The digitization of industries: between reality and challenges

BOURI Nassima, LARAFIT, University of Oran 2 (Algeria), nassimabouri@rocketmail.com

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Abstract:

The digital economy encompasses different technological and economic dominations and expressions, covering: new technologies, the new economy, telecommunications, and interconnections, and information and communication technologies, as well as electronic commerce and electronic economy.

The digital economy made up of two concepts "economy" and "digital", in fact, the interaction of the two concepts economy and digital thus designates the sector of economic activity relating to information and communication technologies, in particular to the production and the sale of goods, services and digital content.

This paper aims to summarize the major trends induced by the digitization of goods and services.

Key words: Digital Economy, Industrialization, digitization, Big data, Internet of Things, Cloud Computing.

Jel classification: L86, L6, O31, L64, L63.

INTRODUCTION:

The digital economy refers both to businesses and individuals who use ICTs in their daily activities and to the ICT industry, which includes manufacturers and service providers. It has been defined as "the network formed by the providers and users of digital content and technologies used in daily life. Pervasive, this content and technologies are essential to almost every activity in our economy and society. They allow businesses to be innovative and productive, governments to deliver services, and citizens to interact and exchange information and knowledge." Indeed, the digital age is transforming everything: the nature of markets and products, the way of producing, the way of paying and paying, the scale of capital to be exploited globally and human capital needs. It also boosts productivity, exposing businesses to new ideas, technologies, management and business models, and creating new channels to market. It is no exaggeration to predict that companies will increasingly rely on artificial intelligence for basic routines and for more complex tasks.

The rapid advancement of digital technology provides a variety of new options for data logger communications and for networking data loggers with computers and smart devices. The benefits to those involved in data acquisition include greater data storage capacity, faster and more robust data transfer, and expanded capacity through an interface with smart devices. Digital disrupts established orders, for the industrial enterprise, digital changes appear on all economic and commercial areas.

1. Digital Economy : literature review

The economy digital encompasses two Notions who the compound: the economy and the digital. Indeed the term economy having already been defined and explained in several research and several economic references :

"Economics can be defined as a discipline of the social sciences whose object of study is the allocation of scarce (or limited) human resources to the satisfaction of its multiple and competing needs. It focuses on the production, distribution and consumption of goods as well as institutions, regulatory frameworks and the environment facilitating these activities "(Alexandre Nshue M. Mokime, [2012]).

- The second notion ' digital », « Brings together Information Technologies and of the Communication so than all of the techniques used in the treatment and the transmission of the news such than by example the telecommunications, internet or IT. The digital sector refers to the sector of economic activity relating to technologies of Information and of the Communication and at the production and at the sale digital products and services.

1-1- Definitions of the digital economy

1-1-1- Temptation of a global definition of the digital economy

" The digital economy is a science that covers different concepts, dominations and technological, economic and social expressions according to the authors, especially since this notion has evolved over the years : new technologies, new economy, telecommunications, interconnections, information and communication technologies, electronic commerce, and electronic economy.

The digital economy refers to all processes, transactions, interactions, interconnections and economic activities between different economic agents and based on digital information and communication technologies and the internet economy»[1].

1-1-2- Definition of the digital economy according to INSEE

The digital economy is assimilated to information and communication technologies (ICT), and in particular to the productive sectors. According to the OECD and INSEE, the ICT sector groups companies that produce goods

and services supporting the process of digitization of the economy, that is to say the transformation of the information used or provided into digital information (computer science, telecommunications, electronics) ".

Given the difficulty of defining the digital economy and the complexity of quantifying it, INSEE likens it to the ICT producing sectors[2]. The ICT sector groups companies that produce goods and services that support the process of digitization of the economy, that is, the transformation of information used or provided in digital information (IT, telecommunications, electronics[3]).

1-2- Issues and Benefits of the Digital Economy

This new so-called digital economy is today at the heart of the growth and competitiveness of nations and companies on a global scale. Long remained specific, it has become the most dynamic sector of the world economy with a growth rate twice that of the classical economy in most developed countries. It is the main factor of gaining competitiveness for the economies of these countries and now accounts for nearly 30% of global growth (OECD, [2017]).

