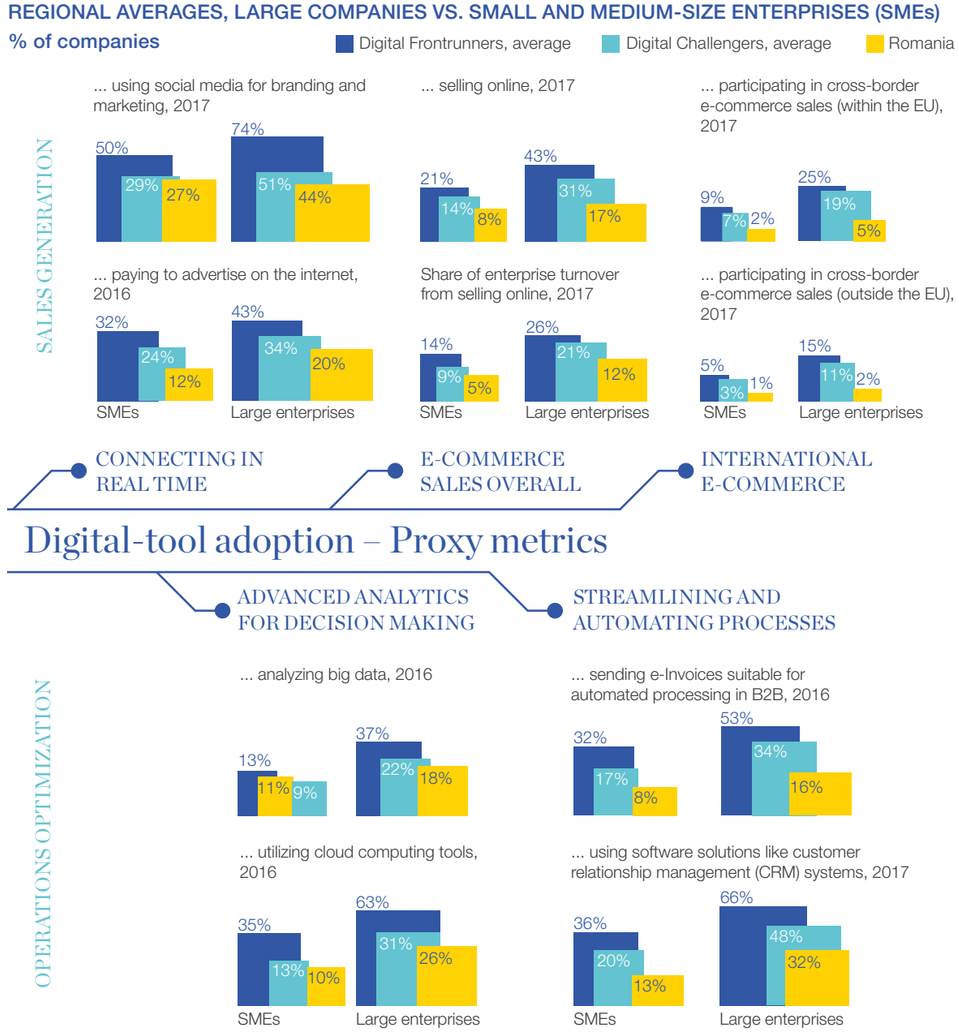
SOURCE: Eurostat; PISA: Programme for International Student Assessment (OECD)

3 DIGITIZATION ENABLER

Increase the adoption of digital tools by Romania's small, medium, and large enterprises

With the help of digital tools, businesses can enhance their performance through boosting their revenue growth capabilities, as well as increasing their efficiency through better resource allocation. We look at five ways in which companies can achieve such benefits, benchmarking Romania against Digital Challengers as well as Digital Frontrunners.

REGIONAL AVERAGES, LARGE COMPANIES VS. SMALL AND MEDIUM-SIZE ENTERPRISES (SMEs)



SOURCE: Eurostat

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 in Romania.

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

4 DIGITIZATION ENABLER

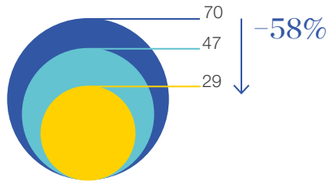
Increase the adoption of digital skills and take-up of internet services by Romania's general population

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.

