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Competitiveness in Technology and Innovation: How to Keep On?

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Abstract: Digital technology in general and information and communication technologies (ICT) in particular have proven to be critically important as key enabler of socioeconomic progress and development, enhancing productivity and economic growth, bringing prosperity in many ways. Digital technology is increasingly revolutionizing production and business processes, access to markets and information sources together with social interactions. We call it The Fourth Industrial Revolution.

Innovation is the single most important engine of long-term competitiveness. The growing importance and the ability of companies, institutions and countries to innovate, have far-reaching implications for their strategy. The critical questions is what policymakers, business leaders, scholars, and entrepreneurs can do, either separately or acting together, to catalyze both public and private sector innovation environment (and hence grow and increase their competitiveness) and improve innovation capacity of their economies. Competitiveness is fundamental for sustainable prosperity of a nation. Economies that are more competitive are able to produce higher levels of income for their citizens. Country that is more competitive is likely to grow faster than the others over the medium to long run. The central challenge for policymakers is to create the market conditions for both companies and employees to upgrade their productivity by absorbing digital technology and innovation momentum while maintaining reasonable costs of doing business and living in the country.

Benchmarking a country's competitiveness in technology and innovation remains challenging for a number and variety of dynamically changing influencing factors. Numerous inconsistent and incomparable reports and indexes, as well as of the quality and availability of statistical and real market data do not help either. Therefore, the World Economic Forum, the key source of competitiveness data and analysis, is set to significantly reform and change the way they calculate and measure Global Competitiveness Index while national economies are coping with the momentum of The Forth Industrial Revolution.

Keywords: competitiveness, digital technology, innovation, productivity, benchmarking

INTRODUCTION

The unique combination of economic and digital technology forces have changed the world in the last thirty years and already disrupted the entire industry sectors and societies as we know of. Taking our civilization to the next level, it is not only about Cloud, Social and Mobile technologies combined abolishing existing legacy systems, but also about end-to-end transformation of the way we have structured our entire world of work and life so far. In the inner segment of manufacturing, this evolution in the context is called *Industrie 4.0*¹. However, implications of digital disruptions go far beyond the pure economic or technology ramifications. Much wider in scope, they refer to a systemic transformation that will immensely influence our civilization and its fundamentals – human identity, civil society and governance structures. “Digital technologies [...] are not new, but in a break with the third industrial revolution, they are becoming more sophisticated and integrated and are, as a result, transforming societies and the global economy. We call it The Fourth Industrial Revolution” [1].

Therefore, the economy itself has gone through a number of profound changes in recent decades. The decrease in the costs of diffusing and using information, the shortening of product cycles, driven both by an accelerating pace of technological change and rapidly shifting consumer patterns, the progressing internationalization and liberalization of exchanges and interactions (commercial, financial, cultural, etc.) are some of the developments that are transforming the determinants of wealth creation. These ongoing structural changes are fundamentally reshaping businesses, summed up in terms such as knowledge economy. In the last few years, and even more strengthened by the recent global financial crisis, the concept of technology and innovation driven economic growth and competitiveness has gained increased importance [2].

Here, innovation is not meant for just about creating high-tech products or companies. Nor it is just about research leading to the incremental or disruptive inventions and creation of new products. Innovation here refers to new processes, business models and other ways of doing things, as much as it does to new products and services. Furthermore, the generation of new knowledge and ideas does not necessarily lead to a successful innovation. The productive interaction among companies, academia and the government is critical for transforming new knowledge and ideas into commercially viable products or services, economic growth and improved wellbeing. These interactions are captured in the concepts of *triple helix*² and *innovation systems*. Finally, innovation is not restricted to science and scientist but has to be extended to a wider community of entrepreneurs, corporations, and even the civil society.

¹ The term “Industrie 4.0” originates in 2011 from a project in the high-tech strategy of the German government, promoting the computerization of manufacturing. The concept has been revealed in late 2012.

² The Triple Helix thesis is that the potential for innovation and economic development in a Knowledge Society lies in a more prominent role for the university and the hybridisation of elements from University, industry and Government to generate new institutional and social formats for the production, transfer and application of knowledge (Stanford University Press).

