

## TOWARDS A MASSIVE DATA-TASK ECONOMY AND ITS RELATIONSHIP WITH THE INFORMATION ECONOMY AND SOCIETY IN FRONTIER AND PERIPHERAL TERRITORIES

### *RUMBO A UNA ECONOMÍA DE DATOS MASIVOS Y SU RELACIÓN CON LA ECONOMÍA Y LA SOCIEDAD DE LA INFORMACIÓN EN LOS TERRITORIOS FRONTERIZOS Y PERIFÉRICOS*

Javier PARRA-DOMÍNGUEZ<sup>1</sup> , Andrea GIL-EGIDO<sup>1</sup> , Jonas QUEIROZ<sup>2</sup> ,  
Paulo LEITÃO<sup>2</sup>  and Fernando DE LA PRIETA<sup>1</sup> 

<sup>1</sup> *BISITE Research Group. University of Salamanca, Edificio Multiusos I+D+i,  
Calle Espejo, 2, 37007, Salamanca, Spain*  
{javierparra, age, fer}@usal.es

<sup>2</sup> *CeDRI Research Centre, Instituto Politécnico de Bragança, Campus de Santa  
Apolónia, 5300-253 Bragança, Portugal*  
jonas.queiroz@fe.up.pt, pleitao@ipb.pt

**ABSTRACT:** This article motivates a historical review of the evolution of the information economy and the data economy or massive task. The implications are drawn from the study make us assess the step toward the new industrial revolution and its technological capacity in border and peripheral territories because of the current state of digital transformation. Throughout the work, we ask ourselves about the place of technological evolution in border and peripheral territories, responding to this concern related to the progress of these areas by highlighting the main factors of non-evolution such as the theoretical barriers of borders, the different societies and rates of progress concerning social and economic changes and the new geography and geopolitics of digital globalization. To fight against the above factors, the result of the review is that it is necessary to deepen the development and innovation of the area, the creation of infrastructures, the

dissemination of organizational models based on and adapted to the logic of related technologies and the establishment of regulations and institutions appropriate to the existing technological paradigm.

**KEYWORDS:** information economy; massive data-task economy; border and peripheral territories.

**RESUMEN:** Este artículo muestra la revisión histórica de la evolución de la economía de la información y la economía de datos o tarea masiva. Las implicaciones que se extraen del estudio nos hacen evaluar el paso hacia la nueva revolución industrial y su capacidad tecnológica en los territorios fronterizos y periféricos debido al estado actual de transformación digital. A lo largo del trabajo nos preguntamos por el lugar de la evolución tecnológica en los territorios fronterizos y periféricos, respondiendo a esta inquietud relacionada con el progreso de estas áreas destacando los principales factores de no evolución como son las barreras teóricas de las fronteras, las distintas sociedades y ritmos de avance en torno a los cambios sociales y económicos y la nueva geografía y geopolítica de la globalización digital. Para luchar contra los factores anteriores, el resultado de la revisión es que es necesario profundizar en el desarrollo y la innovación del territorio, la creación de infraestructuras, la difusión de modelos organizativos basados y adaptados a la lógica de las tecnologías afines y el establecimiento de regulaciones e instituciones adecuadas al paradigma tecnológico ya existente.

**PALABRAS CLAVE:** economía de la información; economía de tareas masivas de datos; territorios fronterizos; territorios periféricos.

## 1 Introduction

In the last three decades of the twentieth century, we can notice some significant changes in the capitalist society of the time, these changes were characterized by their great depth in the socio-economic impact of the time and their basis in the productive development of new technologies, because of this characterization, the classification of these changes as two technological revolutions began to be popularized through media discourses [10, 2, 26, 23]

sometime later, some experts in the field came to the consensus of defining them as two industrial revolutions [1, 7]. To establish context, we understand the industrial revolution process to be underpinned by: first, a set of fundamental technical changes in the production and distribution of goods [20], together with, second, a group of significant social and cultural differences [24].

We must highlight the significant difference between the first (18th) and second (19th) industrial revolutions of these last two revolutions. The focus of these ruptures is very different, giving greater importance to scientific knowledge as a driving instrument for technological, economic and social development. This can be seen in the direction of the changes and advances of the breakthroughs closest to our time, such as the invention of the microprocessor and the exponential growth of processing (1971), or the generation of deoxyribonucleic acid (DNA) sequencing methods and the genetic modification of living organisms (1977). In the first half of the 1970s, major historical events took place that marked a turning point in the world economy [16], including the collapse of the Bretton Woods international financial system [11], due to the abandonment of the gold standard by the United States [12]. Despite all this, the advanced industrialized countries managed to keep the global economy from collapsing in the post-1973 crises, «they were, on the whole, richer and more productive than in the early 1970s, and the world economy of which they remained the central core was much more dynamic» [14].

