Policy Report on KIBS for the Basque Country

Jean Pierre Seclen Luna[1]

Ian Miles[2]

[1] Pontifical Catholic University of Peru, Peru.

[2] Manchester University, United Kingdom.

2023 / I

EUSKO JAURLARITZA GOBIERNO VASCO

EKONOMIA ETA OGASUN SAILA
Ekonomia eta Plangintza Zuzendaritza

DEPARTAMENTO DE ECONOMÍA Y HACIENDA
Dirección de Economía y Planificación

Ikerketak-Ekonomiaz is an electronic publication produced by the Basque Government Directorate for the Economy and Planning that presents studies by in-house and external economists that look at the Basque economy from the viewpoint of economic analysis and public-sector policies. It seeks to provide in-depth knowledge and diagnostic analysis of significant aspects of our economy and encourage debate to ensure the best possible grounding for economic policy. The viewpoints expressed are entirely those of the authors and may not coincide with the official position of the Basque Government Department of the Economy and the Treasury.

Ikerketak-Ekonomiaz es una publicación electrónica de la Dirección de Economía y Planificación del Gobierno Vasco que recoge trabajos, tanto de economistas de la propia dirección como del exterior, que versan sobre la economía vasca desde la perspectiva del análisis económico y de las políticas públicas. Su objetivo es profundizar en el conocimiento y diagnóstico de aspectos relevantes de nuestra economía y propiciar el debate y la mejor fundamentación de la política económica. Los puntos de vista expresados en ella son de exclusiva responsabilidad de los autores y las autoras, que no tienen por qué coincidir con la posición oficial del Departamento de Economía y Hacienda del Gobierno Vasco.

2023 MAY

EUSKO JAURLARITZA
GOBIERNO VASCO
Dirección de Economía
y Planificación

Abstract

The purpose of this report is to make visible and characterize Knowledge Intensive Business Services (KIBS) to inform and guide policymakers in general, and especially those of the Basque Country, about the importance of these B2B firms for achievement of the aims of public policy. KIBS play a role in the distribution of knowledge throughout the economy, and contribute to the development of innovation systems. They are not just intermediaries, but can also generate and apply new practical knowledge of their own, which can span technology, administrative matters, and even social and cultural issues. KIBS sectors of the economy are associated with high-skill, high-wage jobs; and while traditional KIBS companies exist in most localities, advanced and innovative KIBS tend to cluster in creative cities. The report outlines major policy issues arising in connection with KIBS development.

Keywords: *knowledge transfer, technology, business services, high-skill jobs.*

JEL codes: *M15, O14, O31*

Resumen

Este informe tiene como objeto facilitar información a los responsables políticos en general, y especialmente a los del País Vasco, acerca de la importancia de los Servicios Empresariales Intensivos en Conocimiento (KIBS, por sus siglas en inglés) a efectos de su contribución en las políticas públicas. Los KIBS desempeñan un papel en la distribución del conocimiento a través de la economía y contribuyen al desarrollo de sistemas de innovación. No son solo intermediarios, sino que también pueden generar nuevos conocimientos aplicados propios, que pueden abarcar tecnología, asuntos administrativos e incluso cuestiones sociales y culturales. Los sectores KIBS de la economía se asocian con empleos de alta cualificación y salarios altos, y mientras que las empresas KIBS tradicionales existen en

la mayoría de las localidades, los KIBS avanzados e innovadores tienden a agruparse en ciudades creativas.

Palabras clave: *transferencia de conocimiento, tecnología, servicios empresariales, empleos de alta cualificación.*

Códigos JEL: *M15, O14, O31*

Laburpena

Txosten honen helburua da Ezagutzan Intentsiboak diren Enpresa Zerbitzuak (KIBS, ingelesezko sigletan) ikusaraztea eta ezaugarritzea, arduradun politikoei, oro har, eta, bereziki, Euskal Autonomia Erkidegokoei, politika publikoetan egiten duten ekarpenaren garrantziari buruzko informazioa eta orientazioa emateko. KIBSek eginkizun bat betetzen dute ezagutzaren banaketan ekonomiaren bitartez, eta berrikuntza-sistemak garatzen laguntzen dute. Bitartekariak izateaz gain, beren ezagutza aplikatu berriak sor ditzakete, teknologia, administrazio-gaiak eta gizarte- eta kultura-gaiak barne har ditzaketenak. Ekonomiaren KIBS sektoreak kalifikazio handiko enpleguekin eta soldata altuekin lotzen dira, eta KIBS enpresa tradizionalak herri gehienetan dauden bitartean, KIBS aurreratuak eta berritzaileak hiri sortzaileetan biltzeko joera dute.

Hitz gakoak: *ezagutzaren transferentzia, teknologia, enpresa-zerbitzuak, kualifikazio handiko lanpostuak.*

JEL sailkapena: *C51, C53, E13*

Índice

1. Introduction

This report aims to provide a briefing for policymakers, especially these in the Basque country, concerning Knowledge-Intensive Business Services (KIBS). It explains that these are firms who supply expert-based services to other businesses – and to clients in public services and other organisations – that assist with business processes requiring expert inputs. They are assisting their customers to solve problems, and often work closely with these clients to coproduce solutions – where the expert knowledge is elaborated with information concerning the clients and their problems. KIBS firms play a role in distributing knowledge through the economy, and this is one way in which they contribute to the development of innovation systems. They are not only intermediaries, but can also generate new applied knowledge of their own - which may span technology, administrative affairs, and even social and cultural issues. KIBS sectors of the economy have grown more rapidly than most other sectors, so they have become increasingly prominent in advanced regions of the world. They are typically associated with high-skill, high-wage employment, and while traditional KIBS firms exist in most localities, advanced and innovative KIBS tend to cluster in creative cities.

KIBS are important for policy makers concerned with the functioning of their economies, and with the scope for local KIBS to export services – and be challenged by transnational firms acting in these fields. They have been of particular attention to those dealing with regional affairs, since it is likely that firms in more "peripheral" regions (especially SMEs) are disadvantaged by lack of access to KIBS firms (these tend to be concentrated near metropolitan centres). Lack of access to KIBS is complemented by lack of experience with these service firms, and thus with limited capabilities for determining when and how to use them, how to select among providers, what sorts of interaction are liable to be required, and how to capture knowledge from the interaction to empower innovation. Policies, then, can be directed at KIBS (potential) clients as well as towards KIBS themselves. Furthermore, there is considerable diversity across different types of KIBS (with different knowledge specialisations); some specific policy issues arise for specific KIBS subsectors, though there are very common issues around, for example, skills and training, certification, and supportive infrastructure (especially telecommunications). A "policy mix" will be required to achieve significant long-term results.

Finally, KIBS policy should consider wider features of the innovation system in question. Other sources of expertise may be mobilised (for example, in public sector organisations). More generally, policies in several areas may need to be coordinated. When it comes to the reorientation of economies and innovation systems that is required to affect the transition to a sustainable low-carbon economy, this is even more the case.

The systemic transformation is a process, not an instantaneous event; policies will need to evolve and succeed each other. Much of this will involve innovation, which means that not everything is predictable - there is considerable scope for learning from large-scale demonstrators and similar efforts to embed novel policy mixes into regions and subregional areas. KIBS-client relationships function best when they constitute mutual learning processes; and we can add that orchestrating KIBS-related policies that help embed the socioeconomic sustainability transition is itself a learning process. This report, then, presents many policy possibilities that policy makers with deep knowledge of local circumstances can draw upon in establishing future directions for a greener economy.

Finally, KIBS policy should consider wider features of the innovation system in question. Other sources of expertise may be mobilised (for example, in public sector organisations). More generally, policies in several areas may need to be coordinated. When it comes to the reorientation of economies and innovation systems that is required to affect the transition to a sustainable low-carbon economy, this is even more the case.

The systemic transformation is a process, not an instantaneous event; policies will need to evolve and succeed each other. Much of this will involve innovation, which means that not everything is predictable - there is considerable scope for learning from large-scale demonstrators and similar efforts to embed novel policy mixes into regions and subregional areas. KIBS-client relationships function best when they constitute mutual learning processes; and we can add that orchestrating KIBS-related policies that help embed the socioeconomic sustainability transition is itself a learning process. This report, then, presents many policy possibilities that policy makers with deep knowledge of local circumstances can draw upon in establishing future directions for a greener economy.

2. KIBS theoretical framework

The term "Knowledge Intensive Business Services" was introduced in the mid-1990s; it was defined as referring to FIRMS (private businesses), who supply expert-based SERVICES supporting the BUSINESS PROCESSES of other organisations. At the time, industrial classification systems did not go into much detail concerning KIBS – in the present century statisticians have sought more clarity, and the businesses covered in the category "Professional, Scientific and Technical Activities" are mainly KIBS. In the North American Industrial Classification System (NAICS), this group covers practically everything considered to be KIBS [1]; in the European Industrial Classification System (NACE), most KIBS are also within its group of "Professional, Scientific and Technical Activities"[2] but some (computer and information services) are in an "Information and Communication" group. KIBS firms are specialists in supplying services of this sort (Zieba, 2021). Box 1 explains how other firms (and public sector organisations and even charities) may also supply such services.