The digital market recorded a global increase of 4.3% in 2011 to reach 3070 billion euros in value (OECD, [2017]), said the Audiovisual and Telecom Institute in Europe (Idate). This is a real revolution which, for the present and the near future, is making decisive changes for society and for the world economy in all their aspects and in all fields, thus imposing new rules, conventions and laws that govern international relations.

The digital economy has challenged and profoundly transformed the processes of production, distribution, sale and consumption of goods and services. Its expansion is the usufruct of a long process of global economic and social transformation, which asserts itself every day a little more. The immediate consequence is a radical upheaval in the lifestyles and communication, the professional practices, the consumption habits of states and their citizens.

New needs, created by an increasingly aggressive, subliminal and diversified offer, were born in fields as varied as health (telemedicine), education (e-learning), energy and the environment, culture (digital content), commerce (e-commerce) media and entertainment (website, blogs, tweet,

etc.), security, defense (closed telecommunications networks), transport, administrations and public sector (e-government, open data), services (e-services), production methods and industry, computerization and business management (ERP, e-management).

In three decades, new technologies have progressively become part of the core business, creating new sectors, businesses, products and services that support the process of digitization of the economy and that offer opportunities for all stakeholders of the global economy and enables them to conquer the key markets of the future and thus adequately address the major challenges in redefining the principles of international trade, for the advent of a new global economic order.

This "new economy" requires economic actors (states, companies and other users) a new way of "doing business and creating value" for which the Internet and its tools and services are both the vector and the symbol.

2- The main pillars of the digital economy

The digital economy can be understood as: all economic activities of production, intermediation and consumption of goods and of services of nature informational, scanned and so re plicable or transmissible. According to researchers and economists, the digital revolution is based on three pillars main[4] :

2-1- The technological pillar

Through the increasingly massive data transmission and processing capabilities, the development of artificial intelligence and connected objects ... The appropriation of these technologies by companies allows major innovations in both processes (gains productivity) and products (new markets, new products or services).

2-2- The economic pillar

With the emergence of powerful economic actors (the GAFA) who are able to reorganize value chains and imposes new business models and intermediation. In all sectors, companies must adapt to better meet the expectations of consumers and the competition of these new players by deploying organizational and marketing innovations.

2-3- The social pillar

The digital stimulates the innovations of uses and consumption (collaborative consumption, co-production and dissemination of knowledge,

communities). But it also questions the centralized powers and sovereignty of states, and calls for new forms of economic regulation and governance[5].

3-The major and major trends induced by digital

3-1- The economy

The digital economy is assimilated to information and communication technologies (ICT), and in particular to the productive sectors. According to the OECD and INSEE, the ICT sector groups companies that produce goods and services supporting the process of digitization of the economy, that is to say the transformation of the information used or provided into digital information (computer science, telecommunications, electronics) ".

The economy is moving towards an economy of services and use (also called economy of functionality) including in the industrial sector where we tend towards the "servicialization" of the products. These realities change the value creation chains.

The interaction of the two concepts (economy and digital) thus designates the sector of economic activity relating to information and communication technologies, in particular to the production and sale of goods, services and digital contents. It encompasses, beyond the reducing concepts listed above (e-commerce, m-commerce, new economy, etc.), telecommunication services , audiovisual, software industry, computer networks, computer equipment and telecoms, computer engineering services, online services and content, etc.

3-2- Demand, product and market

On the other hand, for the digital industry[6], these networked goods and services add the characteristic of being digitizable. In addition, the digital economy is the subject of special issues related to the standardization and / or compatibility of networks in services.

Through digitization, the evolution of products is accelerating. Time-to-market is getting shorter. Innovation and adaptability become key factors of differentiation and performance.

The customer profile will change, and will want differentiated products adapted to its particularities and tastes. Demand drives the industrial value chain, which must integrate end-to-end and reorganize accordingly. The production model is moving towards mass customization.

So, the technological complexity of the product tends, however, to fade in favor of the user experience that occupies a pre-eminent place from the design. *The products are connected and generate data. They tend to become service products.*

4- Technologies related to industrialization

As part of the digitization of the industry, a set of disruptive technologies that can act as real levers of transformation mature and become accessible.