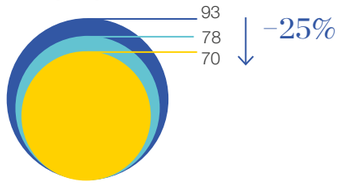
DIGITAL TOOLS AND SKILLS PERSPECTIVE

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

... with at least basic digital skills

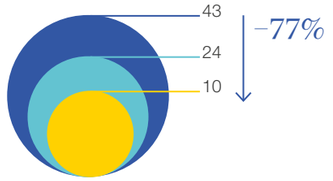


... using the internet in the last 12 months

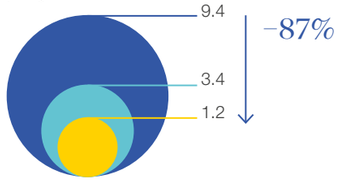


Advanced digital skills – % of population aged 16-74 (2017) ...

... with above basic digital skills



... who have written a computer program



Digital Challengers, average
Digital Frontrunners, average
Romania

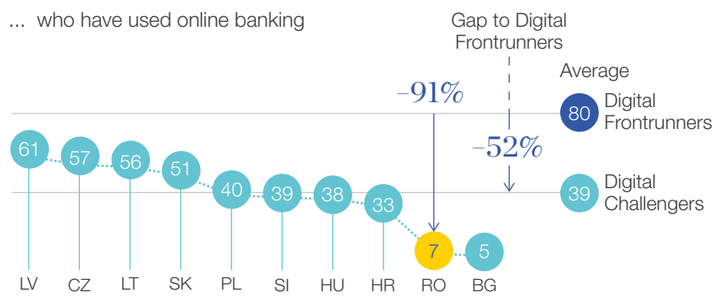
The share of the population in Romania using the internet is below both the CEE and Digital Frontrunner average. Romania also trails both benchmark groups significantly in terms of the adoption of basic digital skills in the general population.

Looking at advanced digital skills, the gap to Digital Frontrunners is even larger. The share of people with above basic digital skills is almost twice larger there compared to Romania.

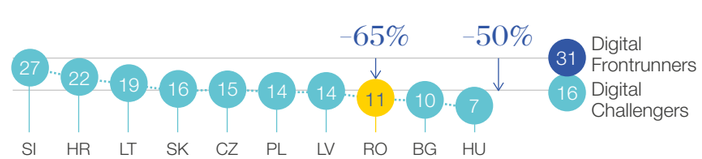
TAKE-UP OF INTERNET SERVICES PERSPECTIVE

% of population aged 16–74 (2017) ...

... who have used online banking



... who have used health and care services provided online



Looking at the adoption of various internet services in Romania, gaps can also be seen to Digital Frontrunners. For instance, a smaller share of people in Romania, compared to Digital Frontrunners, have used online banking or health and care services.

SOURCE: Eurostat; Digital Economy and Society Index, 2017

5 DIGITIZATION ENABLER

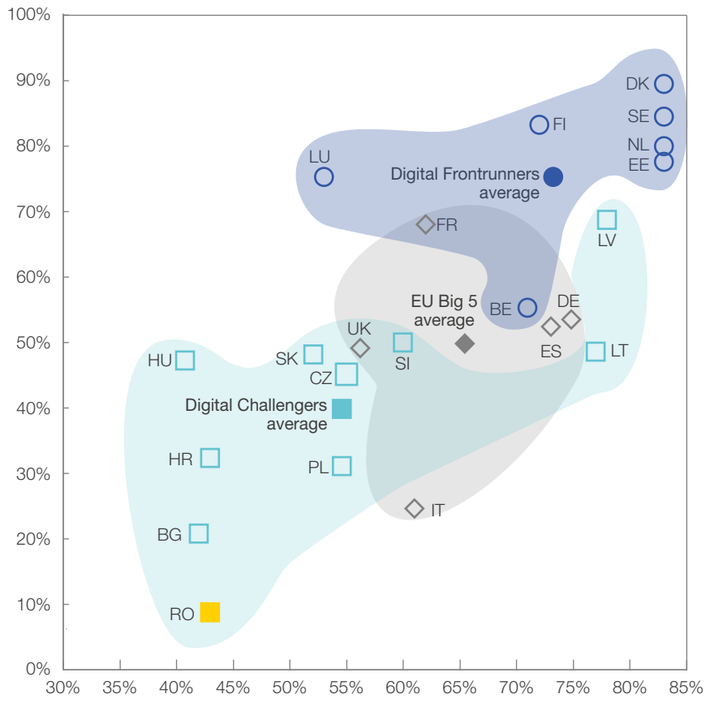
Develop, implement, and promote e-government solutions in Romania's public sector

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.

E-GOVERNMENT PENETRATION AND UPTAKE

Digital Challengers
Digital Frontrunners
EU Big 5
Romania

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



Penetration: Government Digitization Index

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.