Box 1. KIBS and KISA

The term "Knowledge Intensive Service Activities" (KISA) is used to describe not only the processes undertaken by KIBS experts, but also those undertaken by people who perform these activities in other organisations (Martinez-Fernandez *et al*., 2011). Many KISA that can be purchased from KIBS firms specialising in, say, accountancy, advertising, architecture, and so on can also be entrusted to employees hired by the user organisation itself. For many professions the shares of workforce engaged in the occupation within KIBS and within user organisations vary considerably across countries and over time.

KISA may be outsourced to KIBS or insourced to one's own professional employees. KIBS firms are specialised in providing specific KISA to their clients. KIBS are used for a variety of reasons – higher levels of expertise, flexibility of professional staff, efficiency where it comes to addressing sporadic needs, ability to address rapidly changing problems and bodies of knowledge, external validation of company perspectives. Sometimes KIBS are used to complement existing in-house capabilities. Often, they are invoked when client has not developed adequate in-house capabilities to deal with new problems – for example, how to make effective use of new technologies, how to adjust to new regulations or changing market demand, and so on.

But also, sometimes, KISA are outsourced to organisations who are not themselves classified as KIBS. These are organisations whose main products are not business services, but who apply some of their capabilities to supply these services to other organisations on a commercial basis. For example, a university or Business School may provide consultancy or design services to businesses. This is typically a small part of the organisation's outputs (in this case, education, and research), and a small part of the total volume of such services supplied in the economy. However, sometimes KIBS-type services can become major parts an organisation's outputs, and in extreme cases a manufacturing company may

[1] NAICS sector 54 comprises *professional, scientific, and technical services for the operations of other organizations* - https://www.census.gov/eos/www/naics/2017NAICS/2017_NAICS_Manual.pdf

[2] NACE section M - https://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF

become a KIBS business – thus IBM moved from being primarily an equipment supplier, to a computer services company.

Sometimes the service activity supplied by a non-KIBS firm is one that supports that firm's products – as in the case of software services bundled with, or sold as complementary to, computer equipment. Sometimes a company may find that it has scope to sell services based on its business processes. For example, a firm (or a university) may sell services based on its technical testing facilities – its laboratories or its specialised equipment - or it may sell on management or marketing capabilities that have been honed by application in its specific markets – for example, an airport company may offer airport management services to other airports.

Finally, it should be noted that some types of KIBS firm are often founded as spin-offs from universities or from businesses. Various types of consultancy and R&D service firms have emerged in this way.

Source: Own elaboration.

2.1. Characteristics and classification of KIBS

KIBS specialise in various areas of knowledge. They are unusual industries in that their core workforce involves highly qualified professionals. Many studies agree that KIBS are characterised by a large share of the workforce consisting of university graduates (in this they resemble health and education services). KIBS firms also have important roles for technical and other support workers, as we consider later.

While there are many similar issues across KIBS, it has long been customary to differentiate between two major categories of KIBS industries, often labelled P-KIBS and T-KIBS.

- P-KIBS include what are traditionally known as professional services such as: legal services; accounting, bookkeeping, and payroll services; management and other consulting services. The knowledge they focus on is typically concerned with organisational and administrative systems, and bodies of rules.

- T-KIBS are more focused on science and technology: such as engineering; computer services; technical testing services, etc. One important subsector is research and development (R&D) services, which is so unusual that we discuss it in Box 2 below.

Additionally, some recent studies suggest that KIBS dealing more with creativity and cultural knowledge should be considered as C-KIBS: examples include advertising, marketing and market research, and public opinion polling; translation and

interpretation services; industrial, product and service design; architectural services (which combine technical and cultural knowledge and creativity).

Box 2. Research and Development (R&D) Services

The R&D services industry is an important KIBS subsector but is in many respects different from most other KIBS. Its statistical classification is Division 72 in Europe's NACE classification. (In the North American NAICS classification it is code 5417). Note that this does NOT include market research and opinion polling (NACE 73.2, NAICS 541910) In NACE there are subdivisions between natural science and engineering R&D – and biotechnology as a discrete part of this – and social sciences and humanities R&D. NAICS also pulls out nanotechnology for special attention. We suspect that some activities pursued in areas such as Artificial Intelligence (AI) might be functioning in similar ways to those in other areas of strategic and rapidly advancing science and technology (S&T), but these will often be in the national statistical accounts as computer services or software businesses.

Much of the R&D services industry is involved in creating new scientific or technological knowledge. Perhaps because of the need for equipment, laboratories, and similar facilities, firms in this subsector tend to be, on average, larger than those in other KIBS subsectors. Two other features mark them out. First, unlike other KIBS subsectors in that, in some countries, the official statistics feature a number of what are effectively government-run research establishments. Public research institutions and government laboratories enter into the data because the industrial classification system is based on the activities and products of industries and is not primarily concerned with matters of ownership or funding. Second, not all R&D services firms are primarily working on providing solutions to clients who present them with problems. Some R&D service firms certainly do provide contract research services. The pharmaceutical industry is a major user of certain services, for example clinical trials are provided by what it terms "Contract Research Organisations". Other contract-oriented R&D services firms address a wide range of topics, such as determining the best metallic alloys or ceramics to use in specific vehicle designs, for instance, or the principles around which energy-efficient buildings can be constructed (and in the case of social science R&D services, assessing the impact of different policy interventions). In such cases, the client poses a question for which R&D is required. However, an important group of R&D services firms are more proactive: some or all of their effort is put into R&D to create Intellectual Property (IP) that can be applied in the economy. They may be funded by venture capital or similar sources to develop IP, for example in application of genomics to allow for new diagnostic instruments, therapeutic methods, and the like. Other areas of strategic research such as nanotechnology and artificial Intelligence, and of challenges such as remediation of waste and containment of biohazards, also attract such KIBS. Some are what are referred to as "tech firms". They often originate as spin-offs from universities or other start-ups.

Rather than starting their R&D process in response to a request from a client, the key activities of such firms begin with their recognising that they can develop knowledge that will provide opportunities to create valuable innovations. They may sell on their IP for other to exploit or move on to becoming manufacturers of these innovations themselves (ultimately, perhaps, moving away from being KIBS, see Lee *et al*., 2020). Many KIBS businesses will undertake internal R&D, but those who specialise in R&D contract services and in the more proactive search for commercialisable IP have this as their core function.

Source: Own elaboration.

Table 1 summarises this classification, but it should not be understood too rigidly. Most KIBS include a mixture of all three types of knowledge – professional, scientific, and cultural. The point is that KIBS will tend to specialise in at least one of these. The mixture of knowledge types varies over time – not least as technology is applied

in various fields of professional and creative activity, and as environmental challenges are more obviously bound up with all sorts of other business problems and opportunities.

Table 1. Three Types of KIBS, their Sectors and Knowledge

Section	P-KIBS	T-KIBS	C-KIBS
Sectors	• Legal services. • Accounting, bookkeeping, and payroll services. • Management and other consulting services.	• Architectural and engineering services (though architecture may have a large share of C-KIBS activities). • Computer services for business uses. • Research and development (R&D) services. • Technical testing services.	• Advertising, marketing, and market research services (including opinion polling, etc.). • Design services (often put into the A&E category in official data series). • Translation and interpretation services.
Core Knowledge	Knowledge of administrative systems, of organisational structures, business, and economics. Some firms acquire specialist knowledge of related technical areas, for example knowledge of computer and digital applications is important for many KIBS, Intellectual Property (IP) lawyers may specialise in particular technologies, etc.	Knowledge of sciences (e.g., ecology, life sciences, quantum physics) and technologies (e.g., information systems, new materials).	Knowledge of creative practices and how to facilitate these; knowledge of cultural trends and sensitivities (e.g., market demands and social groups).
Complementary Knowledge (examples)	Understanding of applications of Information Technology to support professional work processes. Sensitivity concerning cultural differences across diverse areas of operation and among staff from different backgrounds.	Sensitivity concerning cultural differences across diverse areas of operation and among staff from different backgrounds. Awareness of aesthetic and ergonomic aspects of technologies. Knowledge of regulatory and professional processes governing areas of practice.	Understanding of applications of Information Technology, and other technologies, that can support creative work and associated processes (e.g., storage, display, marketing). Knowledge of cultural and regulatory circumstances affecting creative activity in different contexts.

Source: Own elaboration.

Most KIBS sectors feature a higher share of small firms and establishments than is the case for manufacturing and some other service industries; they typically feature only a few large firms, and many smaller and even micro-businesses. Some of the large KIBS firms are transnational firms, which often service large clients (and whose overseas expansion may have initially followed that of particular-clients). For

example, there are the "Big 4" accountancy firms, and well-known names in consultancy, engineering, computer and information services. Such large businesses are able to rapidly transfer knowledge across branches in several countries (and sometimes use franchises and professional affiliations for knowledge transfer). Many countries and some regions feature KIBS firms that serve national or regional markets, and in some cases, these are expanding into more local markets. Nevertheless, small firms continue to play an important role, some of them excelling at linkages with local markets (trust is an important issue in most KIBS-client relationships), some of them pioneering applications of new knowledge (e.g., in cybersecurity, biomedicine, ecosystem analysis, etc.).

