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HOW DIGITAL INNOVATION HUBS CAN HELP THE SMES DIGITALISATION, PORTUGUESE AND SPANISH EXAMPLES

¿CÓMO LOS CENTROS DE INNOVACIÓN DIGITAL PUEDEN AYUDAR A LA DIGITALIZACIÓN DE LAS PYMES? EJEMPLOS PORTUGUESES Y ESPAÑOLES

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Abstract: This article introduces the different DIHs that currently operate in the Castile and Leon region in Spain and the Norte region in Portugal and presents some success stories involving SMEs from both countries.

A brief presentation on the status of digital adoption in both countries per sector and per technology is made.

Keywords: DIH-Digital Innovation Hub; Digitalisation; Digital Technologies.

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Resumen: Este artículo presenta los diferentes DIH que actualmente que operan en la región de Castilla y León en España y en la región Norte en Portugal y presenta algunos casos de éxito de las PYME de ambos países.

Se presenta brevemente el estado de la adopción digital en ambos países por sector y por tecnología.

Palabras clave: DIH – Digital Innovation Hubs; digitalización; tecnologías digitales.

1 Digitalisation and Digital Innovation Hubs within the European policy

1.1 Background

Digitalisation is an enormous opportunity and challenge for the current generation. It is revolutionising the world of work, business structures and value chains as well as innovation and market structures. The recent COVID-19 pandemic is a sombre reminder of the relevance —and the necessity— of digital technology for a variety of businesses and sectors: from health to retail, from manufacturing to education [1].

In what regards the manufacturing sector the Digitising European Industry Initiative [2], adopted in April 2016, identified the Digital Innovation Hubs as gateways to link the existing digital innovation capacity of Europe in order for traditional sectors and small and medium enterprises (SMEs) to be able to access the knowledge from high-tech sectors that face strong competition from other parts of the world.

According to the European Commission (EC) the Digital Innovation Hubs (DIHs) are not-for-profit, one-stop-shops that support companies —in particular small and medium-size enterprises (SMEs)— and public organisations in their digital transformation, offering them services such as:

- Test before invest. Experimentation with new digital technologies —software and hardware— to understand new opportunities and return on investments, also including demonstration facilities and piloting;

- Skills and training to make the most of digital innovations: train-the-trainer programmes, boot camps, traineeships, exchange of curricula and training material;
- Support to find investments: feasibility studies, develop business plans, incubation & acceleration programmes;
- An innovation ecosystem and networking opportunities through marketplaces and brokerage activities [3].

Within Horizon 2020 500 million EUR was for Digital Innovation Hubs (2016-2020) activities, namely to support more than 2000 Start-ups, SMEs and mid-caps to test digital innovations in collaboration with more than 200 DIHs networked across the European Union [3]. These projects typically cascade funding through open calls by engaging SMEs in innovative experiments with DIHs in a cross-border context.

1.2 The digitising current status

Three years after the launch of the Digitising European Industry Strategy the economy has made significant progress. The level of digitalisation however remains uneven, depending on the sector, country and size of company: only 20% of SMEs in the EU are highly digitised [4].

According to the Study «Who is prepared for the new digital age?» from the European Investment Bank Investment Survey (EIBIS) [1] only 66% of manufacturing firms in the European Union report having adopted at least one digital technology. Digitalisation is associated with better firm performance. Digital firms tend to have higher productivity than non-digital firms, have better management practices, be more innovative, grow faster and create higher-paying jobs. A major barrier that is identified in Europe towards the increase in digital adoption is the high percentage of small firms that do not invest in digital technologies, that reinforces the important role of the DIHs.

EIBIS presented some comparison data between the EU and the US, in regards to digital adoption per sector, that is also disaggregated per country. In Figure 1 the data are presented including Portugal and Spain, the two countries involved in the DISRUPTIVE project.

