Article

Activity & growth

Industry as the crux of transformation: past, present and future

Content available in
Spanish Catalan

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Over the last few centuries industry has become crucial for countries' economic development. The expansion of industrial activity has been hugely important in driving technological innovation, export capacity and the sophistication of production processes. In short, it has been key to boosting economic growth. The effects of the different industrial revolutions, moreover, have gone beyond what is strictly economic, encouraging important changes at a social and demographic level, such as creating an extensive middle class and increasing the population. It therefore comes as no surprise that industry's apparent loss of relative importance

over the last few decades has been a recurring source of concern.

The Fischer-Clark model provides a conceptual framework that is useful to explain how a country's economy goes through different cycles of sector development over time. The hypothesis of this framework is essentially as follows. During the earlier phases of economic development, agriculture and fishing employ most of the working age population; the hallmark of pre-industrial societies. As technical advances in industrial activities increase the sector's production capacity, agricultural employment loses relative weight at the same time as manufacturing employs an increasingly larger share of the population. Industrialisation advances and becomes more complex until industry becomes the most important engine in an economy's production structure (in terms of employment and GDP), albeit for a short period of time. It is during industry's development phase that industrial societies come about and in most of the countries that make up the advanced bloc today, this occurred at the end of the 19th century and beginning of the 20th. From this point on, the technological factor becomes increasingly important and gains in productivity in the manufacturing sector accelerate. As this pattern consolidates and the income of workers increases, so does the relative weight of activities related to the services sector, such as those connected with leisure, healthcare and education. This increase in demand for services is partly due to the income elasticity of demand for services, which tends to be higher than in the case of demand for manufactured goods. Services therefore become the economy's main sector of activity, a distinctive trait of post-industrial societies.

The graph reproduces the Fischer-Clark model for the case of the US, although the underlying message also applies to the rest of the developed countries. The relative weight of the secondary sector in the US has gone from accounting for almost 30% of GDP in the mid-20th century to just over 11% in 2015. A very similar trend to the one observed in employment: this has fallen from 35% of the total number of employees in the mid-20th century to 10% currently. However, it should be noted that the secular decline in industry is due to a combination of factors and some of these entail significant distinctions when quantifying industry's «real» loss in terms of GDP and employment. The production and organisational changes that have occurred in this sector and the growing degree of

interdependence between industry and services (a phenomenon known as the servitisation of manufacturing) are just some of the most important aspects, as detailed in the article «Industry is dead! Long live industry!» in this Dossier.

One of the most far-reaching issues related to the phenomenon of deindustrialisation is whether they involve a shift towards a new economic, social and even demographic order. In this respect, throughout history there have been watersheds that have resulted in drastic changes regarding the predominant status quo at any particular time. One of these is the Industrial Revolution, which started in Great Britain in the second half of the 18th century and whose main hallmarks are the mechanisation of the textile industry and the development of the factory production system (replacing decentralised, home-based production methods). As everyone knows, these technological developments had a formidable impact throughout the following decades. Firstly, an incredibly important historical fact occurred, namely the emergence of the working middle class. Secondly, and related to this last point, the world's demographic pattern changed radically. The population grew considerably, doubling its size in the 100 years following the Industrial Revolution and reaching 1,240 million inhabitants in 1850. This contrasts with the feeble growth in population that had been the pattern until then.[1] Moreover, manufacturing firms grouped together in cities to be close to their suppliers and customers, reducing transport costs both for intermediate and end goods. These agglomeration economies encouraged a proliferation of industrial districts in many cities in the 19th century, as was the case of the East End in London and Poblenou in Barcelona. The Second Industrial Revolution took place between the last few years of the 19th century and the early 20th, introducing assembly lines and the concept of mass production with electricity and fossil fuels as its key features. The process of urbanisation intensified, population growth rocketed and the consciousness of the working class became firmly established.

Now that industry's downward trend is difficult to refute, its influence on important areas such as demography, the role played by cities and inequality has once again come under the spotlight. Regarding demographics, although the reduction in the birth rate has coincided with the decline in industry's relative

weight, particularly in the main developed countries, this relationship does not seem to be causal. In fact, the reduction in the birth rate is more closely related to a change in preferences and needs as the level of economic development increases.

Regarding cities, although it is true that their growth was closely linked to the development of industry because this helped to reduce transport costs, their role has been undergoing considerable changes for several decades now. In an increasingly tertiarised economy, cities play a very important role in providing leisure services and creating a denser labour market, improving its efficiency and enhancing the environment for generating and spreading innovative ideas.[2] The bulk of the evidence available therefore suggests that the process of urbanisation will continue in the next few decades in spite of industry's decline.

The issue of increasing inequality, or the smaller relative weight of the middle class, is different. In this case there does seem to be some connection between the rise in inequality observed in countries over the last few decades and industry's loss of relative weight. Ultimately we must remember that industry, like other economic sectors, is going through a far-reaching metamorphosis due to the emergence of new technologies such as the digitalisation of production processes, the development of artificial intelligence and robotisation, the new production possibilities brought about by 3D printing and the use of big data, among others. All these advances, stealthy in essence but powerful in intensity, are giving rise to what is known as Industry 4.0 and entail important changes in the kind of professional skills required by the sector. Whereas industry originally employed a large number of workers from the agricultural sector without them requiring much training, those now employed in the sector have an increasingly higher level of education, essential to be able to take maximum advantage of the opportunities provided by new technologies. However, the more mechanical or repetitive tasks, which used to be carried out by workers receiving an average wage, are being replaced by robots or mechanised processes. As noted in the article «The new industrial policy: challenges and opportunities» in this Dossier, such changes pose a considerable challenge for economic policy.

In summary, there can be no doubt that an effort must be made to promote those advances that will bring about Industry 4.0 and the servitisation of manufacturing while, at the same time, minimising the potential repercussions of this new industrial paradigm. The challenge for economic policy is not inconsequential; neither is the threat.

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1. An excellent account of the history of the world's population is provided by Livi-Bacci, M. (1990), «Historia mínima de la población mundial». Editorial Ariel, Barcelona. The author documents an average annual growth in the planet's population from year 0 to 1750 of 0.06%. Over the next 200 years (1750-1950), the average annual growth rate increases to 0.6%.

2. On this issue, see the Dossier «The time of cities» in MR06/2016.

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