KIBS – and especially the larger KIBS firms – tend to cluster in large metropolitan centres. An ongoing concern of economic geographers and regional policymakers has been those peripheral areas, already suffering from regional disadvantage, may find it harder to access quality business services. However, the great majority of KIBS, in most sectors, are highly local businesses. There are some small KIBS who have unique knowledge bases that they can deploy in national and even world markets – such firms may well experience rapid growth, although some find niches that allow their professionals to provide their services while avoiding what they consider to be the management burdens associated with scaling up. But these are exceptional cases. Most small KIBS – which are very often form the bulk of KIBS industry - compete on the basis of local knowledge, and local networks where they have established good reputations and built strong relationships of trust (in which face-to-face contact may be important).

This last point brings us to the nature of KIBS-client interactions, and of the specific services provided. The service produced by a KIBS firm is generally quite unlike a mass-produced (or even small batch) physical good. Some of the services provided by KIBS are one-off, developed very much around a specific client and its unique problems; some other services are highly tailored to the requirements of the client (though there may be a common core service on top of which variants are articulated, and/or a set of service modules which can be combined in different ways); and some services are much more routine ones for the KIBS supplier, who merely has to access information about the client's situation and enter this into a standard template, or process it through a standard set of algorithms. The service is specified, developed, and delivered through a process, involving several steps, in the course of which there will be exchanges of information between KIBS and client over a succession of

"touchpoints". These exchanges are liable to be more intensive when the services are more highly customised to the client, and less a matter of routine. Despite advances in telecommunications, many KIBS activities – especially non-routine ones – still require face-to-face contact for at least some of the interaction. This is believed to be a major reason for KIBS firms to often cluster near to where their clients operate. Most of the current regional development strategies that include smart manufacturing as a priority, also involve developing a strong KIBS sector (De Propis and Bailey, 2020). T-KIBS in particular support the technical elements of the digitalisation of industry, most obviously computer and related services. However, the innovation-supporting roles of KIBS are not limited to their enabling change in the manufacturing sector. KIBS can be providers of innovation, especially that connected with ICT, in the service sector (where inputs on design, on marketing, and on business strategy more broadly will all be significant). KIBS themselves may benefit from innovative inputs from other KIBS (Cabigiosu, 2019), and it is worth noting that KIBS are among the industries liable to be affected by applications of digital technology, with impacts on professional as well as more routine roles. Here communications technologies may be used to restructure KIBS-client relationships, while AI applications may augment professional expertise (not least by automating some of the tasks undertaken by professionals).

The changing occupational structure of KIBS suggests some implications for the future of employment in this sector. There are long-term trends in the ratio of professional to support staff within KIBS, for example, resulting in fewer support staff per professional. Miles *et al*. (2019) attribute these to the uptake of earlier generations of computer-communications (for example, word processing and document management systems). New generations and applications of technology are liable to underpin a wide range of major transformations affecting professional and support roles in KIBS (see especially Susskind and Susskind, 2015).

KIBS will have to rethink the different professional roles, occupations, and skills needed to make effective use of the increasing opportunities offered by the new technologies. While attention to KIBS' high-skill employment has usually centred on their university graduate employment, it is misleading to assume that this is the only relevant category. Firms' ability to apply knowledge and technologies depends on both their high-skilled and medium-skilled workers. Along these lines, Cedefop (2014) showed that in countries with strong apprenticeship systems, highly skilled employees are complemented by medium skilled technical workers: this is believed

to substantially enhance a country's productivity and innovation capacity. The VET workforce[3] is key in the deployment of Industry 4.0 and ICT (Spöttl and Windelband, 2021). Indeed, many key support functions, commonly associated with vocational education, are carried out by technical staff in areas such as design, product development, and improvement of production processes (Tether *et al*., 2005). Some of these jobs may be particularly impacted by the new technologies, but whether this means an erosion of employment, or an upgrading of the tasks undertaken, and skills required – or a mixture of the two – is liable to vary across sectors and firms of different sizes and organisational structures. In any case, for policy maker the challenge is boost complementarity between "worker of knowledge", both technical staff and graduate from universities.

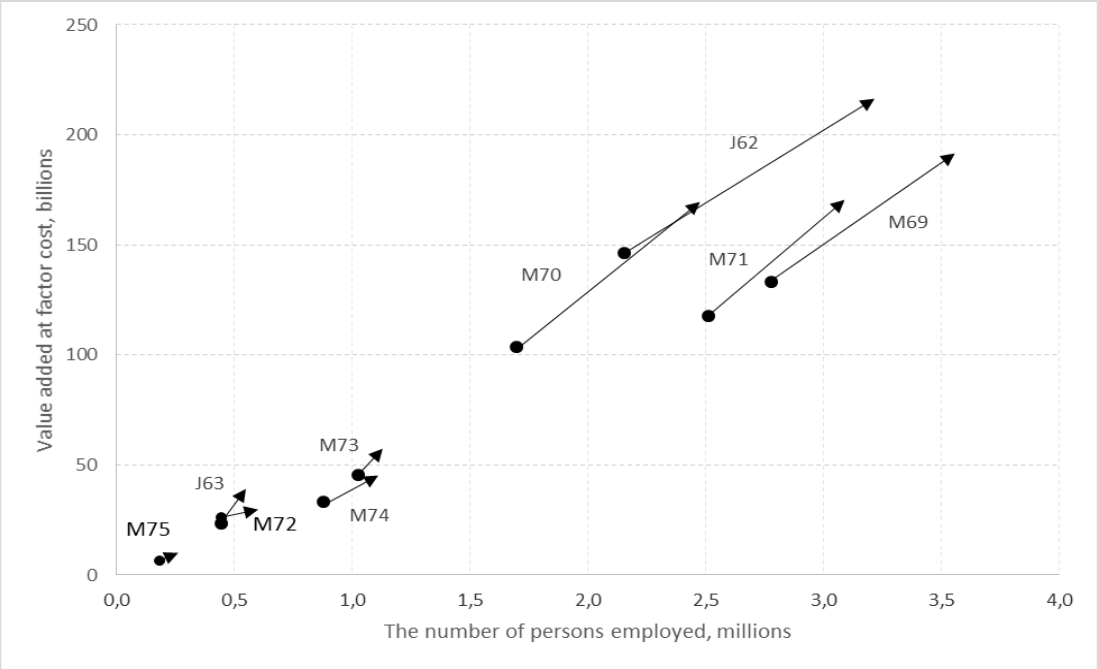
2.2. Roles of KIBS in economic activity

KIBS help their clients deal with a complex and changing world, where businesses (and other organizations) require new knowledge for changing environments and evolving technological challenges and opportunities. This has meant a growth in KIBS' share of employment and output in most advanced economies, to the extent that together, KIBS represent an important share of employment and output. See Figure 1 below. Their rapid growth was interrupted briefly in the wake of the financial crisis in 2008 but rebounded until the pandemic hit economies in 2020.

The various KIBS industries in the EU over almost all display growth in both dimensions, and we can see that computer-related activities are relatively large, as are legal and accountancy services (the two are composited in these data); architecture/engineering and consultancy are also rather large sectors; in contrast, R&D and veterinary services are rather small, in terms of employment and value-added.

[3] The Vocational Education and Training (VET) workforce refers to those who have graduated through VET systems that have provided them with the skills, technical knowledge, and other workplace capabilities they may require in current and future employment circumstances. VET systems can often equip people with skills required for types of administrative and technical work that do not necessarily require a university qualification.

Figure 1. KIBS growth in Europe from 2005 (EU-27) to 2014 (EU-28)



J62 - Computer programming, consultancy, and related activities; J63 - Information service activities; M69 - Legal and accounting activities; M70 - Activities of head offices; management consultancy activities; M71 - Architectural and engineering activities; technical testing and analysis; M72 - Scientific research and development; M73 - Advertising and market research; M74 - Other professional, scientific and technical activities; M75 - Veterinary activities

Source: Miles *et al*., (2018), using data drawn from Eurostat.

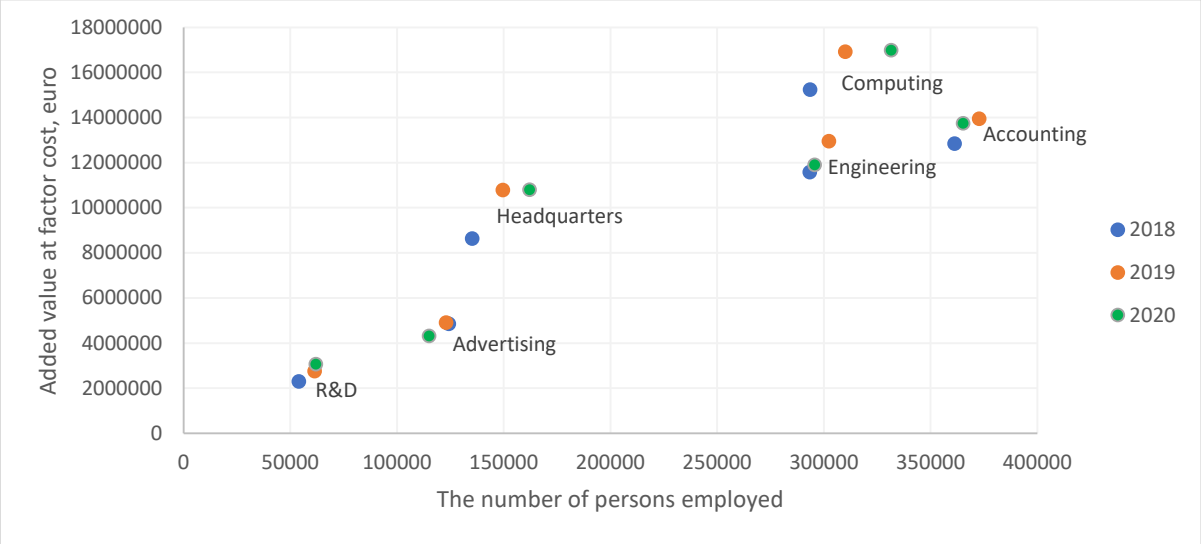
Examining data concerning Spain in recent years we can see that the relative shares of different KIBS sectors look fairly similar to those for the EU as a whole. Figure 2 shows that legal and accountancy services are largest in terms of employment - though computer services seem to be catching up, and architectural and engineering services are also substantial employers[4]. Computer services are in the lead where it comes to value-added. Management and advertising and market research services are both moderate in terms of both employment and value-added, and R&D services form a rather small subsector. Almost all of the various KIBS industries represented display growth in terms of both number of persons employed and value added at factor cost. The chief exception is Advertising and Market Research services. The poor performance of Advertising and Market Research seems to be a pattern shared in recent years across several other countries[5]. We speculate that it reflects the shift of