SOURCE: Eurostat; Digital Economy and Society Index, 2017

6 DIGITIZATION ENABLER

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 – a potentially crucial avenue for combating the issue of brain drain.

SELECTED DIGITAL SUPERSTARS

There is a growing number of success stories in Romania's digital landscape that are capitalizing both on local talent and on foreign investments. UIPath 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. dcs plus develops technology such as booking tools and systems for the travel and tourism industries, including major airlines and travel agencies from 45 countries. Clevertaxi is one of two ride hailing services in Romania that connect licensed taxi drivers to users.

E-COMMERCE ECOSYSTEM

Romania's e-commerce companies are present across the value chain. General online shops such as eMag, that is now also present in Poland, Hungary and Bulgaria and growing at 30 percent per year are complemented by specialized ones such as Autovit.ro as well as classifieds like olx and price comparers such as Compari.ro. Payment processing is facilitated by providers such as PayU and Plationline.ro. Behind the digital counter, Smart Bill provides Integrated billing and ERP services, while Frisbo takes care of warehousing, packing, delivery and other logistics.

SOFTWARE DEVELOPMENT PLAYERS

Multiple Romanian software development companies are becoming regional powerhouses, some of them focusing on innovation while others on end-to-end solutions. Several are ranked among Europe's fastest growing companies, including Trencadis, Tremend, Accesa. Others (for example Qualitance and Softvision) are also expanding their global presence, partnering with their clients through agile methods.

DIGITAL CENTERS OF EXCELLENCE FOR LARGE MULTI-NATIONALS

Large foreign corporations from traditional industries are also jumping on Romania's digital bandwagon. Banks with or without local presence, have chosen Bucharest for their IT development hubs. DB Global Technology supports Deutsche Bank's application and software needs in Central and Eastern Europe. ING Tech is developing the bank's core banking applications, handles data management as well as retail and wholesale solutions. Lidl Digital is an IT Center of Excellence, supporting the retailer's e-commerce and digital platform needs. Metro Systems delivers a large part of the wholesalers' digital systems such as merchandise, logistics and data warehousing. GE Power's Grid Software Solutions provides integration, software development and testing to projects worldwide. Wipro's Automotive Center of Excellence delivers embedded software solutions to the company's clients, such as in-vehicle infotainment and Advanced Driver Assistance Systems.

SOURCE: Press releases, company webpages, McKinsey research

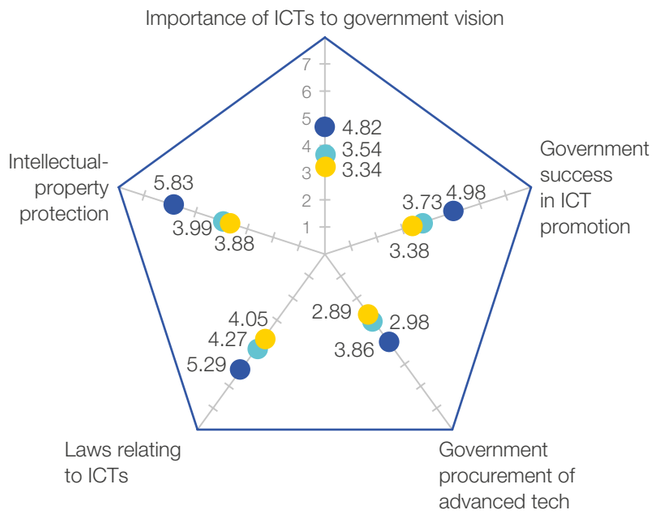
7 DIGITIZATION ENABLER

Improve Romania's ICT regulatory environment to ensure investment attractiveness

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.

Digital Frontrunners, average | Digital Challengers, average | Romania

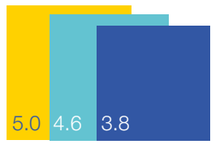
WORLD ECONOMIC FORUM NETWORK READINESS INDEX
Synthetic score, scale of 1 to 7, where 7 is highest performance



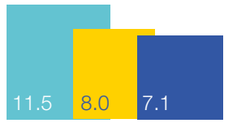
Investigating the friendliness of the regulatory regime toward ICT in Romania and CEE, we see gaps to Digital Frontrunners. On average, laws related to the use of ICTs (e.g., electronic commerce, digital signatures, consumer protection) are considered to be less well developed, with Romania below the Digital Frontrunners average. 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.