4-1- Additive Manufacturing or three-dimensional printing

Additive Manufacturing Also known as 3D printing ; or three-dimensional printing is the naming General public "Processes for the manufacture of parts by volume by addition or agglomeration of material. In industrial language, the term additive manufacturing is preferred.

This manufacturing process transforms a 3D digital model into a physical object, by adding successive layers of a material. Several materials (plastic, metal ...) and techniques can be used. Additive manufacturing makes it possible to manufacture complex shapes. It is now well suited to the manufacture of unit parts and products, prototypes and small series.

3D printing makes it possible to create a real object : a designer draws the 3D object using a computer-aided design (CAD) tool. The 3D file obtained is processed by a specific software that organizes the slicing of the different layers necessary for the realization of the piece. The cut is sent to the 3D printer which deposits or solidifies the material layer by layer until the final piece. The principle remains close to that of a classic 2D printer with this big difference : it is the stack of layers that creates the volume.

4-2- Augmented reality

Augmented reality is one of the emerging phenomena enabled by the development and democratization of information and communication technologies (ICT) at the end of the 20th century. century (trends closely followed by the prospectivists) and it participates in some *enhanced forms* of collaborative work and collaborative economics as conceptualized by Michel Bauwens .

This is the superposition of digital information on a real image viewed through a screen, glasses or a viewfinder. In an industrial environment, augmented reality can be used to guide the operator to perform certain tasks or certain actions.

4-3- Virtual reality

Virtual reality (or *immersive multimedia* or *computer-simulated reality*) typically refers to a computer technology that simulates the physical presence of a user in an artificially generated environment. Virtual reality creates an environment with which the user can interact.

It is a simulated computer-created environment in which the user is immersed and with which he can interact. It finds its place today in the design phases to facilitate communication around a digital prototype, for example. In other words, virtual reality adds virtual elements in a real environment whereas virtual reality virtually creates a real or imaginary environment.

4-4- Cobotic or collaborative robotics

" The **cobotics** is the field of human-robot cooperation, the interaction directly or remotely controlled, between humans and robots to achieve a common goal[7]".

Collaborative robotics is a branch of robotics that groups systems designed to interact and collaborate with humans robots, painful and repetitive tasks; to the operator those involving specific know-how or with a particular complexity.

The term comes from the English word "cobot ", Neologism from" cooperation» And «robotics ". It was proposed in 1996 by JE Colgate, W. Wannasuphoprasit and MA Peshkin, professors at Northwestern University[8] . It was introduced and initially used to designate passive physical assistance devices that guide operators.

However, Cobotics is not limited to the study of cobots, which are technical devices. It is interested in real interaction, direct or teleoperated, between a human operator and a robotic system[9].

Its fields of application are varied, since it is very present in the industry, but is also an important prospect for the nuclear field (remote collaboration),

health (surgery, rehabilitation, help and substitution), home automation, the military field, or for education.

5- Technologies related to international competition

5-1- Big data

Big Data is considered a source of profound upheaval in society . This concept was popularized in 2012 to reflect the confrontation of companies face data volumes (data) to be treated more and more considerable in the context of the management of their managerial, commercial and marketing activities.

It involves examining the large and varied data set for hidden models, unknown correlations, market trends, customer preferences, and other useful information to help businesses make more informed decisions.

This term then refers to the ability to collect, store and process in real time very large flows of data of various kinds in order to apply to them all sorts of advanced analytical and statistical treatments that fall under artificial intelligence (predictive analysis, machine learning, deep learning, etc.). These powerful treatments are designed to reveal information that is difficult to detect by traditional channels and that can create value. They allow continuous and real-time analysis of the environment. Big data combined with IoT makes it possible to control the plant with data.

Big data does not derive from the rules of all technologies; it is also a dual technical system. Indeed, it brings benefits but can also generate disadvantages **.** As a complex polymorphic object, no precise or universal definition can be given to Big Data.

Its definition varies depending on the communities that are interested in it as a user or service provider. A transdisciplinary approach allows to understand the behavior of different factors : designers and suppliers of tools (computer scientists), categories of users (managers, business managers, policy makers , researchers), health actors and users.