[4] See data in detail on annexes. Table A.1. KIBS in Spain from 2018 to 2020.

[5] This was reported to be the one KIBS sector that had not recovered from the COVID-19 pandemic – see Miles *et al*. (2021).

demand for such services to new media services (some of which will be captured within the computer services sector).

Figure 2. KIBS in Spain from 2018 to 2020



Source: Own elaborations based on National Statistics Institute of Spain. Available at: https://ine.es/jaxiT3/Datos.htm?t=36180 (accessed 10/04/2023).

The very fact that KIBS have grown in this way tell us that they are performing functions that other firms find useful. The conclusion is that they provide access to services that users require, and their services are liable to be more efficient/ timelier/ more up-to date/ and/or more advanced than the users could readily acquire from in-house staff to supply. They involve high-skill and fairly high-salary jobs and are attractive careers for university graduates in the areas in which they are located. These are all reasons for policy attention to the KIBS industries.

In providing this access to valued services, KIBS are applying their specialist knowledge. But they may also be providing their clients with knowledge. In the interchanges between KIBS and client information flows both ways – the KIBS firm learns about the client and the problems it confronts; and the client can thus learn about the issues at hand. The client can learn about their own industry, competitive environments, available technologies, changing regulations, labour force issues, and much more. They may even learn about their own performance, and how it can be bettered.

The growth in interest in KIBS is very closely associated with attention to the role of KIBS in innovation. The idea is that the sorts of learning outlined above can enable the users to reflect on what they are doing, and what they might do better – which could involve technological or organizational innovation, the development of new or improved products and/or the application of new or improved processes.

EU countries regularly survey innovation activities across the market economy using the CIS – Community Innovation Survey. The results of these surveys regularly show that KIBS industries themselves typically report high levels of introduction of product and process innovation. T-KIBS are among the most innovative of all sectors, and most KIBS report higher levels of innovation than is prevalent among the bulk of service industries (Miles *et al*, 2018). Furthermore, there is much evidence that they support innovative activities in their clients. A recent systematic literature review announced that concerning "innovation outcomes, it is well-known the use of KIBS in manufacturing innovation processes has a strong positive effect… KIBS companies contribute more to radical innovations rather than to incremental innovations in manufacturers" (Amancio *et al*., 2022).

Some KIBS are devoted to solving problems that clients face in relation to innovation. R&D services are obviously particularly oriented to this, but there are also KIBS focused on industrial and product design, on service design, on computer systems integration, and on changing markets and user demands; these can contribute to product, process and organisational forms of innovation. Some go beyond problem-solving, by supplying knowledge that can help clients spot new opportunities: consultancies may well work on this sort of positive approach.

Innovation is best thought of as a process, that can produce innovations as its outcome: ideally the process goes beyond just creating a new product or process, and on to the successful implementation, organisational adaptation, or marketing of these novel things. With this in mind, Miles (2023) relates KIBS inputs that can be made across the innovation process. Table 2 outlines these inputs in relation to steps (somewhat idealised) in the innovation process.

Table 2. KIBS and Innovation Processes

Activity	Examples
Strategic Research and Development: Creating new knowledge – and ideas of how this can be applied	As noted in Box 1, some R&D services undertake strategic research in emerging areas where fundamental science can be close to practical application – e.g., Artificial Intelligence, biomedicine, and nanotechnology. Businesses and public sector organisations working at such cutting-edge areas may use KIBS inputs, in strategic consultancy, competitive intelligence, and information services, to identify strategic opportunities and challenges in science and technology, in markets and regulatory processes, and the like, to help guide decisions about investment, collaborations, knowledge management and Intellectual Property (where specialist patent lawyers may be employed).
Applied research and development. and design, concerning new products and processes.	R&D service firms, and industrial design and engineering and testing services are engaged in the effort to create satisfactory new products and processes. Many of the matters featured in the cell above also apply here, with more attention to specific applications. For example, testing services can assess conformance with regulatory and other standards, marketing services can assess consumer responses to product design features, rapid prototyping and other engineering services can examine the detailed operation of equipment and of the industrial systems required for production at scale. Again, legal services may be involved in IP protection (including trademarks and the like).
Implementation of process and organisational innovations.	Firms engaging in industrial (or service) process innovation, and those introducing substantially new products or operating in substantially new markets may make use of computing services (including systems integration), design services, engineering services, and other KIBS specialising in, for example, human relations aspects of organisational change, supply chain management, and the like. While some large KIBS offer a wide suite of services, smaller firms will often be specialised with respect to the issues tackled, or the client sectors served. KIBS active in consulting, lobbying and public relations may play roles in shaping the policy agenda and collaboration of industrial actors when innovations require co-ordination of multiple standards, regulations, and intermediate suppliers (for example smart meters require action on all of these fronts).
New product launch and roll out.	These steps in an innovation process require evolution of relationships with intermediaries (e.g., retailers and other business partners) as well as final consumers of purchasers in B2B activities. KIBS may specialise in supporting interactions - this can be particularly important when an innovation requires numerous related elements to come into place (e.g., electric vehicles with automobile sales and leasing, car clubs and pooling schemes, electrical installations in garages, homes and public locations, etc.) Advertising and marketing services present new products to consumers, and inform the messaging that producers employ to promote use of the product. Public sector organizations may also use such services when seeking to raise public awareness or to influence patterns of behaviour.
Ongoing production, sales, and product development.	As products diffuse beyond early adopters (from whose experience much may often be learned) and as processes come into widespread use, there is often scope for incremental innovation in the product or process, introduction of new complementary goods and services, and understanding of new living patterns, business processes and organisational structures that can now be used more widely. KIBS may support benchmarking and sharing of knowledge concerning best practices and associated opportunities (this role is taken up by

	consultancies advising on digitalisation or green innovation, for example. Problems may also be associated with the uptake of innovations, for example where their use leads to negative externalities, and market research and related activities may be involved here.

Source: Miles (2023).

As Table 2 indicates, KIBS of many kinds can be active across the innovation process, in this way, the management of the innovation process becomes relevant (Seclen-Luna and Barrutia, 2019). Furthermore, this process takes place within what has come to be known as "innovation systems". Successful innovation requires activity from not only inventors, and suppliers, but also from education and training institutions, public authorities (in some cases), financial services, end-users and the trade services that intermediate between the supplier and the user, providers of inputs to production and of goods and services complementary to use, and so on. The interactions of these various stakeholders are critical to the innovation system's continuing vitality. KIBS are often described as being intermediaries, as helping to distribute knowledge around the innovation system by "bridging network gaps". They may seek to share information on a wide scale (e.g., advertising services), or provide a specific client with information and advice, accessed, and presented in line with that client's problems and capabilities. KIBS role as intermediaries is an important one, but they can be doing more than just packaging existing information for clients – they may help clients' creative processes, they can apply their expertise to client problems to generate novel solutions; they can, in short, assist the innovation processes within individual clients and more broadly across the innovation systems they are located in. These benefits are liable to be greatest when the clients themselves are able to absorb KIBS inputs in an effective way (their "absorption capacity" and "mutual learning", see Lundvall and Borras, 1997) can take place on both KIBS and client sides of the interaction.

2.3. KIBS response to address climate-energy challenges

KIBS can be major players in addressing climate and energy-related challenges. One set of challenges concerns adapting to climate change. Recent years have seen numerous extreme weather events, such as heatwaves and droughts, unusually strong winds and flooding, and the like. KIBS themselves may be affected by such conditions, but in general they will be much less affected than sectors like agriculture, forestry, construction, emergency services and transport. Some KIBS can provide

support to organizations whose activity and locations render them more susceptible to these growing threats.