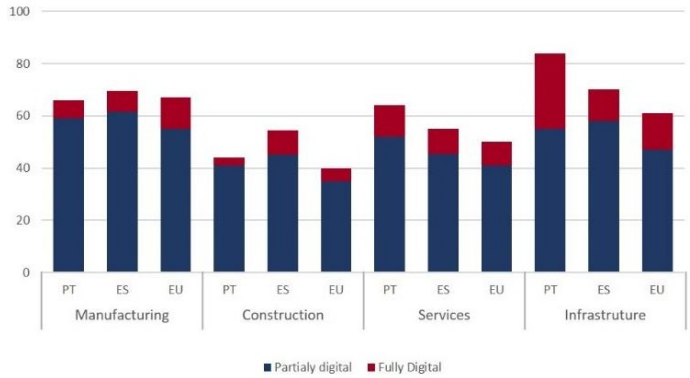

Fig. 1. Digital adoption per sector in Portugal, Spain and the EU (in % of all firms) SOURCE: Adapted from EIBIS wave 2019. Note. A firm is identified as partially digital if at least one digital technology was implemented in parts of the business and fully digital if the entire business is organized around at least one digital technology. Firms are weighted using value added.

Analysing the data in terms of digital adoption in the manufacturing sector, it can be observed that both Portuguese and Spanish companies are above the EU in the minimum digitalization, meaning with at least one digital technology implemented in parts of the business, but the number of fully digital companies in EU is higher than in either Portugal or Spain. On the other sectors in overall terms both Portugal and Spain are above the average EU companies.

Concerning the two countries involved in the DISRUPTIVE project, Portugal and Spain the adoption of different digital technologies by sector is given in Figure 2.

In what concerns the technologies most implemented they differ per sector being IoT the only one that is commonly used, followed by 3D Printing that is only absent in Services. Focusing on the manufacturing sector and analysing by technology, the EU integration of 3D printing is more expressive than in PT or ES and is quite similar on robotics; In IoT and Big data and AI both countries are above the EU with Spain presenting slightly higher values. In the other sectors Spain is higher or equivalent to the average of the EU companies, while Portuguese construction companies are behind in 3D printing and virtual reality, service companies slightly below in virtual reality and big data and AI. In Infrastructure PT and ES are slightly below the EU.

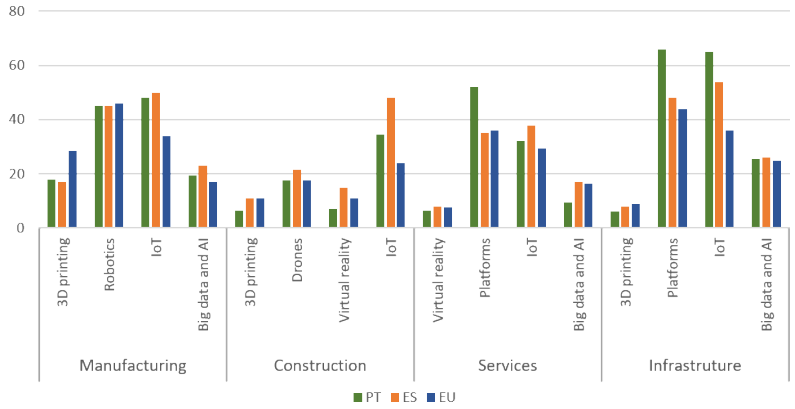

Fig. 2. Adoption of different digital technologies per sector in PT, ES and the EU (in % of all firms) SOURCE: Adapted from EIBIS wave 2019. Note. IoT: Internet of Things, AI: Artificial Intelligence. Firms are weighted using value added.

1.3 The upcoming EC financial framework 2021-2027

Within the new EC financial framework for 2021-2027, DIH will continue to play a key role, as they will be part of both the «Horizon Europe» and «Digital Europe» programmes. On the one hand, the «Horizon Europe» programme will support experiments where highly innovative companies work together with DIH to develop innovative digital solutions to improve their business. And on the other hand, the «Digital Europe» programme aims to increase the capacity of DIH to enable all businesses, SMEs and the public sector to benefit from strategic digital technologies and advanced digital skills [3].

2. DIHs in Castilla y Léon (Spain) and Norte (Portugal)

In the Portuguese Norte region, 2 fully functional DIHs are identified:

- PRODUTECH Digital Innovation Hub Platform (http://www.produtech.org), coordinated by PRODUTECH and located in Porto. The mission is to promote the digitization of the manufacturing industry, by establishing a critical mass of capacities, articulating and networking the relevant actors and by stimulating the ecosystem, presenting

a portfolio of support services that enable and enhance the modernization of the industry.