The growing importance and the ability of companies, institutions and countries to innovate, have far-reaching implications for their wellbeing. The critical questions is what policymakers, business leaders, and scholars can do, either separately or acting together, to catalyze innovation (and hence grow and increase their competitiveness) and improve *innovation capacity* of their economies. Thanks to the global competitiveness, all nations are somehow transitioning from the *factor* and *efficiency* driven towards *innovation driven* economies. They also experience different policy reforms momentums, specifically concerning the restructuring of public services and financial systems, educational, information and communication infrastructure. While countries who score high in the competitiveness, generally experience different and uneven economic growth rates, thou certainly grow steady over the long run, their competitiveness benchmarking show very even and spotty indicators of the national micro and macroeconomic environment, quality of institutions and healthy social tissue.

The same applies to the major indicators of their innovation capacity, technology readiness and human capital. All of those countries are looking to innovation and information technology policies as pivotal for tackling the structural challenges facing their economies as they are striving for sustainable growth and development in the future. They tend to have well-educated labor forces but with significant high-tech inclusion and modern skills above the requirements of the current collaborative and manufacturing technologies. They all have significant capacity for research and development with public and state institutions playing critical consortium, cluster and networking roles, but with high contributions of the private sector. In spite of all this, the countries' individual ability to develop, nurture and utilize their human capital remains under question due to the stalled productivity and demographic dynamics.

IMPORTANCE OF TECHNOLOGY

Throughout the history, technology has been the single most important economic factor of labor productivity and therefore a major contributor to the creation of human wealth. Ability of an individual, group or organization, economy or nation to adopt existing technologies to enhance its productivity became the critical differentiator and an essential element of their capacity to compete and prosper. In today's world, Information and Communication Technologies (ICT) are those that have evolved into the technology of "general purpose". Given its rapid and effective spillovers to all economic sectors, and its role as an efficient infrastructure for commercial cross-border transactions, ICT itself became one of most prosperous and fastest growing industries of all times. Equally importantly, ICT has proven to be instrumental for enabling less developed, developing and other economies in transition to leapfrog traditional factor and resource barriers and jump into more sophisticated stage of development by fostering overall economic and social transformation.

Technology has also an important impact on development of innovation capacity of societies and economies. This eventually occurs in three main stages. In the *first* stage new

technology substitutes the old one; the *second* stage of impact occurs when the new technology is adopted across society; in the *third* stage, new lifestyles and businesses emerge thanks to the new technology already widely diffused and adapted in society. This is the stage of transformation that societies and economies undergo today with the new digital, information and communication technologies. Here ICT increasingly affects and transforms a wide range of organizational and business innovation activities, from internal research, development and education up to design and marketing of products and services. There is also growing evidence that ICT is boosting innovation by allowing creative thinking and responsive problem-solving thus becoming an important learning enabler for societies and companies and providing opportunities for all. However, the use of technology in a country has to be distinguished from its own ability to innovate and expand the frontiers of a nation's knowledge.

Access to the global resources and markets through the networked economy became an important success factor of the world's most competitive economies and societies. For a particular country's competitiveness, it is less important whether new technologies have been designed and developed within its national borders. More important is for individuals, companies and institutions operating in a territory to have an easy access to the advanced technology, its inventions and the ability to use them easily. That is why many evangelized modern governments have promoted their e-strategies, projects and initiatives intending to overcome widening local and international digital divide, especially in the smaller and transition countries. Business leaders believe that by investing in ICT their companies will be able to achieve strong growth and penetrate new markets with new business models and processes. Nevertheless, ICT has also attracted and created lot of expectations, sometimes improbable and naive as in the *dot.com* frenzy in mid 1990s. The consecutive Internet investment crash in 2000s has only proven that the same basic business rules apply to ICT as to any other business sector.

Economies and people worldwide are starting to sense the first effects of the convergence of technologies that is blurring the lines between the physical, digital, and biological in ways that promise to disrupt almost every industry in every country. Breakthroughs are happening and proliferating at an unprecedented pace. From *sensors everywhere* and *blockchain* to *human-brain interfaces* and *technology-enabled platforms* in the "*sharing*" or "*on-demand*" economies are upending business models and forcing countries to re-think how they formulate economic policies. The number of industrial robots in the world is roughly doubling every five years and are projected to reach 400,000 by 2018 [3]. As the Internet of Things (IoT) becomes mainstream, the number of connected devices will almost triple by 2020, to reach 38.5 billion [4]. In addition, the proportion of products sold via e-commerce will more than double, from 6 percent in 2014 to 12.8 percent by 2019 [5]. The combination of automation and digitalization is revolutionizing manufacturing and services alike, as well as confusing the lines differentiating them. This process is increasing business efficiency, optimizing logistics, and making prices more transparent and competition starker. At the same time, it is reinforcing the need of companies, organizations and countries to remain ahead of the innovation curve.