In contrast, a second set of challenges require more proactive responses: efforts specially to reduce greenhouse gas emissions that contribute to climate change, mainly through energy efficiency and shifts away from fossil fuels and towards renewable energy.[6] There is a little research on KIBS' own efforts to become more sustainable, although there is some attention in trade papers to firms that seek to reduce the carbon footprint of their travel activities (consultants have a reputation for high level of air travel). Many established KIBS have become active in the field of ESG assessment and are inevitably led to examine their own performance here.[7] One study of digital KIBS reported a great number of initiatives being undertaken by the leading businesses here – some of whom rack up high levels of energy use through the substantial computer and server networks that they operate (Belousova *et al*., 2022). These are not, in the main, so-called "green" KIBS - they are leading (and mainly transnational) businesses that are committed to achieving higher levels of sustainability, which does inspire hope that they can contribute some of this commitment to their clients.

KIBS can support individual clients in transitions to greater sustainability, in response to emerging client demands - but they can also take more proactive positions by alerting clients to the requirements (and opportunities) implied by the process of transition toward sustainable economies. This transition requires major changes in production and consumption, giving rise to novel business problems across the economy. KIBS main role is helping organizations solve problems, and they will need to develop capabilities to provide this support. Some KIBS may find niches that are counterproductive, supporting recalcitrant businesses to "greenwash" their practices rather than effect real change. (Some even collude in obstructing transitions by, for example, Public Relations and advertising tactics such as those used for years to prop

[6] It should not be forgotten, however, that some greenhouse gases are released by other industrial processes – and service activities. For example, some anaesthetics used in modern medicine are potent greenhouse gases, that can contribute substantially to the impacts of modern hospitals. See Vollmer *et al*. (2015).

[7] ESG – environmental, social and governance aspects of business: frameworks have been established to rate firms' performance across a spectrum of indicators of these three features of business practice, and have become influential in the investment decisions of many financial institutions. A study of ESG rating agencies is Escrig-Olmedo *et al*. (2019).

up the cigarette industry, by legal action to undermine regulatory measures, and the like)[8]. But many more KIBS are engaging seriously with the transitions.

Innovation systems are changing, and KIBS practice will evolve alongside these changes – and may even help establish the directions they take. KIBS as contributing to policy analysis and even lobbying aimed at supporting governments in developing and implementing the ecological agenda and instruments that are required to provide businesses (and consumers) with the regulations, signals and roadmaps that promote informed decisions and consistent trajectories of change.

Already numerous KIBS specialize in such areas as sustainability consulting, "green" investment and marketing, energy auditing and environmental impact assessment, and much more. The modern environmental services sector goes well beyond traditional waste management and landscaping activities, to supply much knowledge-intensive inputs to clients across the economy. But KIBS that were not established with a sustainability mission are building "green" capabilities into their portfolio of services. To provide a low-tech example –engineering services can play substantial roles in hotels' moving to more energy-efficient heating systems (Pace and Miles, 2020).

The sociotechnical transition to an energy-efficient, low-carbon economy can be seen itself as a process of innovation. A body of literature on "transition management" (transition theory) has emerged to elaborate a systematic perspective on this process, seeing it as involving the co-evolution of social, economic, political, and scientific-technological subsystems (see, Cooke, 2011; Geels, 2019). KIBS can play transformative roles in developing green Information Technologies, for example, bringing actors with different resources and interests together. Thus, in the Gothenburg region of Sweden, KIBS are at the heart of activities taking place on a multi-level geographical scale where contact and clients are essential for knowledge transfer in developing green ITs (Xu and Ström, 2016).

Different types of actors play key roles in the development and diffusion of new environmental technologies and solutions. One type of actor is the innovation intermediary or diffusion intermediaries (e.g., project developers, consultants or

[8] There has been a less than honourable history of lawyers, accountants and others assisting fraudulent and criminal activity, and by more or less open practices of "wealth concealment" by use of offshore tax havens and the like. Some experts value their short-term gain over collective well-being and global sustainability. Professional organisation and training have a vital role to play in limiting such unsustainable practices, enabling KIBS to drive, or at least lubricate, the transformation of innovation systems.

other KIBS). Intermediaries can help adopters evaluate and select among technologies and suppliers, and guide them through institutional problems, for example related to support systems and permit applications. Adopters of, for example, renewable energy technologies face a diverse set of actors - and system-level challenges, and intermediaries can help them handle some of these problems (Mignon, 2017). Most attention to intermediaries' roles focuses either on innovation intermediaries' contributions to technology and product development rather than adoption and diffusion issues. One commentator has discussed "transition intermediaries", ones that contribute to sustainability transitions by linking actors and activities. (Kivimaa *et al*., 2019).

One conclusion from a study of diffusion intermediaries (looking at 14 solar and wind power companies in Sweden), is that such KIBS should formulate their business models more in terms of a brokerage role, rather than focusing on general service provision (Aspeteg and Bergek, 2020). They can capitalise on this value proposition as compared to the offerings of technology suppliers and other actors. In addition, policy makers could find diffusion intermediaries with their accumulated knowledge, experience, and contacts, to make them valuable collaboration partners. In particular, diffusion intermediaries can reach many different stakeholders; they can therefore play an important role in legitimizing and spreading new technologies, methods, and standards as well as implementing new regulations. In this context, policy makers might consider the important contributions that diffusion intermediaries create through brokering, not only for individual customers and projects, but also for the diffusion process as a whole.

Innovation systems involve flows of knowledge, and transitions require new flows and new knowledge. One important way of accessing relevant knowledge, capabilities, and other resources, is through collaboration - with suppliers, customers, universities or KIBS. This can reduce the risks or costs that businesses face, and enhance their competitive advantage (Niesten and Jolink, 2020). A study that actually focused on environmental innovation and cooperation employed data from the Spanish Technological Innovation Panel (PITEC-2015) with 12,844 observations was performed by De Marchi *et al*. (2022) who reported positive results emerging from combination of the knowledge and capabilities of suppliers, customers, KIBS, universities or even competitors, aiming to successfully innovate so as to reduce environmental impacts. This is not to say that introducing green innovation is an easy

task; such innovations are often characterised by even higher levels of complexity than other types of innovations.

One of the main visions of a sustainable transition involves a shift to the "Circular Economy" (CE) paradigm, where goods and services are produced and used with as little waste as possible – through recycling, re-use, sharing, leasing and other practices.[9] This requires complex innovation processes within firms, value chain and the whole economic ecosystems. Circular Oriented Innovation (COI) has been defined as "the coordinated activities that integrate CE goals, principles and recovery strategies into technical and market-based innovations, such that the circular products and services that are brought to market purposively maintain product integrity and value capture potential across the full life-cycle" (Brown *et al*., 2019, p. 3). According to these authors, the COI process interacts with all levels of business strategy; it involves many different types of innovations (products, services, process, business models, system innovations); and it also engages many different stakeholders (internal to the firms and value chains and external, e.g., consultancies and other KIBS, public research institutions, etc.). Studies have demonstrated that there are numerous barriers to circular business models and circular oriented innovation (Diaz *et al*., 2019); some can be overcome through collaboration among different agents in order to afford the increasingly complex and systemic changes entailed by COI.

One study that considers the role of consulting or KIBS firms in supporting clients who want to adopt COI examined a number of these firms in Spain (Pereira and Vence, 2021). The qualitative research showed the firms to offer a wide range of services aimed at implementing COI and the CE principles. Another important function is the evaluation, optimisation and, eventually certification of products and services. To provide this service, the consultancy firms applied internationally recognized methodologies, such as Life Cycle Assessment (LCA), Life Cycle Cost (LCC), as well as 'ad-hoc' methodologies developed in the course of projects. Such tools are used to evaluate products, services, and value chain environmental impacts, and to identify hotspots and opportunities for the implementation of COI. The study´s main findings are:

[9] It remains to be seen how far these new practices will depend upon the development and stabilisation of platforms (to support sharing, re-use and the like), and if this is the case, whether these platforms arise from within established businesses or come from disruptive outsiders; are "home-grown" or supplied by transnational companies; and how far singe dominant platforms take on the main share of the activity. Public policy will need to consider issues of competition and equity with respect to platforms. A Discussion of "green platforms" is Pyka and Stöbe (2023).

- Consultants perform key functions for the clients' innovation processes by transferring specialized knowledge on the multiple facets of the CE. Consultancies rely not only on their own knowledge, but also on their capacity to bring together knowledge from different agents in the system; one way of doing this is through active participation in R&D networks and collaborative projects.

- Organisations developing COI move fundamentally for economic reasons: they are substantially driven by search for cost reduction, as well as by demands from supply chains and market niches, by top management's environmental conviction, and by seeking to improve brand reputation.

- External barriers are substantial, with much development required in the business environment (lack of knowledge, immature market, value chain organisation challenges). The legal framework could be a major trigger for eco-innovation, though it remains underdeveloped for circular innovations.

- Internal barriers are also important (and interrelated), including a lack of knowledge about the CE and its potential business opportunities; decision making (especially in SMEs) is predominantly "short-sighted", with uncertainty as to financial structures and circumstances proving a problem.

These results are indicative rather than definitive: they come from a small number of firms who are in the vanguard of what remains a very early stage in companies' transition towards a CE; few organisations have adopted disruptive changes. Still, the results are relevant for developing policies targeted at the various obstacles to transition. KIBS could play an increasingly important role in the diffusion of the new CE paradigm and in fostering COI among their clients.