That period was not only characterized by significant changes in productivity as the relationship between capital and labour and the labour force but also new points began to be worked out in terms of regularization and commodification, expanding the exploitation of resources, the entry of a natural and effective economic and trade globalization, the construction of new legal frameworks in the different markets, are some of the changes and transformations that stand out to defend the idea of the industrial revolution in this era (Mokyr, 2018). Since the concept of the industrial revolution has received significant criticism, in theory, it is a social and economic rupture based on the irruption of a specific radical technological innovation, which over time expands and overflows these innovations globally. However, the criticism focuses on a «European superiority», as this overflow, on numerous occasions, does not reach the globality of which the theoretical framework speaks [22].

This raises several questions about the nature and extent of the transformations in society, economy and culture and whether they represent a significant enough rupture to be considered an industrial revolution. Answering these questions would entail an arduous and extensive analysis, so this study will focus on showing the effects and evolution of the economy and society due to these waves of digitalization in cross-border and peripheral territories. For the development of the work and following this introduction, we will introduce the current reality of the economy and society in section two. Section three will link this reality with that of the cross-border and peripheral areas, and we will end with some conclusions.

## 2 Current reality of the economy and society

### 2.1 Information and Knowledge Economy-Society

We understand the information society as a concept that highlights the consideration that the production, multiplication and distribution of information is the constituent principle of today's organizations [27]. This refers to the new role that technology plays in this context, assigning it a position of great importance in the social order and situating it as an engine of economic development [3].

Suppose we focus more closely on the context and situate ourselves in the European sphere. In that case, we can observe how a conceptual change has been generated from information to knowledge over the last few decades, considering it as the structuring principle of modern society. This conceptual change is of great importance in modern societies, as it has a tremendous evolutionary impact in terms of education, economic structures and markets.

When we study these terms, we can check the significant link they have with globalization, highlighting the political and ideological constructions which were affected most rapidly in the search to create an open, global and automated market paradigm. Of its resulting consequences, the most well known and most pointed out result in the socio-economic sphere is the deepening of the gaps between rich and poor societies, noting that these gaps are also observed within the organizations themselves, with significant differences between rich and poor [13].

In the late 1990s, the term knowledge society was coined, which seeks to incorporate other areas and thus achieve a more comprehensive conception so as not to be linked only to the economic dimension and to show a broader scope of the study [8]. It is currently considered to summarize the transformations taking place in modern society and serves to analyze these transformations. For all these reasons, we understand that information and knowledge societies are characterized by this digitalization or wave of digitization, where information, communication and knowledge predominate in the economy and all human activities.

## 2.2 Features of today's Information and Knowledge Economy Society

First of all, we must consider a question that is currently driving reality: «science and technology in mutual feedback, constantly creating, force continuous innovation in all fields: scientific, technological, organizational at all levels and also axiological» [5]. We find ourselves at a time when new sciences and technologies are developing more and more. However, at the same time, they are still tied to a world of values, ideologies, religions and axiologies that can slow down or harm this development.

The spheres of social and economic life have been gradually transformed due to information technology, as it has enabled the development of interconnected networks as an expansive and dynamic form of organization of social and human activity. These networks allow and facilitate a globalized economy based on innovation, competitiveness and efficiency, which in turn seeks to generate wealth, giving rise to a context where culture, knowledge, and technology feedback are significant players in the economic performance of societies [25].

### Technical-productive changes

Businesses and the economy are subject to a new production system, with the corresponding implications and transformations in the workplace. This new system is closely dependent on the capacity to generate, process, and apply everything that technological innovations in the fields of information and knowledge bring us, such as the application of new energy sources, inventions,

or new basic materials. The adoption of digitalization, automation and ratification has enabled production processes to reach higher optimization levels in their work. A correct combination of these, with workers specialized in different fields, allows companies to get unthinkable production levels decades ago [17].

Moreover, we must not forget that we are in an organization on a global scale, either through a network of links between economic agents or in a more direct way. «Access by global networks of capital, management and information to technological knowledge constitutes the basis of productivity and competition». [4]. With such changes, we find that, at present, industrial technology capital and financial capital are increasingly interdependent, creating what some consider to be a network of capital networks.

