



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



Industry 4.0

Opportunities and
Challenges of the New
Industrial Revolution for
Developing Countries and
Economies in Transition

Panel discussion



TOGETHER
for a sustainable future

Fifty years ago, in 1966, the United Nations General Assembly adopted a resolution establishing the **United Nations Industrial Development Organization (UNIDO)**. UNIDO is the UN system's industrial development arm, and continues to work to eradicate global poverty by assisting developing and middle income countries in achieving inclusive and sustainable industrial development.

To celebrate its 50th anniversary, UNIDO organized a series of events from 21 to 25 November 2016 at its Vienna Headquarters. The week-long celebration was attended by some 1,600 participants from over 190 countries, including high-level representatives of UNIDO's 170 Member States, as well as leaders of international organizations and the private sector, and leading figures from academia. Around 300,000 people from all over the world took part in the celebrations via our social media channels, and were able to join us directly through the live streaming of selected events.

In total, 28 events were organized in the course of the week, including panel discussions and presentations, as well as food festivals and cultural performances. The events featured 155 speakers and focused on topics such as the way forward in achieving the 2030 Agenda and Sustainable Development Goals; financing for development; industrial development for job creation to address root causes of migration; the Fourth Industrial Revolution and its implications for developing countries; and climate change.

Industry 4.0 is one of the major drivers of the Fourth Industrial Revolution. The first industrial revolution was triggered by water and steam power to move from human labour to mechanical manufacturing. The second industrial revolution built on electric power to create mass production. The third used electronics and information technology to automate manufacturing. The fourth is the current trend of automation and data exchange in manufacturing technologies. It includes cyber-physical systems, the Industrial Internet of Things (IIoT), and cloud computing. Industry 4.0 is gradually implemented, often with digitalization as the first important step. Digital technologies allow for new business models and value-producing opportunities, and are attainable for most developing countries.



SYNOPSIS

This event, that took place on 23 November 2016, on the occasion of UNIDO's 50th Anniversary, debated the **Industry 4.0**, which is a major driver of the Fourth Industrial Revolution, also referred to as the New Industrial Revolution (NIR). The panel discussed how UNIDO, and the development community at large, could help developing countries and economies in transition address opportunities and challenges stemming from the Fourth Industrial Revolution in the context of 2030 Agenda and the Sustainable Development Goals (SDGs). This included new innovative approaches to climate change mitigation; development of the circular economy; the role of strategic partnerships; the role of agreed standards for the exchange of data and components in the digital ecosystem; data security and privacy issues; loss of jobs; and digital gaps.

The panellists highlighted the necessity for pro-active skills transformation, both in the educational system and in the workplace, emphasizing the role of the younger generation - the 'robotic natives'. They foresaw that humans in the future will need to learn to coexist and collaborate with intelligent machines in the workplace, and stressed the need for partnership for innovation and technological learning, highlighting UNIDO's role as catalyst in this area.

The key conclusions from the expert discussion were:

- ▶ The importance of building awareness of the Industry 4.0 consequences for inclusive and sustainable industrial development (ISID) and providing access to know-how, skills, education and technology.
- ▶ The great potential of innovation management standards to help developing countries and economies in transition to leapfrog into Industry 4.0. These guiding frameworks would be relevant for all types of organizations, including SMEs.
- ▶ The potential of UNIDO to assist in establishing multi-stakeholder knowledge sharing platforms to create awareness on Industry 4.0 opportunities and challenges for pursuing ISID in developing countries; for sharing available tools and methods for innovation management; designing training curricula for new workforce skills requirements; exploring methods and best practices to support SMEs digital transformation and bridging the gender digital divide; building awareness among policy makers and industry associations on the issues of new infrastructure, standards and policies that need to be developed or mainstreamed to correspond to the new technologies.

INTRODUCTION

Several advanced economies are implementing the concept of Industry 4.0, marking the Fourth Industrial Revolution. Increasingly, companies are applying innovative solutions, including through the “Internet of Things” (IoT), cloud computing, miniaturization, and 3D printing that will enable more interoperability and flexible industrial processes and autonomous and intelligent manufacturing. The physical components of industrial production are being transformed by smart, digital networking into cyber-physical systems (CPS), allowing for the management of production processes in real-time across great distances and customized products.

Industry 4.0 has the potential to improve productivity and competitiveness, increase energy and resource efficiency and effectiveness and hence to protect the environment. It could, further enable the transition to a circular economy, or industrial economy in which end of life products are reused, remanufactured and recycled. Taken together, these developments would lead to the emergence of more sustainable production and consumption patterns, and could thus provide opportunities for developed and developing countries to achieve economic growth and sustainable development in line with the 2030 Agenda for Sustainable Development.