5-2- The Internet of things (IoT)

The Internet of Things is composed of many complementary elements each having their own specificities. This concept is the extension of the Internet to the physical world. The need to connect logistic and industrial objects appeared in the 2000s and developed with machine-to-machine

connections. More open and benefiting from a broader purpose, the Internet has taken precedence.

Some define [10] the IoT as " objects with virtual identities and personalities, operating in smart spaces and using smart interfaces to connect and communicate in a variety of contexts of use. " Others hypothesize that IoT represents a revolution because it connects people and objects anywhere, anytime, by anyone.

These definitions, which emphasize the ubiquitous dimension of IoT, personify objects by giving them intelligence and the ability to communicate. They do not yet reflect the concrete dimension related to the uses of IoT.

5-3- Mobility

The operator of the future industry will be mobile. Indeed, this mobility includes all the solutions and devices - smartphones, tablets, wearable computing, mobile applications, which allow to remain connected and to have permanent access to its working environment, in situation of mobility.

5-4- Cloud computing

Cloud computing " in French " cloud computing " or " nuagique " or " cloud Computing » (In Quebec)[11], is the provision of IT services (servers, storage, databases, network management, software, analysis tools, artificial intelligence, etc.) via the Internet (the cloud) in order to offer more innovation fast, flexible resources and economies of scale.

This is the now established model of industrialization and commercialization of computing. In the cloud, the provider provides the enterprise with computing resources (applications) as a service. The user company no longer needs to purchase the eventual hardware and software license.

Cloud computing consists of exploiting the computational power or storage of remote computer servers via a network, usually the Internet . The servers are rented on demand, most often by use, according to technical criteria (power, bandwidth , etc.), but also to the fixed price.

It also frees itself from the maintenance of the whole. It pays only the service consumed. Its capital investment expenditures (Capex) are transformed into operational expenses (Opex), more easily controllable.

Cloud computing[12] is characterized by its flexibility: depending on the skill level of the client user, you can manage your own server or just use remote applications in SaaS mode[13].

6- The digital economy and emerging economies : a challenge of international competition or a lever of growth

The *digital* economy and the economy of the internet and its commercial uses have generated great interest. However, computer and networking technologies have the potential to transform not only consumer behavior but also the way the economy works. An economy characterized by these technologies is the digital economy, where market agents behave differently according to different economic rules than the physical economy.

On *the* other hand, it should be added that digitization has had consequences on practically all cultural and particularly socio-economic fields. In connection with this new fundamental trend, new topics are gaining more importance related to data security, data protection, cybercrime, as well as business management in the digital age, training and continuing education. , social media, the sharing economy etc.

The digital economy is an opportunity for emerging countries to redefine their economic growth model. Specifically, the digital economy can play a key role in the expansion and modernization of markets in these countries, by facilitating the collection and dissemination of information, by improving the management of transactions ...development in these countries is partly a result of the poor functioning of the markets.

The challenge for emerging countries such as the Maghreb is to create around digital technologies a growth dynamic, truly autonomous and adapted to the needs of consumers and businesses in these countries, and not just dedicated to outsourcing.

CONCLUSION:

Emerging economies need to formulate policies with the ambitious goal of reaping second-rate benefits. Policies to enhance participation in e-commerce and digital platforms, for example, can only boost a country's long-term competitiveness if it is clear that additional effort will be needed to push the economy towards digital technology development position.

Different initiatives must therefore be integrated into a single national strategy to prepare the economy to go beyond the adoption and use of these technologies. This is not an easy task, especially since some of the policies designed to capture first-rate benefits are not necessarily aligned with second-rate benefits.

In order to manage perfectly the transition towards the scanning, the managers will have to make in kind than the economy has the capacity to adapt; than the business are brought by the strengths of market to do evidence of flexibility; than the earnings economic are widely distributed; than " the various programs education, learning, immigration and employment insurance programs are in keeping with the commitments of employers in material of training in middle of job " (Poloz, [2016], 6); and that tools (statistics, taxation, competition and industrial relations policies) and related institutions that manage the economy are current and able to fulfill their mandate[14] ".

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[1] Personal clothing
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- ICT-producing sectors ([22] fabrication of computers and computer equipment, TV, radio, telephone, ...);
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