In terms of work, we can observe a tendency toward more individualized work processes, with a diversity of related tasks, resulting in multiple occasions in the loss of their collective identity, individualizing skills, working conditions, interests and projects; this is due to, in part, to the increasing emergence of new occupations. The flexibility and continuous change we observe in processes and markets introduce flexibility also in the labour market and work, creating a new type of worker with a temporary and part-time job. This individualization has also pushed workers to build teams to maintain and expand knowledge, seeking accurate communication and solidarity, resulting in improved working conditions and work optimization.

### **Social-cultural and institutional-political changes**

We find ourselves at a time when the nation-state is still struggling not to lose its place in the face of the continuing advance of global capitalism. We can see a perspective where states function more like components of a worldwide system than sovereign states, leading to a contradictory situation. The more they represent their identity, the less effective they are on a global scale and vice versa. Globality in sovereignty has its pros and cons, so each state has to consider how it wants to position itself for actual effectiveness to be achieved.

The social change that these digital and global firms are bringing about is the idea that there is no need for identities. This idea has been so widespread that counter social movements have been created that fight for the resistance

of identities, refusing to be erased by global flows and radical individualism. These movements do not communicate with the state except to fight and negotiate for their interests and often do not see themselves represented by states.

The new social structure is fully linked to globalization and digital and technological development, creating and combining new digital forms, giving rise to the need for greater regulation of digital giants and global powers [9]. In addition, these changes have also led to greater awareness and the pursuit of citizen empowerment and participatory and direct democracy.

### **3 Linking up with border and peripheral areas**

All the changes and evolutions shown in the previous section have led us to find ourselves in a new socio-economic paradigm, a paradigm that has greatly influenced all aspects related to the state. A very interesting object of study to see how this new framework has influenced together with the continuous globalization we are suffering is the study of borders and markets between nations, in this way we will be able to see in a real way how the points previously exposed are represented in the nations.

As has been explained, today's globalized society is predominant, creating situations in which states are seen more as components of a global system, and there are circumstances in which the identity of each nation can be lost. Under these circumstances, we can observe that on many occasions and in some geographical regions, the theoretical barriers of borders or cross-border areas are blurred and even disappear due to the similar adaptation of the different societies to social and economic changes. We are facing new geography and geopolitics of digital globalization, where territorial borders give way to other border zones, marked not by territories but by the development and innovation of the area [6]. All this causes the population to have greater awareness and trust in international policies and institutions than in national ones, as we can see in the following graph; therefore, we can affirm that the paradigm shift affects all socio-economic levels.

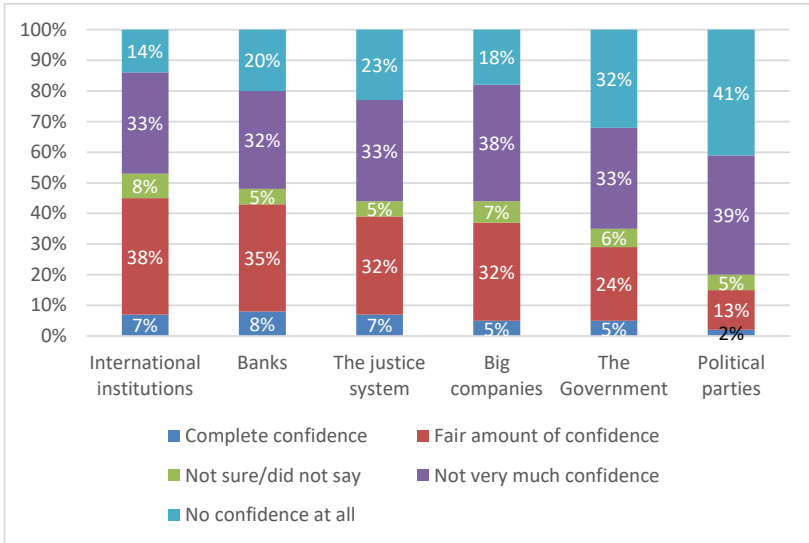


Fig. 1. Level of confidence people from select countries have in national and international institutions, as of July 2018.

A great example of these new frontiers would be the OECD, an Organization for Economic Co-operation and Development, an international cooperation body composed of 38 states (2022) from 4 different continents, aiming to coordinate their economic and social policies. The quest to exchange information and knowledge, together with the harmonization of policies, blurs the borders between them with the sole objective of maximizing their economic growth and collaborating in their development, as well as trying to contribute to a healthy economic expansion and progress for non-member countries in the process of economic development.

This linkage is closely related to a society's level of nation-state establishment [15]. Therefore, it would depend on the decisions adopted in each country concerning the creation of infrastructure, the dissemination of an organizational model adapted to the logic of related technologies, and the establishment of regulations and institutions appropriate to the current paradigm [21]. With this new paradigm, we find localities that begin to form part of functional networks, detaching themselves from their cultural, historical and geographical significance.