STARTING A BUSINESS

Number of procedures to start a business

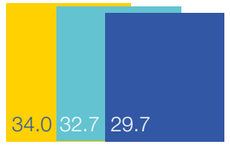


Number of days to start a business

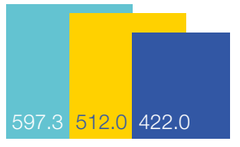


ENFORCING CONTRACTS

Number of procedures to enforce a contract



Number of days to enforce a contract



The overall attractiveness of the business environment in Romania indicates room for improvement compared with Digital Frontrunners. Looking at proxy metrics, such as the number of days and procedures needed to start a business or enforce a contract, Romania underperforms relative to Digital Frontrunners.

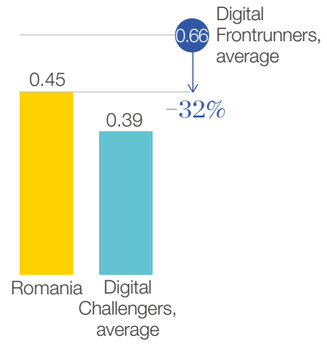
SOURCE: World Economic Forum, Network Readiness Index, 2016

Foster entrepreneurship in Romania to stimulate the startup ecosystem

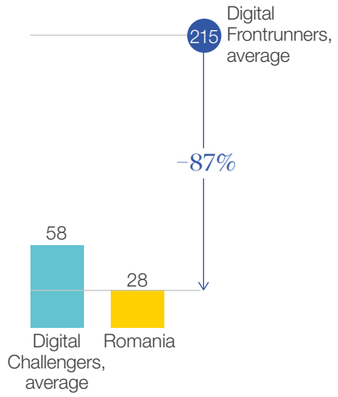
Here we look at the state of the ecosystem for startups in Romania compared to Digital Frontrunners. Our focus is on five areas: the entrepreneurial talent base, the startup community, early-stage startups, growth-phase startups, and enterprises having achieved significant scale. Digital Challengers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

EARLY-STAGE STARTUPS

Global Entrepreneurship index



Number of startups per million citizens, 2018

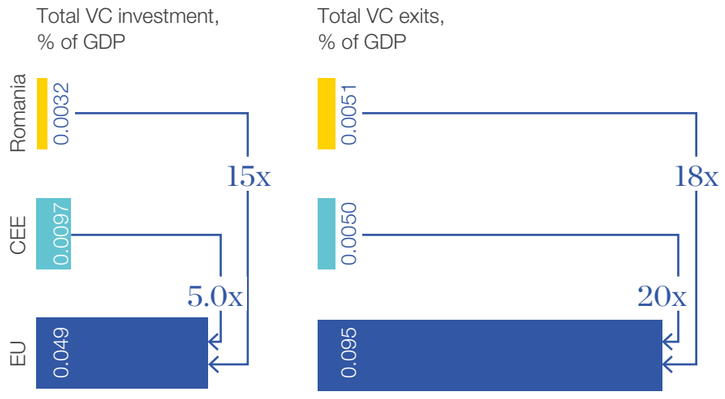


Romania is on par with the Digital Challenger average in Global Entrepreneurship Index, which ranks countries in terms of entrepreneurial attitudes, abilities and aspirations of the local population. However, Romania still trails behind Digital Frontrunners in this area.

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)



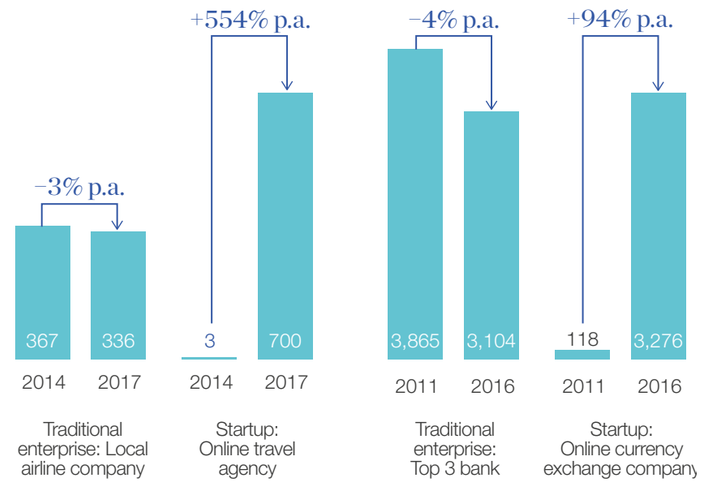
Beyond the aspect of entrepreneurship, financing is also a factor. Controlling for GDP size, VC investments, and VC exits in Romania are significantly behind Digital Frontrunners.