IMPORTANCE OF INNOVATION

Innovation generally refers to new way of doing something, a novel solution to a problem or to a successful utilization of new ideas. In economy, an “innovation is the implementation of a new or significantly improved product (a good or service), or a business process, a new marketing method, or a new business practice, workplace organization or external relations” [6]. Innovation must be replicable at an economical cost and must satisfy a specific need. Innovation involves deliberate application of information, imagination, and initiative in deriving greater or different value from available resources. In business, innovation results often from the application of a scientific or technical idea in decreasing the gap between the needs or expectations of the customers and the performance of a product. Although many innovations are created from inventions, it is possible to innovate without inventing, and to invent without innovating. In a social context, innovation is equally important in devising new collaborative methods or structures that lead to positive change and amplified creativity, improved learning and ultimately to the increased wealth.

Innovation capacity is the single most important engine of long-term competitiveness. More than half the total growth in output of the developed world results from innovation and the proportion is increasing as the economy becomes ever more knowledge-intensive. The capacity to apply new knowledge in order to improve productivity relies on not only scientific inventiveness and entrepreneurial flair of a nation but on the local market conditions, which restrict or permit, discourage or encourage and sustain innovative creativity. Effective policy-making depends on authoritative analysis of the multiple institutional and regulatory levers, which stimulate or stifle company-level innovation. For modern governments, innovation will be the primary driver of successful industrial and enterprise policy, but also policies in areas such as education, employment and taxation. Innovation is also *pervasive* and *diverse*. It takes place in firms of all size, in every region and in every sector, not just in ‘naturally innovative’ high-tech sectors such as biotechnology and information technology. An innovation policy focusing exclusively on high technology therefore risks missing much larger opportunities for improved competitiveness and new products and processes in more traditional industries, which still remain major and more intensive employers [6]. New knowledge is created through not only research and development. It may also be acquired because of an investment in plant and machinery, and most importantly through human resources development.

Innovation is also unevenly *distributed*. The innovation performance of countries, and of different regions and sectors within individual countries, very widely varies. Innovative capacity of industry is highly skewed towards larger firms but there are a growing number of lively and dynamic technology-based small and medium enterprises (SMEs). Many are making a vital contribution to technological progress, are achieving great success in international markets, and are growing rapidly. However, SMEs tend to lack both the internal resources and the external networks necessary for easy access to

the knowledge, skills, technologies and finance on which innovation depends. Furthermore, technology oriented SMEs are disproportionately affected by many institutional barriers and costs. Innovation tends to be *systemic* rather than *linear*. That means, the process of innovation is multidimensional and involves many different players. Successful innovation may entail a transfer of technology but the speed and the success of the transfer almost certainly depend on conditions in the local and national innovation environment. Innovation capacity therefore requires the development of highly interconnected and well-functioning innovation systems. They serve to ensure the intensive flow of information between companies, researchers, entrepreneurs, investors, consultants, patent agents, local authorities and other intermediaries. Such systems are *de facto* networks of individuals and proximity is their important feature.

Nevertheless, the most important element of innovation competitiveness is *technological innovation*. Although significant advantages may be gained by investing in institutions, building infrastructures, improving macroeconomic stability, or enhancing the human capital of the population, all these factors eventually have diminishing returns. The same applies for the labor, financial and goods markets efficiency. Long term, productivity can be increased and standard of living expanded only with technological innovation. This is particularly important for advanced economies approaching the limits of generic internal knowledge, since the possibility of integrating exogenous technologies tends to disappear. Less-advanced countries can still improve their productivity by adopting existing technologies or making incremental improvements in other areas. However, countries that have reached the innovation stage of development, increase in productivity is no longer sufficient. These countries must design and develop cutting-edge products and processes to maintain at a competitive edge. This requires an environment beneficial to innovative activity and supported by both the public and private actors. More precisely, this means ample investments in research and development, high-quality scientific research institutions, extensive collaboration in research between universities and industry, and the effective protection of intellectual property.

IMPORTANCE OF COMPETITIVENESS

National competitiveness is defined as the “set of institutions, policies, and factors that determine the level of productivity of a country” [7]. The level of productivity defines the level of prosperity that can be earned by an economy. In other words, economies that are more competitive are able to produce higher levels of income for their citizens. Since productivity also determines the return on investments in an economy, and returns are the fundamental determinants of the growth, a more competitive country is one that is going to grow faster over the medium to long run. The concept of country competitiveness thus involves static and dynamic components: level of income and economy’s growth potential. Competitiveness is therefore fundamental for sustainable prosperity of a nation. While *Gross Domestic Product* (GDP) per capita may swing over

time due to certain macroeconomic shifts, political developments, resource prices and flow of foreign investments, the only reliable basis of true prosperity remains in the productive potential of a nation's economy. While sound macroeconomic policies and solid management remains important for governments, their central focus should be on competitiveness.