The digitalization of the economy and society, together with the different states' globalization, comes to play a significant role, particularly when we talk about peripheral states and border areas. Accessing flexible and digital jobs increases the chance to offshore such work; this offshoring can have two approaches. The first has a more positive impact on the person, while the second is on the company. In the first case, the worker is being allowed to perform their work remotely or, as it is commonly called, «telework», thus choosing from where to carry out these tasks. This modality of work has grown exponentially in the coming years, with Spain, for example, seeing an evolution from 9.8 % of the working population teleworking in 2020 to 25.2 % in 2021, representing a growth of 15.4 percentage points in just one year. This point helps a lot to the population. If a person does not have an obligation to be in a specific place to work, they can choose from which location they want to work. This results in many choosing to stay in their city or country of origin or even decide to telework in «quieter» areas; The latter could be seen during the pandemic between 2020 and 2021, where, with the growth of teleworking, there was a trend of population growth in rural areas, as opposed to the population loss of previous years [18].

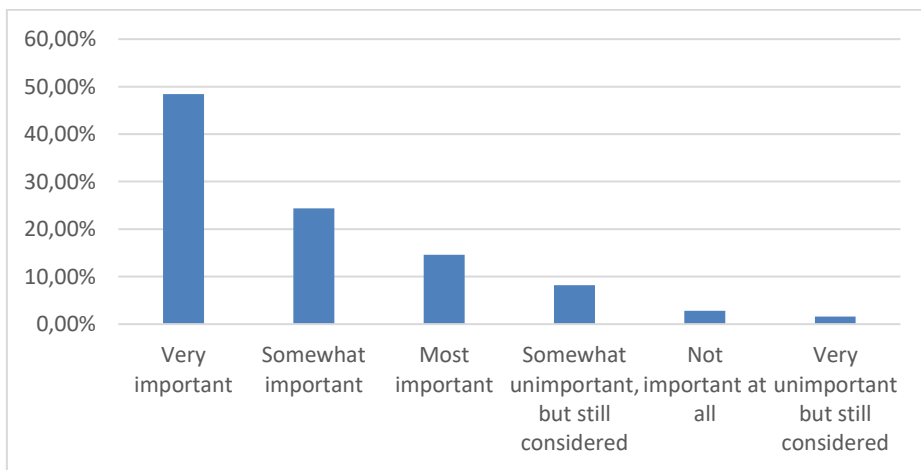


Fig. 2. Importance of remote work ability for future employment decisions worldwide 2021.

The second point we highlight, where the company is the significant beneficiary, is the offshoring of large organizations. The digitization and automation of work will modify current business strategies, which will seek cheaper and more efficient production. This commonly leads companies to relocate production to areas with lower labour costs or to states that impose lower taxes on such practices (so-called tax havens). Finally, there is a global context, both economic and social, where nations are moving towards an increasingly digitized society, striving to achieve innovation goals, with a general tendency to establish «Smart cities», where every part of society benefits from this digitization. This objective has a global tinge, which means that many societies are working together to make progress and achieve interconnection between them, blurring the borders between states.

Therefore, we can conclude that we are at a point where, depending on each state's position, its borders are being affected in opposite ways. While societies that are more driven by the nation-state ideology impose more and more barriers at their borders, societies with a more global mindset are gradually blurring these borders.

## 4 Conclusions

It is apparent and notorious the space of time that we share due to the advance in digitalization. In this advance, historically, the logical evolution of the data economy or massive task has a great weight, as we have seen.

The historical study we have carried out shows how the advance of the information society highlights the consideration that the production, multi-application and distribution of information is the constituent principle of current societies, to which we must add the context of digital transformation in which we are currently immersed.

It is important to note that the social shift towards these digital forms is conducive to the so-called digitization mentioned above and thus to the idea that there is no need for identities in the world.

Related to the above, the process can be taken to its fullest extent by commissioning it to affect cross-border and, in some cases, peripheral areas, giving rise to identities specific to those particular regions.

It is concerning these identities that we can observe the relevant role of combating the factors that we have identified in the literature, such as:

- The theoretical barriers of borders.
- Different societies and rates of progress to social and economic change.
- New geography and geopolitics of digital globalization.

For which border states and peripheral zones have to deepen the progress of:

- Development and innovation of the area.
- Creation of infrastructures.
- Diffusion of organizational models adapted to the logic of related technologies.
- Establishment of regulations and institutions adapted to the existing technological paradigm.