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

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.

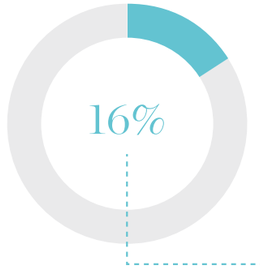
EXAMPLES OF HOW DIGITAL STARTUPS CAN REACH SIGNIFICANT SCALE: COMPARISON WITH TRADITIONAL INDUSTRY FIRMS

Annual revenue, € million

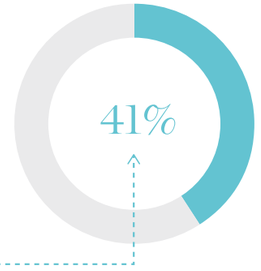


European startups are oriented toward international markets. On average, they generate 55 percent of their revenue outside their domestic markets. Digitization allows startups to replicate digital assets and reach a global consumer base (see examples on the left of two fast-growing startups from CEE 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).

% OF YOUNG SMEs IN TOTAL EMPLOYMENT



% OF YOUNG SMEs IN NEW JOB CREATION



Young small and medium-size enterprises (SMEs) contribute disproportionally to job creation: Across 17 OECD countries, they account for 16 percent of overall employment but create 40 percent of new jobs. Additionally, creating one high-tech job can lead to the creation of more than four additional non-high-tech jobs in the same region.■

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

Four arguments for the benefit of collaboration between Digital Challengers

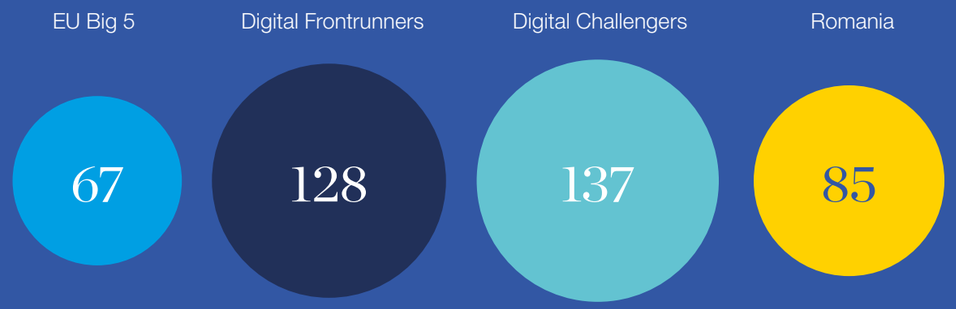
Ⓐ SCALE EFFECTS

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

Ⓑ 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.

Trade, 2017, % of GDP



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

SOURCE: World Bank

Ⓒ BEST PRACTICES

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

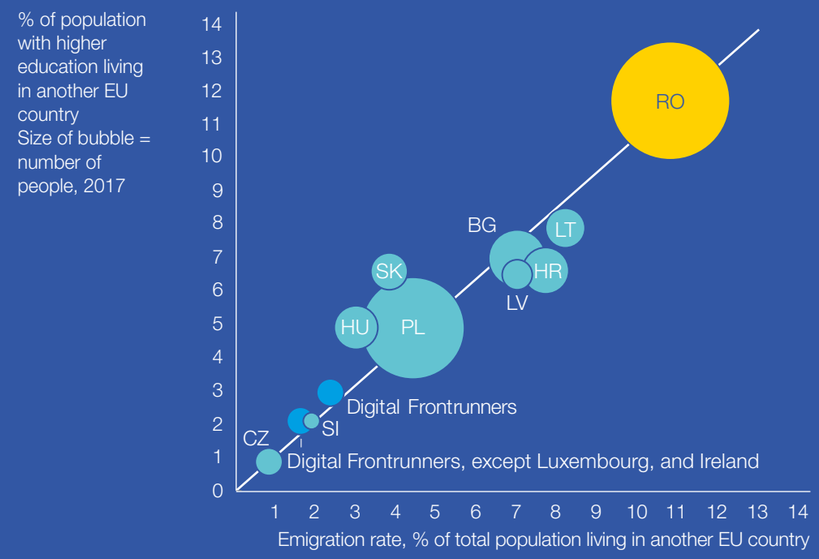
Looking at the various KPIs and case studies we have explored in our CEE report *The rise of Digital Challengers: Digitization as the next growth engine for Central and Eastern Europe*, we see that no single Digital Challenger market outperforms the other countries across all digitization enabling areas. Most markets in the region appear to have digitized differently, developing advantages in certain fields. For instance, we already saw Romania exhibiting digitization rates above the CEE average in the utilities, the manufacturing, and trade sectors. In many digitization enabling areas, however, Romania performs only 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), participation rates in adult learning among the general population, and the adoption of digital tools by companies for cross-border e-commerce. This implies that sharing best practices between countries could be very beneficial.