- iMan Norte Hub-Digital Innovation Hub for Customer-Driven Manufacturing @ Norte (https://www.imannortehub.com/), co-coordinated by PRODUTECH and located in Porto. The main objective is to facilitate and foster manufacturing technology adoption and diffusion in the areas of cyberphysical production systems and robotics.

Currently, the Spanish region of Castilla y León has 4 regional DIHs, three of which are fully operational and one in preparation:

- DIH IoT (https://www.innovationhub.es/), coordinated by AIR Institute and located in Salamanca. The objective of the IoT-DIH is to help companies become more competitive through the adoption of Internet of Things (IoT) Technologies in their business or production processes.
- DIH Ciberseguridad (https://www.cybersecuritydih.es/), coordinated by Cluster of Cybersecurity and Advanced Technologies and by INCIBE. Located in León. The objective of this DIH is to bring cybersecurity and other advanced technologies closer to companies. Improve the knowledge that companies have of the active security policies that they must adopt.
- DIHBU Industria 4.0 (http://www.dihbu40.es/), a private non-profit association with legal personality. Located in Burgos. The DIHBU objective is to incorporate different 4.0 Technologies into the SMEs ecosystem. As well as guiding administrations in the implementation of digital solutions.
- Smart City Valladolid y Palencia (http://www.smartcity-vyp.es/), is under preparation under the coordination of CARTIF. Located in Valladolid. This DIH is a novel Project since it considers two cities, close and with different characteristics, this adding transport from one city to another as one more which is an added problem within a Smart City.

3 Projects participated by the Castilla y Léon and Norte DIHs

Within Horizon 2020 several activities boosted by DIH networks to support Start-ups, SMEs and mid-caps to test digital innovations where implemented.

3.1 Portugal and Norte region

Within the Norte Region and within the PRODUTECH ecosystem two projects are on-going DIH2 – A Pan-European Network of Robotics DIHs for Agile Production and DIH4CPS – Fostering DIHs for Embedding Interoperability in Cyber-Physical Systems of European SMEs.

The DIH^2 project (http://www.dih-squared.eu/) establishes a network of 26 Digital Innovation Hubs, from equivalent number of European countries including Portugal and Spain, with the objective to trigger incremental and disruptive innovation processes in industrial companies, supporting SMEs in their agile production challenges and promoting their digitalization through more cost-efficient robotic solutions for small batch productions. Within this project 26 pilots and innovative experiences with the potential to become open standards for agile production will be selected from an open competition and financed. A total of 96 applications were submitted to the Open Call, 5 proposals were Portuguese. In total 11 projects were selected for funding by an external panel, 2 of which Portuguese projects, FIREFIT and FEATS. The FIREFIT – *Fiware Ready Quality Control for packaging Systems in the Food Industry*, is being developed by INTROSYS and applied in A. Pires Lourenço & Filhos S.A. company. FEATS – *FIWARE Enabled Autonomous Transport System* is being developed by DALMASYS Lda. and implemented in DURIT – Metalurgia Portuguesa do Tungsténio, Lda.. The implementation of these experiments lasts 8 months and includes the support from the responsible DIH, PRODUTECH in the case of the Portuguese projects; financial support up to €248,000; technical support; mentoring and training and support on ethical, data privacy and cyber-security issues by EU experts. Currently the experiments finished the «Experimental setup» and the «Implementation of Smart Factory services» phases and are starting the «Experiment execution»

on manufacturing companies and the «Business development» for the new technologies.