Much remains to be further examined concerning KIBS' roles in sustainability transitions; this is not surprising given the rapid evolution of thinking and practice in the field. What is clear is that KIBS' well-evidenced support for client innovation, and their roles in innovation processes and systems more widely, means that they have the potential to contribute substantially to the process of systemic change. KIBS may need to develop more capabilities here, and potential clients may well need to be more aware of these capabilities. Relevant policies can of course involve established methods of training, awareness-raising, and competence building (with a much "greener" orientation). But there will also be scope for new initiatives that can help

build networks and collaborations, with, for example, living laboratory and knowledge hub -type measures, demonstrator projects, and exchange of experience beyond national borders.

3. International perspectives on KIBS

3.1. Perspectives on KIBS from international organizations

The KIBS terminology emerged in the mid-1980s, with the first effort at providing a clear definition being made only in 1985 in a report to the European Commission's EIMS (European Innovation Monitoring System) that was only made available online and never published in hard copy. This way of thinking about a set of advanced B2B service industries took off and has generated a good deal of interest from innovation researchers in particular (as charted by Miles *et al*., 2018). In the TSER (Targeted Socio-Economic Research) programme, a predecessor to Framework Programmes and Horizon Europe at the turn of the century, two multinational collaborative projects, KISINN (Wood, 2006) and especially SI4S ("Services in Innovation, Innovation in Services", see Boden and Miles (2000) devoted substantial effort to understanding these industries and their role in innovation. These projects, bringing together researchers from across Europe, helped orient not only academic, but also policy and statistical work more widely. Various studies of the KIBS role in innovation systems have followed under EU auspices. However, the main focus of most recent work has been on the problems KIBS face in the Internal Market, as discussed elsewhere. Other work has considered specific sets of KIBS, such as IT services, professional services, and those in the creative industries – with different policy concerns (e.g., competition and monopoly power, entry barriers and qualifications, Intellectual Property, respectively).

The uptake of the KIBS focus in the United States was relatively limited, though some exceptional analysis of management issues has been accomplished there; Canada seems to have been more receptive. Over the last two decades attention to KIBS has been apparent in Central and Eastern Europe, and in many Asian and Latin American countries. Much of this attention is aimed at supporting the development of industrialising economies, cities that are on the rise, and (especially in wealthier countries) peripheral regions.

The attention to issues of regional development may be one reason for KIBS as a whole having been relatively rarely examined by international organisations. The United Nations Industrial Development Organization (UNIDO) might have been expected to have taken the issue up, but if so, this is not prominent in their publications. The International Labour Organization (ILO) has addressed KIBS in the

context of environmental and related topics, where the role of KIBS in supporting environmental management and impact assessment has been explored. This role has been examined in studies of the textile and garment sectors of a series of South Asian countries, where it is shown to be crucial -but hindered by relatively weak development of local KIBS and inadequate knowledge transfer to businesses (along with limited implementation of regulations by government authorities). These results are guiding formation of policies and ILO strategies for promoting a just transition that can engage small and medium-sized enterprises in these (and ultimately other) sectors.

Concerning more economically advanced countries, the Organization for Economic Co-operation and Development (OECD) has paid attention to KISA (knowledge-intensive services activities - see Box 1), which include not only these activities within KIBS, but also those insourced within other sectors of the economy. The work here included several studies of specific activities (e.g., software) and of KISA involving public and social services (e.g., care of the elderly); the common feature of much of this work was calling for improved documentation and classification of such activities, whose role in terms of economic and policy performance was seen as highly favourable. OECD was instrumental in highlighting the innovation activities in services such as software, in the 1990s, at a time when services had been generally considered to be innovation laggards – and rarely instrumental in effecting innovation for themselves, let alone their clients. More recent work recognises the significance of KIBS (and some other business services: "Because of the strong forward linkages with other sector…access to an efficient business sector is essential for economy-wide productivity growth" (OECD, 2007, p.9). In line with many OECD policy recommendations of the day, this report argued that:

- To realise the full potential of the sector, the regulatory framework should not be overly restrictive (regulations affecting KIBS should be streamlined).

- Common industry-wide standards can be beneficial (standards can benefit service suppliers and clients alike).

- The IPR regime should favour access to knowledge (balance incentives to innovate with sharing of knowledge - enhance the economic use of IPR, for example through good licensing practices, cross-licensing and patent pools).

- Efficient reporting of intellectual assets (reliable information on intangible and intellectual assets should be generated and made available).

- Another theme apparent in OECD work has been the impact of outsourcing on professional work; and current concerns about impacts of Artificial Intelligence also include this specific topic.

3.2. Perspectives on KIBS from developed countries

Despite this report is based on KIBS experiences from developed countries, most explicit and sustained attention to KIBS came from Finland (more recently they have veered more to design and/or services more generally I believe) though there has been some attention in the UK and a few other countries. Often national-level policy concern seems to focus on skills issues (and occasionally on working conditions), and on international trade (depending on ministry issuing ideas).

But a major issue is that policy focus is most commonly on subsets of KIBS – digital (where it gets mixed up with interest in other digital services like telecoms and media), professional services (may get mixed in with policy on financial services), and more creative services (design etc -then gets drawn into discussions of other creative economy issues.) Each has its own dynamics – though similar policy issues arise, they get very different prominence in each case– acute skill shortages; regulation (and in the case of financial services issues of quality, collusion etc), IPR. There are also "geographical" questions – issues of access in different regions, of concentration in a few urban centres (contributing to local wealth but also inflated housing costs), etc.

From the user industries across Europe point of view, the largest direct users of KIBS are not manufacturing, but market services industries - in particular, financial, and trade-related ones. Thus, more targeted innovation policy action may be developed aimed at supporting the innovative development of these industries consuming different types of KIBS (Chichkanov, 2022).

The empirical evidence also shows that the use of KIBS comes from rural and small firms. That is, KIBS are well valued by firms that face more (geographic) hurdles to access them, and by firms which target their KIBS interactions in strategic ways and which rely on more technical knowledge (Doloreux *et al.*, 2023).

3.3. Perspectives on KIBS from emerging and/or developing countries

A main conclusion of the ILO work on KIBS' role in sustainability transitions in East Asia is that countries there are very dependent on transnational KIBS for support for environmental management, although in several countries local KIBS are active here; there is generally insufficient enforcement of regulations that are driving business use of KIBS, so quality of service varies. There is some work on the development of major KIBS in consulting, software and the like in India and Chine, R&D services in China too: much English-language literature is about the "threat" to Western service providers.

Computer services and IT services more generally – including application development, systems engineering, IT infrastructure services, IT consulting, manufacturing engineering and software development – offer great opportunities for many countries (Banco Mundial, 2012). In 2010 the World Bank estimated that such services often remain underdeveloped, particularly in emerging countries. However, there are several success stories, and India and China feature well-regarded software companies. Several smaller countries are also active in specific industries here, for example, Vietnam has one of the most dynamic IT sectors, and its government has actively helped its rapid development. The government has invested with the aim of modernizing the IT industry, and software is one of the most subsidized industries in Vietnam. Among the policy instruments implemented to support the development of the IT services industry, have been:

- Some kind of corporate tax exemption (e.g., on profits) for business obtained from scientific research and technological development, products made during trial production, and products made with the technology applied for the first time in Vietnam.

- Protection of intellectual property rights for computer programs and data collection[10], as well as layout designs for semiconductors and integrated circuits.

- Promotion of IT capacities in universities and professional vocational training.

[10] This could be implementation of regulations, not just passing laws, but providing resources for regulation; and or it could be support for businesses seeking to acquire IP and capture value from this (e.g., awareness, training, simplification of procedures, reduction in cost, support services in IP law, etc.).

- Creation of infrastructures (e.g., both broadband infrastructure like cables, wireless, masts, etc., and facilities such as buildings, industrial parks, and even networks and associations of business), the link between government agencies, IT parks and startups.

East Asian countries are often seen as rapidly progressing with their industrialisation, which is not the case for all developing regions. But even economies where natural resources represent major axes of production, there are opportunities and challenges associated with greater knowledge intensity of operations, as is pointed out by the Economic Commission for Latin American and the Caribbean (Marin and Stubrin, 2015). The scope for developing knowledge-intensive providers linked to natural resources is attracting attention from researchers and policy makers. Part of this scope involves knowledge-intensive services. For example, a study of Chilean wineries found that some 80% reported using mostly knowledge-intensive services (38 different types are mentioned) across five segments of their value chain. The service-intensive character of the value chain may help to explain how Chile developed into the world's fourth largest exporter (Farinelli *et al*., 2017).