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.

Ⓓ 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.



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 time 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.

Search for relevant solutions and benchmarks, e.g., look at the experiences of other markets such as Canada, Denmark, Singapore.

Commit to the program and measure the effectiveness of actions, e.g., measure changes in employment rates and wages, hold educators responsible for the outcomes of reskilling programs.

Update youth education

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 the curricula of pre-university schools, e.g., increase focus on skills such as programming, entrepreneurship and initiative-taking, leadership and managing others, communication skills. Code School Clubs is program of this kind, educating Romanian children in programming.

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.

Cooperate with the private sector to create practical education programs and support apprenticeships.

Promote lifelong learning and mid-career training

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.

Support new types of education credentials, e.g., digital programs.

Increase accessibility of education by improving people's English-language skills, enabling them to access global knowledge resources.

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.

Attract ICT specialists who have left back to the country, e.g., provide scholarships for young people studying abroad in exchange for a commitment to come back and work in the home country.

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.

Leverage independent work platforms

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.

Support technology adoption

KEY FACTS ABOUT ROMANIA

- Romania trails Digital Frontrunners in the European Comission'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

Digitize the public sector

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.

Support technology adoption at companies

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.

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

Improve the entrepreneurial talent pool

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.

Strengthen the position of major cities as startup hubs, tailored to local needs

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.

Increase access to capital

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.

Strengthen cross-border digital collaboration

KEY FACTS ABOUT ROMANIA

Romania can only capture the full potential of digitization 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)

Establish a coalition favoring pro-digital legislative measures at the European level, strengthening the voice of individual countries in EU policy discussions.

Assemble working groups at relevant levels to develop a pipeline of priority collaboration areas, e.g., representatives from digitization ministries at the national level, private-sector leaders.

Facilitate the sharing of best practices and experience in the region – disseminate what has worked well regarding regulatory policy and investment.

Ensure standardized, flexible digital-policy solutions across the region

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.

Implement cross-border projects facilitating the digitization of the region

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.

Cooperate in the management of social change as a result of changes in the labor market

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.

Actively adopt technology and innovation to close the gap to digital leaders

KEY FACTS ABOUT ROMANIA

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).

Implications for business leaders

Adapt business model to meet the demands of the digital economy

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.

Use digital tools for revenue growth, including boosting your export capabilities

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.

Leverage own or external e-commerce platforms to boost export capabilities and tap into global demand pools for products and services.

Use digital tools to optimize the bottom line

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.

Update the approach to recruiting future employees

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.

Create reskilling and upskilling opportunities for current employees

Enable reskilling and upskilling opportunities, e.g., provide practical in-house training, offer financial support, create opportunities for formal and informal knowledge sharing.

Embrace a pro-digital organizational culture

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.

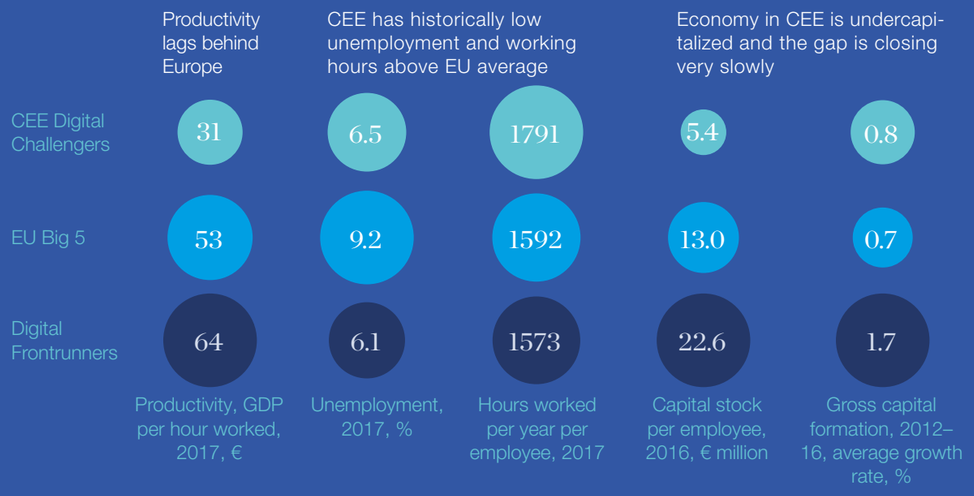
Prioritize agility and learning over forecasting and planning.