Importance of competitiveness has got widespread international acceptance recently, but is still not necessarily well understood. The most perceptive misunderstanding of competitiveness is in measuring of how successful a country is in gaining the global market share for its products. Because it looks like one country's success comes at the expense of others, this makes global competitiveness of a zero-sum game. This view on competitiveness is sometimes used to justify government interventions in favor of local economy, including subsidies, restraints on local wages, and intervention in local currency exchange value. These interventions tend to be seen as incentives for domestic export, but in fact drain national income and drag public policies away from focus on the most productive use of the national resources. True competitiveness is measured only by productivity. Productivity of an economy, measured by the value of goods and services produced per unit of the nation's human, capital and natural resources, depends both on the value of a nation's products and services and the efficiency with which they can be produced. Higher productivity supports high wages, a strong currency, attractive returns to capital and with them a high standard of living and prosperity.

Since many nations were able to improve their prosperity by improving productivity, the global economy is not a zero-sum game. Improving productivity will raise the value of products produced, improve local incomes and ultimately expand the global pool of new demand that has to be met. Globalization has increased the returns to productivity by opening up scalable new markets for competitive countries. Globalization has also effectively raised the costs of low productivity, reducing the ability of a protected local market to sustain in low productivity business or provide high wages for less-skilled employees. The central challenge here is to create the market conditions in which companies and employees throughout an economy can upgrade their productivity while maintaining reasonable costs of living and the costs of doing business in the country.

MEASURING COMPETITIVENESS IN TECHNOLOGY AND INNOVATION

Assessing a country's strengths and weaknesses in technology and innovation competitiveness is challenging because of the sheer number and variety of existing influencing factors. Most of the available competitiveness measurement models confront this complexity using a combination of market surveys and hard statistical data. The dependent variable used in developing these models is the level of GDP per capita, adjusted for *Purchasing Power Parity* (PPP). GDP per capita is the broadest measure of national productivity and is strongly linked over time to a nation's standard of living. However,

GDP of a country can also be influenced by a wide array of short-term and idiosyncratic factors such as natural disasters, macroeconomic shocks, and price movements in dominant export industries. Since a wide variety of internal and external business environment and cluster conditions affect technology and innovation competitiveness, it can also be explained and measured through some microeconomic fundamentals. GDP per employee or GDP per hour worked are therefore also used as dependent variable for productivity in specific technology and innovation activities.

The technology competitiveness performance is now assessed predominantly through the ICT readiness indicators [8]. Those indicators try to capture presence of the ICT conducive components and take into consideration a number of features of: the broad business environment (i.e. accessibility of digital content); some regulatory aspects (i.e. laws related to ICT), and the soft and hard infrastructure for ICT (i.e. number of telephone lines and Internet servers); the degree of preparation needed for individuals (i.e. Internet access to schools), business sector (i.e. quality of management schools) and the government (i.e. government prioritization of ICT) to use ICT; and the actual use of ICT by the above three stakeholders. Dimensions of innovation capacity performance are captured mostly through the main external indicators of innovation (i.e. the availability of high-skilled and educated people, availability of finance for innovation projects and the support of governments for innovation activities; internal indicators (i.e. innovation efforts that firms undertake through investments, entrepreneurial and collaboration efforts among innovating firms and public sector, intellectual property generated as a throughput in the innovation process); and outputs of the innovation activities (as the number of firms that have introduced innovations onto the market or internally, patentable technological and non-technological innovations and their economic effects etc.).

There is a wide variety and substantial amount of reports and indexes evaluating the technology and innovation competitiveness performance of nations and regions. The reports usually include quantitative indicators and qualitative analysis. The World Economic Forum (*Global Competitiveness Report and Global Information Technology Report*), European Commission (*European Competitiveness Report, European Innovation Scoreboard*), IMD (*World Competitiveness Yearbook*), UNCTAD (*Information Economy Report*) and OECD (*Science, Technology and Industry Scoreboard*) regularly publish the most important reports. An index may stand for two different things; either a single numerical value that combines a number of quantitative indicators or a set of indicators of which no common value is defined. The most important competitiveness indexes publicly available are: GCI - *Global Competitiveness Index* (World Economic Forum), *Networked Readiness Index* (World Economic Forum and INSEAD), *Innovation Index* (Porter & Stern), *The European Competitiveness Index* (The Huggins Associates) and *Euro-Creativity Index* (Florida & Tinagli).