The consequences of Industry 4.0 on employment, wealth creation and distribution, are not fully understood. One of the biggest concerns is the impact on jobs in developing countries. Increasing automation of production processes and the displacement of workers by machines is likely to eliminate routine types of jobs, decrease demand for cheap labor in low-end manufacturing, increase inequality, and cause migration. A global net decrease in jobs could be especially challenging for developing countries where, unlike developed economies, millions of young people are entering the job market every year.

More than ever, developing countries and economies in transition must be made aware of implications and challenges related to this paradigm shift. For example, apart from dealing with implementation of Industry 4.0, developing countries must prepare to face the consequences of its implementation in advanced economies. Some of these consequences relate to reversed flows of foreign direct investment and a further manifestation of an already widening technology gap. While the ramifications for developing countries and economies in transition could turn out to be dire, experience tells us that economies have a remarkable adaptive ability to deal with the mechanization of production. As such, the arrival of Industry 4.0 also brings opportunities for development, for example in terms of achieving the objectives set forth in the 2030 Agenda for Sustainable Development and its associated SDGs. Importantly, among developing countries there is great heterogeneity in terms of their ability to handle the advent of Industry 4.0. Indeed, most recently, the World Economic Forum argued that some more advanced developing countries could leapfrog into Industry 4.0, and that its impact could be far reaching to possibly attaining - within a generation - inclusive and sustainable industrial development.



OPENING STATEMENT

Mr. Bernardo Calzadilla-Sarmiento,

Director, Department of Trade Investment and Innovation at UNIDO, emphasized the profound impacts that Industry 4.0 will have on society, factories, households, the public sector, on advanced economies and developing economies and economies in transition. While discussion has focused on what Industry 4.0 means for developed economies, less discussion is devoted to the impact on developing countries and economies in transition. There are developing countries that are already preparing for and adopting strategies regarding Industry 4.0, such as China and India. It is therefore important to take into account their experience.

One of the important challenges for developing countries is the reversal of FDI flows. While previously FDI followed cheap labour, labour cost differentials might no longer play such an important role with Industry 4.0. Additional challenges for developing economies might be a widening technology and knowledge gap, its implications on skills, rising inequalities, and gender equality.

Industry 4.0 offers opportunities, such as increased productivity, reduced waste, and promotion of the circular economy and more sustainable patterns of production and consumption. It might thus also help to mitigate climate change.

Often, developing countries have missed earlier technology waves, resulting in large GDP and productivity gaps and therefore wide differentials in terms of welfare; failing to take advantage of Industry 4.0 risks accentuating such gaps further.

To enable developing countries to respond to the challenges of Industry 4.0, the international community has to take collective actions and pursue new innovative partnership approaches for delivering and strengthening its portfolio of services to address market failures related to the uptake of new technologies and business models.



KEYNOTE SPEECH

Ms. Eva Diedrichs, Managing Director, IMP³ROVE, European Innovation Management Academy, EWIV, in her keynote briefly explored the following questions:

1. What is Industry 4.0?
2. What is the key prerequisite to effectively embrace Industry 4.0?
3. How can this key prerequisite be developed?

What is Industry 4.0?

The World Economic Forum considers that the current paradigm change goes beyond Industry 4.0: “The Fourth Industrial Revolution....[which] is characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres”. The technologies today include artificial intelligence, robotics, the Internet of Things, autonomous vehicles, 3-D printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing. The crucial question is whether the combination and widespread application of these technologies would also result in a positive net effect for our economies and societies at large. Some of the challenges and opportunities of Industry 4.0 are on their way - and in some areas are moving at high speed.



What is the key pre-requisite to effectively embrace Industry 4.0?

Many will be correct in thinking that IT skills are the key prerequisite and will help to engage in automation, in Big Data Analytics, in connecting global value chains, in creating transparency in public administration, and in understanding how cyberspace will become a new dimension for governments, where traditional approaches will reach their limits.

An organization's successful entry into Industry 4.0 depends on its ability to respond to change, and master products, processes and value chains innovation on a continuous basis. Organizations with strong innovation capabilities will need to have a clear innovation strategy and a culture that translates this innovation strategy into action, and will need a well-defined yet flexible process to collect and evaluate ideas, develop them further into products, processes, services or business models.

How can this key prerequisite be developed?

Ms Diedrichs outlined the most important steps for businesses and public institutions in support of economic development:

- ▶ Create awareness of the importance of innovation in general, and digital innovation in particular
- ▶ Educate in innovation management
- ▶ Identify organizations' improvement potentials in innovation management and in digital innovation
- ▶ Take action to gain in agility by improved innovation management capabilities to embrace Industry 4.0.



OTHER PANELLISTS

Dr. Rohani Hashim, Secretary General of the
World Association of International Technology
and Research Organizations (WAITRO)

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https://www.yunbaogao.cn/report/index/report?reportId=5_23199