## Acknowledgments

This work has been partially supported by the European Regional Development Fund (ERDF) through the Interreg Spain-Portugal V - A Program (POCTEP) under gran 0677\_DISRUPTIVE\_2\_E (Intensifying the activity of Digital Innovation Hubs within the PocTep region to boost the development of disruptive and last generation ICTs through cross-border cooperation).

## References

1. Ashton, T.S. *The industrial revolution 1760-1830*. OUP Catalogue (1998).
2. Brown, L.: Cable y Pay TV on Eve of Technological Revolution. *The Times*, 31 (1978).
3. Castells, M. La era de la información. *Economía, Sociedad y Cultura*. Vol.1. La Sociedad Red. Madrid, Alianza Editorial (1996).
4. Castells, M. La era de la información. *Economía, Sociedad y Cultura*. Vol.2. El poder de la identidad. Madrid, Alianza Editorial (1998).
5. Cucarull, M. *Sociedad informacional y sociedad del conocimiento*. Coincidencias y divergencias. Cetr (2016).
6. De Miguel, A., Parra-Domínguez, J., Benzinho, J.M.: Costes de Contexto Transfronterizos en el Ámbito Empresarial. Territorio BIN-SAL (2014).

7. De Vries, J.: The industrial revolution and the industrious revolution. *The Journal of Economic History*, 54(2), 249-270 (1994).
8. Drucker, P.F.: The rise of the knowledge society. *The Wilson Quarterly*, 17(2), 52-72 (1993).
9. Edmunds, J., Turner, B. ¿S.: Global generations: social change in the twentieth century. *The British journal of sociology*, 56(4), 559-577 (2005).
10. Guillén, A.: La revolución tecnológica, la más importante del siglo XX. *El País* (1986).
11. Hahn, E., Mestre, R.: *The role of oil prices in the euro area economy since the 1970s* (2011).
12. Hallwood, P., MacDonald, R., Marsh, I. W.: An Assessment of the Causes of the Abandonment of the Gold Standard by the US in 1933. *Southern Economic Journal*, 67(2), 448-459 (2000).
13. Heiserman, N., Simpson, B.: Higher inequality increases the gap in the perceived merit of the rich and poor. *Social Psychology Quarterly*, 80(3), 243-253 (2017).
14. Hobsbawm, E.J., Faci, J.: *Historia del siglo XX (Vol. 10)*. Buenos Aires: Crítica (1998).
15. Hoffmann, S.: Reflections on the nation-state in Western Europe today. *J. Common Mkt. Stud.*, 21, 21 (1982).
16. Isoglio, A.: La economía basada en el conocimiento: discusiones conceptuales sobre los cambios ocurridos a escala global desde la década de 1970. *Investigación y Desarrollo*, 29(2), 169-195 (2021).
17. Li, J.Q., Yu, F.R., Deng, G., Luo, C., Ming, Z., Yan, Q.: Industrial internet: A survey on the enabling technologies, applications, and challenges. *IEEE Communications Surveys & Tutorials*, 19(3), 1504-1526 (2017).
18. Luis, N.A.S., Ricardo, R.F.: Tax Incentives in Rural Environment as Economic Policy and Population Fixation. Case study of Castilla-León Region (2020).
19. Mokyr, J.: Editor's introduction: The new economic history and the Industrial Revolution. In *The British industrial revolution* (pp. 1-127). Routledge (2018).
20. North, D.C., Wallis, J.J.: Integrating institutional change and technical change in economic history a transaction cost approach. *Journal of Institutional and Theoretical Economics (JITE)/Zeitschrift für die gesamte Staatswissenschaft*, 150(4), 609-624 (1994).
21. Perez, C.: Technological revolutions, paradigm shifts and socio-institutional change. Globalization, economic development and inequality: An alternative perspective, 217-242 (2004).
22. Schäfer, M.: The fourth industrial revolution: How the EU can lead it. *European View*, 17(1), 5-12 (2018).

23. Schuyten, P.J.: Technology, *The Times* (1978).
24. Sorokin, P., Richard, M.P.: Social and cultural dynamics: a study of change in major systems of art, truth, ethics, law, and social relationships. *Routledge* (2017).
25. Schweitzer, F., Fagiolo, G., Sornette, D., Vega-Redondo, F., Vespignani, A., White, D. R.: Economic networks: The new challenges. *science*, 325(5939), 422-425 (2009).
26. Vogl, F.: A technological revolution in American banking habits. *The Times*, 8 (1975)
27. Webster, F.: *Theories of the information society*. Routledge (2014).