The DIH4CPS project (http://dih4cps.eu) aims to support the European strategy of industry digitisation, so that any company in Europe has access to a DIH, supporting it in its digital transformation. In this sense, the DIH4CPS project aims to leverage the network of Digital Innovation Hubs and solutions providers on an European scale, focused on cyber-physical systems and embedded systems (CPS). The project started with 13 DIHs from 10 countries and this network of DIHs is expected to grow to 33 through the financing of two open calls. Within DIH4CPS, Application Experiments (AE), formed by a group of partners that, with different skills and specific competences, will put in practice the aimed solutions, demonstrating how the DIH become available to address specific and otherwise complex business needs. It started with 11 initial AEs, with a DIH in each, to support the research centres, suppliers and end-users of CPS. PRODUTECH takes part of AE 7 – Safety and wellbeing of workers – CPS for security and wellbeing of shopfloor workers. The AE involves also UNINOVA, in the Data Collection setup, KnowledgeBiz, in Data Analysis integration and development, and PRODUTECH, providing the real setup places and enrolment of its members in the activities. For that PRODUTECH started with a survey to 30 SMEs to clarify their main difficulties on occupational health at productive sections. At this AE companies will benefit from the experience of using CPS technology to warn operators about their incorrect posture during work execution. We are currently selecting SMEs with common worker well-being concerns to develop the technology and implement the experiment.

3.2 Spain and Castilla y León region

The IoT-DIH has led different projects in the field of Internet of things applied to different environments and multiple European partners. The scope of work ranges from agricultural to manufacturing industry and the application of IoT solutions in cooperation of multiple partners.

A success case and example is the project GRACE (http://grace-project.org) which was has been developed by different partners. This project included the participation of universities and research centres in the northern region

of Portugal and Spain, among other European countries. The partners of the project were: Universita Politecnica delle Marche (Italy), SINTEF (Norway), IPB (Portugal), AEA-Loccioni Group (Italy), Whirlpool Europe and Siemens AG. It consisted on the development of distributed production control systems integrating process and quality control levels using multi-agent systems principles and self-adaptation procedures to support variation and fluctuation in processes and products.

Another example of a success case in a project developed jointly with partners of the northern Portugal and Castilla y León is the 19K-INOVKIVI project. The 19K was developed by the following partners: IPN (Portugal), APK (Portugal), Universidade de Coimbra (Portugal), Direção-Geral de Alimentação e Veterinária (DGAV) (Portugal), Kiwicoop (Portugal), KiwiGreenSun (Portugal), Kiwi d'Ouro (Portugal), Produção e Marketing do Noroeste, Lda (PMNI) (Portugal), Fuverg, Lda, Kiwi1000, Lda (Portugal), Actiglabro (Portugal). The project consisted on the development of strategies for the sustainability of the Kiwi industry through the creation of a Value-added product. The aim of the project was to stimulate the adoption of measures based on new product, practices, processes and innovative technologies to combat Pseudomonassyringae pv. Actinidiae – (Psa), which is a disease of kiwi culture. The solution consisted in the implementation of different IoT sensors for the collection and treatment of crop data, to monitor the plant growth and to enable the detection of harmful agents.

4 Conclusions

Within Horizon 2020 several activities boosted by DIH networks to support Start-ups, SMEs and Mid-caps to test digital innovations were implemented.

Within the Norte Region and within the PRODUTECH ecosystem two projects are ongoing, DIH^2 and DIH4CPS.

The DIH^2 is allowing Portuguese technological companies to have high within a Pan European community to shape the future of standardization in robotics, access to potential customers offering customised agile and robotic solutions, publish in the COPRA AP Catalogue in the Marketplace and to

interact with companies from other European countries. On the other hand, it allows PRODUTECH to enlarge its network and knowledge on Robotics and Agile production new technologies, as well as finding potential partners and new opportunities for its members.

DIH4CPS project is allowing DIHs to promote the interaction between manufacturing companies and technology providers in order to solve concrete problems, at the same time integrates SMEs in a network of entities focused on CPS technologies with enormous future cooperation and business potential.

After several years operating as a reference on IoT projects implemented in the region of Castilla y León and northern Portugal, the IoT DIH also provides different range of services. From technical advice and mentoring to access to funding opportunities for SMEs. Being also key the fact that the IoT offers events for the technological entrepreneurial ecosystem and allows building relationships with the right connections as accelerators, Universities and Investors among others. The IoT DIH, per year, on average works in more than 20 projects with SMEs. The GRACE project, which was previously mentioned as an example, after three years of research, concluded with a proper solution implemented in the Whirlpool production line and improving the process efficiency.

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