Form strong digital collaborations within trade associations, focusing particularly on SMEs. ■

CEE DIGITAL CHALLENGERS – KEY MESSAGES – RECAP

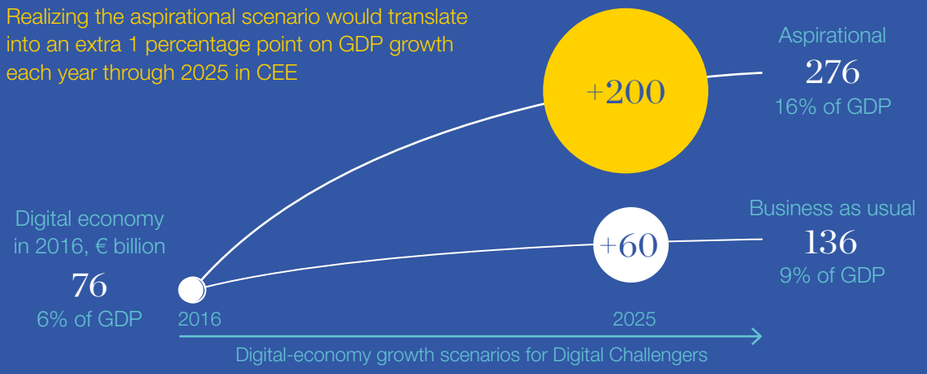
WHY IS DIGITIZATION KEY FOR CEE?

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



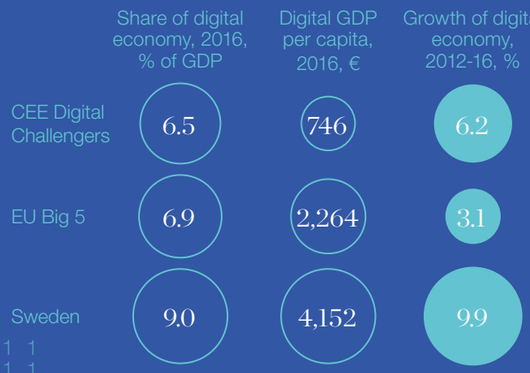
2 DIGITIZATION CAN BE THE ANSWER TO THIS CHALLENGE

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



3 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

HOW TO CAPTURE THE POTENTIAL?

4 ALL STAKEHOLDERS NEED TO ACT FOR A SUCCESSFUL TRANSITION

Implications for policy makers

- Build skills sets for the future, including updating youth education, promoting lifelong learning, and counteracting 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

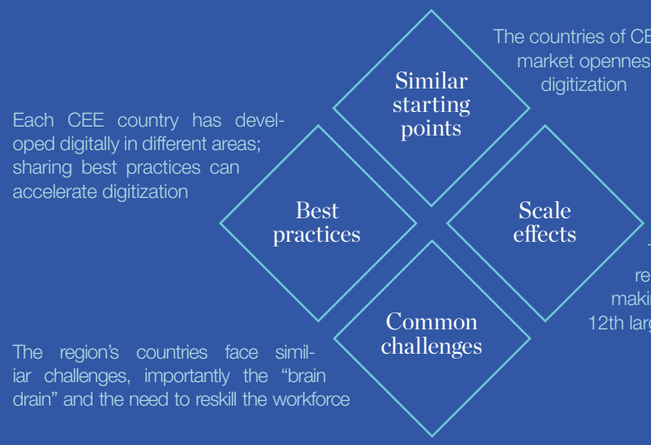
- Adapt business model to meet the demands of the digital economy
- Use digital tools for revenue growth, including boosting your export capabilities
- Use digital tools to improve the bottom line
- Invest in human capital and prepare talent strategies for the future, including an updated approach to 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

5 COLLABORATION BETWEEN CEE DIGITAL CHALLENGERS IS KEY

There are four reasons why cooperation is necessary to capture the full potential of digitization in the CEE region:



6 THE TIME TO ACT IS NOW – OTHERWISE THE REGION MAY MISS THE DIGITAL OPPORTUNITY

Digital Challengers are enjoying an economic boom; this could give new digital initiatives a head-start

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

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

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 research[14] 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 studies[16] that define it as all digital activities in all sectors of the economy. In our report we use the latter definition, while ensuring that the digital economy in our definition is quantifiable and comparable between countries.