However, the International Development Bank (IDB) has declared that traditionally public programs for boosting innovation in Latin American and the Caribbean (LAC) are biased to manufacturing and extractive industries; few public programs are oriented to innovation in services - including KIBS. In addition, there is little evidence - especially in LAC, but generally across developing economies - on the effects that public policies to promote innovation have on innovation and productivity for service companies. The study argues that what evidence there is does indicate that public policies have positive effects on service companies' innovative effort, co-creation of innovations and productivity. However, it is recognized that innovation systems are still incipient in many countries of the region (with the main exceptions being Brazil, Chile, Colombia, and Mexico) (see Aboal *et al*., 2015). LAC countries have yet to design policies that take a systemic approach, including support for the training of human resources, support for research, reform of regulatory frameworks or institutional strengthening; instead, the policy strategy tends to be based almost exclusively on the use of technological funds in order to formulate services innovation more adequately, considering intangible aspects of such innovation, such as organizational design, marketing components, IT-related services, and other knowledge-intensive services. We suggest that some sectoral specific "vertical" programs may also be necessary to favour strategic industries which have particular

growth potential, such as tourism, cultural services or KIBS (several countries seem to have strong software and bioscience capabilities, for instance), in some countries. There is growing attention to the role of KIBS in Latin American countries, and one recent study shows that the geographical location of KIBS can be an important element of emerging innovation systems. The decision of KIBS firms to locate themselves in proximity to other such are becoming a more important issue when technology-based and knowledge-intensive services are scarcer, as in innovation systems in emerging countries with limited science, technology, and innovation capabilities. Here, the value of those services that are available becomes higher[11]. Therefore, it is important for regional and local governments to consider incorporating KIBS into the business ecosystem of manufacturing industries when designing industrial policies (Seclen-Luna and Moya-Fernández, 2020)[12].

[11] The limited availability of these services in many locations means that these locations are disadvantaged. Cost of accessing KIBS may be higher, and increases in availability may have greater pay-offs. But potential users may be unaware of KIBS´ potential and inexperienced in acquiring relevant services or some potential users may have developed other ways of securing such services, via internal provision (recruitment, etc.) or from higher education, international partners, and so on. Thus, there is ambiguity.

[12] KIBS are often locating in particular locations that may become particularly attractive ones for other businesses and where virtuous circles may be set up. But this can run risks of uneven development, high living costs, etc.

4. General trends of KIBS in the Basque economy

As a starting point for analysis of the current context of the Basque Country, we have considered the "Plan of Industrial Development and Internationalization 2021-2024" (Gobierno Vasco, 2021) and the "Competitiveness Report of the Basque Country 2022" (Orkestra, 2022). The first document highlights the vision and commitment of the Basque government to maintaining and renovating the competitiveness of their region. This document shows three main axes and levers for the renewal of competitiveness:

- Support for companies in difficulties, and those in disadvantaged areas. To this end, it focuses on supporting companies in difficulties occasioned by external factors such as financial crises and rapid change in prices or technologies and promoting areas requiring reindustrialization.

- Transformation and renewal of competitiveness. This involves the search for new industrial opportunities resulting from the energy-climate, digital, and demographic-social transition, and presumably acting strategically on the results of such searches.

- A further set of competitiveness levers that are articulated through such "horizontally" instruments as: support for diversification, consolidation, and growth; promotion of cooperation; international positioning (i.e., support to exports and trade shows); reinforcement and adaptation of people's professional skills; support for technology and innovation; promotion of innovative entrepreneurship (including spin-off); infrastructure development.

Although the broad guidelines for competitiveness are articulated, the role of the KIBS as a vector of competitiveness in the region is not highlighted, or even specified, in this Plan. The policies will, of course, apply to KIBS, but the role of KIBS in realising the policies is not explored.

The Competitiveness report focuses on analysing two critical dimensions of the structural context: on the one hand, its productive structure and, on the other, the population's demography and values. As for productive structure, analysis of the evolution of economic and technological activities in the Basque Country between the

periods 2012-2014 and 2017-2019 reveals several changes in the specialization of manufacturing activities and industry-related services:

- An increase in specialization has been observed in sectors related to advanced manufacturing or smart industry, such as the manufacturing of metal products, the manufacturing of machinery and equipment, and the manufacturing of computer, electronic, and optical products.

- However, there is also a decline in specialization in traditionally important manufacturing sectors, such as the manufacture of electrical material and equipment, metallurgy and the manufacture of iron and steel products, the manufacture of other transport materials, the manufacture of rubber and plastics, and coking plants and oil refining.

- An increase in specialization has been observed in sectors related to services important to the knowledge economy, such as research and development, architectural and engineering services, and other professional activities.

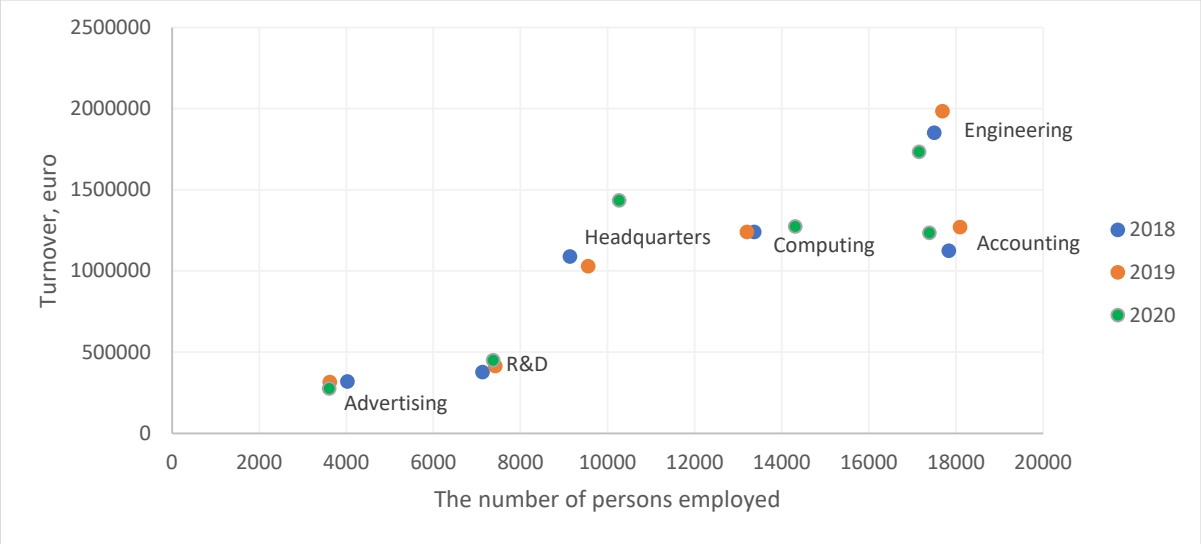
- Conversely, there has been a decline in some important services – those associated with marketing activities and the promotion of new management models, such as advertising and market research, information technology, legal activities, and financial services.

We can note that in this report the importance of KIBS for the knowledge economy is recognized; however, the policies to promote the KIBS industry are not specified, too.

As presented earlier for Spain as a whole (Figure 2), we can draw on data from Spain's National Statistics Institute information on trends on business turnover from 2018 to 2020 to examine KIBS in the Basque Country, many similar features are displayed by the Basque and Spanish data[13]. The largest sectors in terms of numbers employed are Legal and Accounting services (P-KIBS) and Architectural and Engineering services (mainly T-KIBS, but with elements of C-KIBS in architecture and design). Architectural and Engineering services are largest in terms of turnover. Advertising and Market Research services constitute the smallest set of KIBS in terms of both employment and turnover (Figure 3).

[13] See data in detail on annexes. Table A.2. KIBS in the Basque Country from 2018 to 2020.

Figure 3. KIBS in the Basque Country from 2018 to 2020



Source: Own elaborations based on National Statistics Institute of Spain. Available at: https://ine.es/jaxiT3/Tabla.htm?t=36188 (Accessed 10/04/2023).

Overall, it is observed that legal and accounting services, as along with architecture and engineering are the ones that contribute the most to employment in the KIBS sector. Additionally, in general terms, architecture and engineering services, and computing services are the most important KIBS in terms of turnover. This Figure shows that, in general, the KIBS sectors have fared well in recent years, despite the pandemic and its impacts on office work, travel, and face-to-face interactions. The one sector that appears to decline over this period, both in terms of employment and turnover, is Advertising and Market Research – this seems to be a pattern across several other countries, and speculatively it reflects the shift of demand here to new media services (some of which will be captured within the computer services sector).

In terms of turnover, the P-KIBS Legal and Accounting services and the T-KIBS subsector R&D services are the only cases with consistent upward trends, while only Architecture and Engineering and Advertising/Market research features lower levels in 2020 than in 2018. Management and head office services dropped slightly in 2019 (pandemic impact?) but rebounded in 2020. Considering trends in the number of employees, this latter sector shows a steady upward trend, however, while computing services displayed a small drop in 2019 and rebound in 2020. Several sectors appear to have had a peak in 2019: R&D services, legal and accounting services, together with management services. Architecture and engineering services and legal and accounting services, together with advertising and market research, show some drop

in numbers employed across 2018-2020. For example, legal and accounting services, fell from 25,9% in 2018 to 24,8% in 2020. Also, it is much bigger share of the workforce.

Comparing the Basque data with the figures for Spain as a whole, focusing on employment in KIBS, the size distribution of the KIBS subsectors looks very similar. The main difference is in the two smallest groups – R&D services seem relatively overrepresented in the Basque data, while Advertising and Market Research services are underrepresented. Thus, R&D services is some 11% of Basque KIBS employment, 5% of that for Spain as a whole in 2020; in contrast advertising comes in at 5% as compared to 9% respectively. In addition, in the Basque Country the average firm size (employment/number of firms in the sector) show that R&D services seem relatively overrepresented (19,1) followed by computing services (7,0), while in Spain as a whole in 2020, computing services seem relatively overrepresented (7,8) followed by R&D services (6,8). Thus, this data may be reflecting some policies-orientation to boosting KIBS.

