



INDUSTRY 4.0 AND COVID-19:

The IN4ACT Research Strategy in the New Historical Context

It is increasingly clear that our era will be defined as a fundamental pivotal point between two historical phases: the era before COVID-19 and a post-viral period of – as yet – largely undefined and uncharted contours. Today, leading academic, business, and policy circles and reasoned analysts seem to converge around an emerging consensus that we are entering an era where we will witness a dramatic restructuring of the economic and social order in which business and society have hitherto operated. At the same time, we are likely to see the rise of heated debate about what the so-called “new normal” could and should entail regarding the roles, rights, and responsibilities of all stakeholders and key actors in civil society, the state, and institutions of public governance. For the devastating effects of the virus on human life and the necessary public health measures introduced for its containment across the globe will most likely leave an indelible sense of fragility and uncertainty with unforeseeable consequences for future patterns of social behavior and interaction, powered by disenchantment with the present and new expectations of the future. On the other hand, the dynamic interdependencies between COVID-19 and the emerging structural features of the Fourth Industrial Revolution and Industry 4.0 raise fundamental questions regarding the future possible scenarios and trajectories of social, economic and political development on a global scale and its regional and local manifestations.

In this context, the IN4ACT project sets out to map and evaluate the multi-faceted impact of COVID-19 on Industry 4.0. More precisely, the project introduces a new “optic” in its research strategy whose objective is to delineate the specific implications of COVID-19 for the re-design and implementation of Industry 4.0 strategies. The origins of Industry 4.0 as a strategic organizing concept for innovation and competitiveness for firms, regional, and national economies have a much longer history than the recent outbreak of the pandemic. However, COVID-19 will have a decisive impact on the reconfiguration of the priorities and objectives of Industry 4.0 strategies. In this light, IN4ACT seeks to differentiate and assess those factors which – even though immediately urgent – will have an ephemeral effect on Industry 4.0 (the “logic of the conjuncture”) from those which will affect its development in a more lasting manner (the “diachronic continuity”). For instance, it is arguable that what we are seeing in the context of COVID-19 is one of the most rapid and massive transitions to digital operations in history. However, the implementation of Industry 4.0 depends in a fundamental sense on putting into place an “enabling framework” which involves the synergistic and synchronous development of several non-technological elements. These, among other things, include standardization across digital systems and infrastructures, appropriate legal and regulatory conditions, well informed and agile policy frameworks and responses, investments in Industry 4.0 skillsets, and, not least, systematic collaboration of relevant authorities at regional, national, and, in our case, EU levels.

It is the historical challenge of a coordinated and synergistic development across all these areas that the COVID-19 crisis has placed at the center of the horizon of Industry 4.0. For the “technology-push” of Industry 4.0 is unlikely in itself to lead to the expected and often hyped social and economic benefits of Industry 4.0 in the absence of an enabling framework that favor the emergence and maintenance of conditions of a “technology-pull” framework supportive of innovation, socially and environmentally sustainable and inclusive economic development that is consistent with the values of liberal democratic systems of governance.

Against this background, IN4ACT seeks to map, organize, and prioritize the key challenges COVID-19 presents for the future of Industry 4.0 around a tripartite temporal framework – short-, medium-, and long-term. This corresponds to three phases or organizing frameworks of action: 1) Survival and/or damage limitation, 2) Recuperation, and 3) Conditions and passages to a post-COVID-19 techno-economic and socio-technical paradigm. These issues are explored at three different levels: the micro-level (the level of the firm and functions and phases of production, the meso-level (the level of regions and regional innovation ecosystems), and the macro-level (the level of governance, policy, regulation and sustainability).

What follows is a brief outline of the IN4ACT research strategy with highlights of its main focus areas.

I. Micro-level: Industry 4.0 at the level of the firm, functions and phases of production:

I. 1: The decomposition/re-composition of production and the changing value composition of Global Value Chains. Focus area: the changing calculus of opportunities and threats of specific business profiles and value propositions.

I. 2: AI: the cloud, big data, algorithmic models, and the Internet of Everything. Focus areas: the functions and uses of predictive analytics; “smart factories”; implications for different business activities such as knowledge management, marketing and human resources.

I. 3: The platform economy, its typology and economic specificity. Focus areas: design and types of platforms; direct and indirect network effects; two-sided networks and the economics of multisided platforms; transitions from product-centricity to platforms, from value chains to ecosystems, from physical assets to digital and intangible assets and innovation capital.

I. 4 Platform economy business models (with added emphasis on SMEs). Focus areas: technological, organizational, and strategic management challenges; business model (re)design; skills development; challenges concerning security and protection of know-how; risks of loss of control, reduced independence, flexibility and adaptability, performance measurement methodologies.

II. Meso-level: Industry 4.0 on the level of regions and regional innovation ecosystems:

II. 1. Centralization vs. decentralization in Industry 4.0. Focus areas: the dynamics of centralization vs. decentralization of economic capacities; management challenges in the context of existing as well as emerging industries and the regional business ecosystems in which they operate.

II. 2. The changing economic geography and its implications for regional economic ecosystems. Focus areas: the dynamics of concentration of economic capacities few economic centers and the implications for management in regional business ecosystems (e.g., clusters etc.).

II. 3. Commoditization and “smart specialization”. Focus areas: Industry 4.0 and the reinforcement of dynamics of commoditization of business value propositions and business attractiveness of regional economic ecosystems; critical review of “smart specialization” theory and strategies especially concerning the ability of such strategies to provide a sustainable counterweight to the spatial centralization and commoditization that research identifies as key characteristics of Industry 4.0.

II. 4. Symbiotic vs. parasitic ecosystems. Focus areas: critical perspectives on “smart specialization” and “open innovation” (e.g., production vs. extraction of value); different systems of financing innovation and sustainable development).

III: “Macro-level: Industry 4.0 on the level of governance, policy, regulation and sustainability:

III. 1. Comparative readiness for Industry 4.0: assessment and measurement methodologies. Focus areas: how countries and regions across the EU and internationally respond to the management and policy challenges of Industry 4.0 and their strategies to leverage production as a national capability (e.g., WEF Readiness Diagnostic Model Framework).

III. 2. The future of work: Industry 4.0 skillsets. Focus areas: skillset requirements of Industry 4.0; comparative vulnerability of skills and occupational profiles to obsolescence due to Industry 4.0 and automation; design of work processes and workplaces, skills and training needs at firm level; human resources management.

III. 3. Industry 4.0: sustainability and socially inclusive development. Focus areas: the economic and political dynamics driving levels of inequality within firms and society and its management challenges for Industry 4.0 initiatives; social exclusion and segregation and their implications for social sustainability.

III. 4. Governance: regulation, innovation and sustainability. Focus areas: key issues of standardization; skills development; competition and anti-trust regulation, challenges of monopoly and monopsony; labor and consumer protection; global governance of big data; social accountability and legal compliance, inter-state tensions regarding the collection and uses of data.

For more information about the ERA Chair project “Industry 4.0 impact on management practices and economics” (IN4ACT), please visit the website, follow it on LinkedIn, Twitter or contact coordinators of the project by email: in4act@ktu.it