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 Frontrunner 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. ■

About the authors

Jurica Novak

Managing Partner in Central Europe

Advises clients in banking, telco, consumer goods, private equity, insurance, and other industries primarily on strategy, digital, corporate finance, and governance.

Daniel Spiridon

Managing Partner in Romania

Advises clients in the telecom, financial services, energy, and fast-moving consumer goods sectors on developing and executing growth strategies, large-scale transformations, and post-merger integrations, as well as on improving operations.

Marcin Purta

Managing Partner in Poland

Expert with 20 years of experience in strategic consulting, advising clients on growth strategies based on advanced analytics and digital innovations in sectors such as TMT, retail, energy and logistics.

Tomasz Marciniak

Partner

Leader of the Strategy and Corporate Finance Practice, Banking and Insurance Practice in Poland as well as the Electric Power and Natural Gas Practice in Central and Eastern Europe.

Karol Ignatowicz

Local Partner

Advises clients in TMT, retail, basic materials and other industries primarily on strategy, digital transformation, turnarounds and operational improvements topics.

Kacper Rozenbaum

Engagement Manager

Advises clients in energy, telecommunications and technology on topics of strategy, turnarounds and digital transformations.

Kasper Yearwood

Consultant

Advises clients in retail, energy and finance on topics of strategy, digital transformations and advanced analytics.

The authors of the report would like to thank to dozens of McKinsey colleagues who greatly contributed to this report, among them (in alphabetical order): Graham Ackerman, Maria Ballaun, Tim Beacom, Norbert Biedrzycki, Ola Bojarowska, Tomislav Brezinscak, Adam Chrzanowski, Diana Cristea, Mateusz Falkowski, Adrian Grad, Jerzy Gut-Mostowy, András Havas, Oana Ionuțiu, Joanna Iszkowska, Levente Jánoskuti, András Kadocsa, Daniel Kałuża, Tomas Karakolev, Viktor Kozma, Krzysztof Kwiatkowski, Lucie Markova, Márta Matécsa, Małgorzata Leśniewska, Joanna Ostrowska, Péter Puskás, Helena Sarkanova, Ștefan Scorțescu, Dan Svoboda, Michal Skalsky, Jakub Stefański, Anna Szucs, Milena Tkaczyk, Katarzyna Tłuścik, Daniela Tudor, Roxana Țurcanu, Robert Wielogórski, Mateusz Zawisza, Jan Zieliński and Arkadiusz Żarowski.

Endnotes

1 For more insights, see: McKinsey & Company, ***Digitally-enabled automation and artificial intelligence: Shaping the future of work in Europe's digital front-runners***, October 2017.

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

3 McKinsey & Company, ***The rise of Digital Challengers: How digitization can become the next growth engine for Central and Eastern Europe***", November 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, D***igital America: A tale of the haves and have-mores***, December 2015

6 Using data from IHS Economics for baseline GDP growth projections for Hungary

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%)

9 McKinsey & Company, *The rise of Digital Challengers: How digitization can become the next growth engine for Central and Eastern Europe*, November 2018

10 Ibid.

11 McKinsey & Company, *Digital Economy: The next growth engine for Central Eastern Europe's Digital Challenger markets*, November 2018

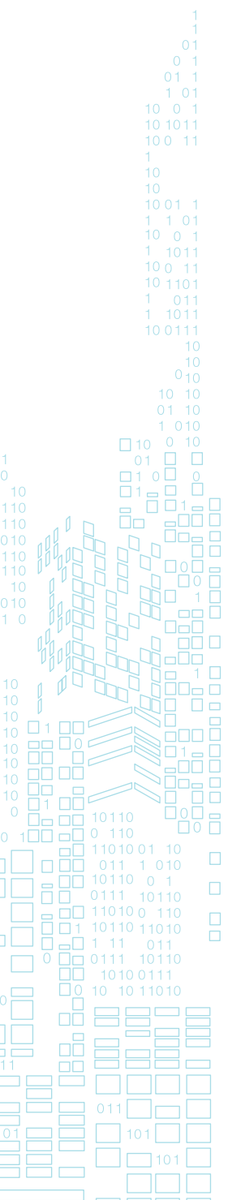
12 Based on difference between hours worked per type of skill in 2016 and forecast hours worked in 2030. Numbers may not sum due to rounding. Western Europe: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom

13 PISA: Programme for International Student Assessment (OECD)

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

15 OECD report, *Digital Economy Data Highlights*, 2016

16 International Monetary Fund Staff Report, *Measuring the Digital Economy,* February 2018



Digital McKinsey
2018