The vast amount of statistical data behind those reports and indexes rely very much on standard international statistical databases maintained by the OECD, EUROSTAT, World Bank and ITU. This data is collected from the national statistical bureaus and institutes and depend very much on their accuracy and standards applied for its collection. The

most reliable comprehensive data comes through the OECD and EUROSTAT sources, but unfortunately, they do not capture the inputs from the most of transition economies. On the other hand, statistics from the World Bank (*Doing Business Report*) and ITU manage to cover most of these countries, but very often data is missing, is outdated or not accurate and entirely reliable. In these particular cases, the only sources of information are random market surveys or empirical evidences. Having all these in mind, the most comprehensive, widest reaching and reliable data and analysis source remains the one published by World Economic Forum in the *Global Competitiveness Report*³ and related *Global Competitiveness Index* (GCI).

However, many of the competitiveness challenges we see today stem from the aftermath of the financial crisis. Today, productivity and growth are not picking up in advanced economies, and the consequences of low and even negative productivity growth in many emerging economies are now evident. The great recession led many advanced economies to implement very loose monetary policy, which in turn fueled a global commodities boom that masked many of the competitiveness challenges of commodity-exporting emerging markets. Vulnerability to commodity price fluctuations in emerging economies and the promises of the Fourth Industrial Revolution underscore the importance of digital technology momentum and innovation as a source of competitiveness and economic diversification to reignite growth.

As a new wave of technological convergence and digitalization materializes in the Fourth Industrial Revolution, innovation and business sophistication, understood as the process of creating new products and services and finding new ways to produce things, are becoming increasingly important. Innovation and business sophistication are more closely associated with income levels in general than they used to be. In addition, sources of productivity within firms became more related to their ability to incorporate new technologies into their production processes. That change is playing a larger role than investment in basic physical and human capital and well-functioning factor and goods markets, frequently thought to be sufficient to ignite growth. Since 2010, GDP per capita became more closely correlated with the GCI's technological readiness, business sophistication, and innovation pillars than it is with the infrastructure, health and primary education, and market-related pillars (goods markets efficiency, financial market development, and labor market adeptness). At the dawn of the Fourth Industrial Revolution, technology and innovation are increasingly driving development evidently. In light of this new reality brought about by the Fourth Industrial Revolution, the World Economic Forum started to question the soundness of its Global Competitiveness Index. Such dramatic changes in the dynamics of the economy need to reflect on how economic progress and its drivers are measured, how we understand competitiveness, growth, and fundamentally the prosperity of countries. Moving away from the current idea that countries progress through sequential, defined stages of economic transformation, and that competitiveness depends very much on market-related developments

³ The most recent WEF report available is the Global Competitiveness Report 2016-2017.

and efficiency, WEF implied that the GCI methodology needs to be modernized and updated accordingly. The increased complexity of today's economy is arguably making current statistical tools outdated, both conceptually and methodologically. Calculation methods built for tracking physical sales of goods and services are incapable of accurately measuring transactions that take place on virtual platforms or through non-monetary exchanges of services. Increased measurement challenges in calculating GDP have lessened its value as an indicator of economic progress, and calls into question the accuracy of productivity estimates, which require precise evaluation of output, capital, and labor.

Measuring the drivers of prosperity likewise requires a conceptual and methodological rethink. When the Global Competitiveness Index (GCI) was introduced in 2006, the impact of the Fourth Industrial Revolution had not yet been acknowledged. Today, although the main drivers of competitiveness identified at that time remain generally valid, they may affect the development process in a different way than they did a decade ago. All countries will still have to have in place sound institutions, well-developed infrastructure, and strong macroeconomic conditions, which together determine the environment in which companies operate. They will also need to keep in focus how the health and skills of the labor force contribute to the human capital component of a country's competitiveness.

However, the markets' components of competitiveness will need to measure more dynamically how firms can rely on product, labor, and financial markets to find the production inputs they need and how quickly and easily they can reorganize when the industry landscape is changing. Therefore, the most important new components of competitiveness will become measures of technology adoption, business dynamism, and innovation capacity influencing the innovation process. Cutting-edge use of existing technology can support rise of new products and business models; countries where businesses are more open to new ideas are more likely to adopt the latest technologies faster and create new ones; and larger markets foster innovation because they enable economies of scale for new products and services. The analysis of competitiveness of advanced and emerging economies alike will more and more rest on a country's future orientation and its ability to update skills, regulations and social norms that promote entrepreneurship and welcome change, collaboration, and creativity connected with absorption of digital technology and capacity for innovation.

There is a clear need to produce a new measurements system of competitiveness that will better capture emerging new reality of digital economy. This should translate into an evolved benchmarking of competitiveness and its drivers to give guidance that is more relevant to policymakers and public-private dialogues. The World Economic Forum has announced that the new comprehensive competitiveness tools and structure will be publicly available for the next 2017–2018 edition of The Global Competitiveness Report (GCR). Let us see how this new methodology will be able to capture dynamics in rise of the Fourth Industrial Revolution relative to the current benchmarking and the competitiveness global order.

CONCLUSIONS

In spite of the significant change caused by the momentum of the *Fourth Industrial Revolution*, productivity undoubtedly remains the key driver of prosperity. Although measuring productivity is becoming more complex due to the nature of technologies involved in production, there is little doubt of its central role in economic progress. Prosperity may increase only if all inputs of production are used smarter and more efficiently to fulfill constantly evolving human demands in consumption. Therefore, the definition of competitiveness as the set of institutions, policies, and factors that determine the level of productivity of an economy [7], which in turn determines the level of prosperity a country can achieve, remains valid and applicable for the time being.

Forward looking orientation is of critical importance for the sustainable success of a nation's wellbeing. Since digital technology is disrupting the business and social landscapes in unexpected ways and does this more quickly than ever before, the primary function of successful economies and countries will be their capacity to be agile, adapt to changes, and respond to disruptions effortlessly and rapidly. These components of competitiveness should be captured by the superior education and skills, flexible labor market, and competitive goods market that grasp the extent to which a country's regulations and human capital support and handle imminent structural change and industrial revamp.

The capacity of a country to innovate has to be thought through as a lively ecosystem that not only produces scientific masterpieces of knowledge but also enables all kinds of industries, including the ones in the service sector, and wider society to be more flexible, interconnected, and open to fresh ideas and new business models. This way, understanding of innovation focuses on a country's ability to bring new products and services to market, and it attributes balanced importance of non-technical as well as technical inventions. To become truly innovative, a country should not only be able to file patents and support research and development in science and technology, but should also provide a interconnected environment that promotes creativity and entrepreneurship, fosters collaboration, and rewards those individuals who are open-minded and easy in embracing new ways to perform dedicated tasks. In ecosystem like this, the modern educational framework also plays essential role: it must embrace life-long learning opportunities and teach students to think critically, collaborate with individuals of different cultures and backgrounds, and expose them to differentiated points of view and ideas.

As digital technology-based business models become more prevalent, countries that fail to make transition to a digital economy will be substantially disadvantaged in competitiveness, not only commercially but also in terms of innovation. Hence, the factors of technology adoption, business agility, and innovation capacity have to be reproached and reformed by considering them all as integral parts of the *innovation ecosystem* [9]. Information and communication infrastructure became imperative and have also to be treated as critical infrastructure as they now play an indispensable role for development as much as other traditional infrastructure, like power or transportation. Similarly,

the financial sector needs to offer even more flexible venture capital and new financing solutions suitable for smaller or riskier projects, as well as better leverage the entire information and communication technologies (ICT) platforms.

The current WEF GCI [10] model assumes that a country's economic priorities evolve as it develops, with infrastructure, institutions, macroeconomic stability, and basic health and education as more important for lower-income countries, and innovation and business sophistication as more important for higher-income countries. With The Fourth Industrial Revolution paradigm in mind, it is reasonable to be more skeptical about this and recognize that all competitiveness factors matter correspondingly to all income levels' countries. Therefore, the exercise of policy prioritization is becoming more complex than we have believed so far. For example, robotics is making light manufacturing less labor-intensive, reducing the feasibility of lower-income countries to develop by leveraging unskilled labor. However, because ICTs enable the rapid transfer of ideas and technologies, they also make innovation less capital-intensive and offer those countries new ways to foster development. We look forward to see how the modernized GCI will reflect this conceptual change in weighting all the development pillars equally for all countries included. We assume that development priorities are country-specific rather than determined by their income level. Whether the new GCI model to show up next year will be better facilitating national policy priorities in technology and innovation competitiveness remains to be seen as a matter of county specific exercise.

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