4.1. Studies on KIBS in the Basque Country

Until recently, KIBS have rarely been the focus of attention in studies of the Basque Country. We examine these recent studies after a brief look at the Basque context. As we mentioned before, the Autonomous Community of the Basque Country is a region with a marked manufacturing nature, and with considerable internal territorial diversity. Urban environments specializing in the tertiary sector coexist with non-urban regions featuring concentrations of industrial activity, and with more rural environments linked to the agriculture sector.

Competitiveness strategies are promoted at the regional and urban level. At the level of the Basque Country, the Basque Government's 2021-2024 Industrial Development, and Internationalization Plan, sets out a strategic objective for more than 40% of GDP to derive from industry and advanced services. With this objective in mind, those areas with reindustrialization needs were identified, while measures are promoted to generate new capacities of the workforce with a view to effecting transformation and generating new opportunities around the green, digital, and demographic-social transitions.

At the municipal level, the governments of the three capital cities (Bilbao, Donostia, and Vitoria-Gasteiz) include a commitment to the KIBS in their respective urban

competitiveness strategies. In addition to identifying the type of KIBS to prioritize, they propose promotion of urban conditions that facilitate smart specialization. Such policies include the establishment of urban technology parks, efforts to attract larger companies (both those with and without headquarters abroad), upgrading of communication infrastructures, and the development of agglomeration economies through the generation of ecosystems of companies, entrepreneurs, universities, etc. In addition, the promotion of strategies for advanced manufacturing, industry 4.0 or the so-called territorial servitization effect, involves regional multilevel governance that includes representatives of cities, along with other regional stakeholders (Estensoro *et al*., 2022).

KIBS can play a leverage role in facilitating innovation and servitization[14] processes across the industrial and business fabric. This power of leverage justifies the efforts made in current industrial development policies to promote KIBS and their connections with the industrial fabric. As mentioned earlier, De Propis and Bailey (2020) report that most current regional development strategies that include smart manufacturing as a priority also involve the development of a strong KIBS sector. Thus, territories with a marked manufacturing character face, among others, the challenge of analysing and understanding the location patterns of KIBS that can help promote the territorial competitiveness, so as to identify conditions that allow the creation and development of relevant KIBS and connecting them with the broader productive fabric.

One study of the localization patterns of Basque KIBS, Estensoro *et al*. (2022) reports several interesting conclusions. KIBS were found to often be geographically concentrated and making use of the existence of technology parks. This clustering facilitates the advantages of agglomeration linked to specialization – exchange of information and knowledge of problems and opportunities, access to relevant personnel, collaboration of various kinds, for example. Important differences exist, however, between the localization patterns of different types of KIBS. T-KIBS (technological KIBS) tend to be located closer to manufacturing activity and seem to be able to prosper more easily in non-urban environments. Multilevel governance

[14] It is important to note that there are several different meanings, and ideas of servitization and tertiarisation vary quite a lot. Most banal - increasing the share of service sector activity within an economy. This used to be thought of as unproductive, or at least as damaging productivity growth - Baumol - now more often seen as depending upon the service activities that are expanding. The increasing the service work inputs into activities, e.g., the use of business services or employment of service professionals (good if it leads to better product quality or more effective production/delivery processes). Then, the adding on of service components and service products for sale or bundling, by non-service companies (Possible source of competitive advantage) or simply a greater emphasis on customer service from any type of organisation to service-dominant logic.

(including that for urban environments) is required for strategies that need not only to recognize the role of KIBS in territories' "smart specialization", but also to recognise the specificities of different types of KIBS.

Much of the interest in KIBS' location stems from concern that certain places may be disadvantaged due to lack of access to the services that these firms can supply. A second set of concerns involve Small and Medium-Sized enterprises (SMEs). SMEs often reported difficulties when it comes to accessing KIBS and other advanced services - Estensoro *et al*. (2022) discuss this, and for a Finnish study that focuses on policy issues here see Kuusisto and Kuusisto (2007). A common theme in such studies is that SMEs have had limited experience in using KIBS (and other external information sources, such as Universities), and often would benefit from support to raise their capabilities in this respect.

Seclen-Luna and Barrutia (2018), in their study based on 53 builders of machine tools from the Basque Country, evidenced that these manufacturers have a relationship with KIBS provides them innovation outcomes and promote their internationalisation processes. However, there are differences owing to the size of the firm. The challenges facing small companies to innovate owing to their scarcity of resources, could lead to an external capability development. Small manufacturers have a relationship with KIBS to compensate and fill the gaps in their knowledge and skills, while the largest ones reinforce their know-how since they carry it out internally. These authors conclude that the limitations due to their small size and their specialisation in a small market niche give a small machine-tool manufacturer few incentives to internationalise and generate new knowledge. Therefore, the small machine tool manufacturers need to enhance their absorptive capacity by increasing R&D investment, given the fact that the industry is beginning to incorporate more and more codified science-based knowledge. However, to improve its R&D capabilities, these companies not only need the efforts of local firms, but the government can also play a crucial role by considering the KIBS as agents of innovation in the framework of public policies.

Zubiaurre *et al*. (2022) looked at manufacturing businesses in the Basque Country and in Catalonia, with a particular interest in their internationalisation (their export orientation). These two regions constitute the traditional industrial heartlands of Spain, and they are two regions with long-standing great innovative dynamism (OECD, 2010 and 2011). KIBS and manufacturers were found to interrelate to a

higher extent when the technological intensity of manufacturing industries was at a higher level, but with maturity in the industry life cycle yet to be achieved. One interesting result supported the idea that business services themselves often internationalise through following (or being inspired by) their clients. Thus, they found that the greater the extent to which exporting manufacturers use KIBS, the more likely it is that their KIBS suppliers are to move into new foreign markets. The authors suggest that there can be a virtuous "innovation-internationalization" circle. They also suggest that the different policies implemented to promote exports in each of these regions play an important role in creating these trends. They argue that regional policy should be built from the existing strengths in services and aimed at supporting its specialization and international competitiveness. Traditional sectors can thus be "rejuvenated" by means of policies that support territorial servitization.

The role of service firms in the global economy is becoming more widely acknowledged. Some KIBS firms are already recognised to be important players in the global context. KIBS can support the internationalization of other firms, but the above study suggests that the internationalization of KIBS themselves is also an important topic to examine. One study that has this focus examined the internationalisation of C-KIBS based in the Basque Country (O'Higgins *et al*., 2022). Many of these C-KIBS do not take the traditional approach of targeting one or several geographic markets. Instead, they focus on "niche customers", regardless of their geographical location.

The researchers reported that these firms confront several sorts of barriers to internationalisation. They faced such barriers as limited access to information to assist their search for new market opportunities. Related to this were marketing barriers confronted when it comes to promoting and selling their services online. More generally, the tendency for human capital here to be more creativity- than business-oriented was seen to result in limited organizational and marketing capabilities. This suggests that policy makers should support the C-KIBS in building their relational capital, in both local and international markets. C-KIBS are of increasing economic and social impact, and export and other policies need to reflect their idiosyncrasies better. But given that C-KIBS are very heterogeneous, broad measures aimed at the sector as a whole may prove to be of limited use given the specificities of different firms. Some of the problems, nonetheless, will be shared with many other SMEs.

With a focus on skills and capabilities, Albizu *et al*. (2022) focused on KIBS occupations in Spain and the Basque Country in particular. They report similar levels of KIBS occupations in the workforce of the Basque Country and at the level of Spain as a whole (around 7%), University graduates are preponderant in KIBS – Spanish figures are 73% of P-KIBS workforce, 71% of T-KIBS, and 58% of C-KIBS. But vocationally trained workers constitute some 16% in P-KIBS, 19% in T-KIBS, and 23% in C-KIBS: quite substantial shares. Noting that CEDEFOP considered the Basque Country's VET system to be a model of excellence in Europe, and examining skill mismatches in the labour force, the authors argue that there is scope for more vocationally trained graduates to take on jobs that are currently mainly occupied by university graduates. In particular, this may apply to T-KIBS and workers with IT skills.

Box 1, above, discussed KIBS-like services being supplied by businesses that are not themselves members of KIBS sectors. Basañez *et al*. (2022) note that small manufacturing firms in the Basque Country can themselves offer some KIBS-type services; these may be somewhat standardised services, but they can make real and effective contributions to their clients.[15] These "hidden champions" innovate and enable innovation, through supplying advanced services. Like the specialised T-KIBS firms, they have technological capacity, based on practical experience (accumulated know-how) and sensitivity towards emerging technologies; many are effectively continuously engaged in R&D, and they know how to learn about and (where relevant) incorporate new technologies. Since the "hidden champions" can "play KIBS-type roles" for the SMEs in their environment, policymakers should pay attention to KIBS-type services, not only to those KIBS firms who are specialised in providing these services. On occasion, it may be that a supplier or agricultural, industrial, or IT equipment is well-placed to provide other businesses (and the public sector) with the services that such equipment is designed to produce.[16] Support concerning the ongoing digital revolution will need to come from various components of the regional innovation system, and "hidden champions" in manufacturing have

[15] The international experiences here involve manufacturers - and Universities - making testing facilities like wind tunnels available to other firms, for a price. But I also see firms making equipment for chemical analysis not just selling the equipment, but also providing analytic services, and similar "servitization" - another meaning, selling the service rather than the process technology approaches from specialised equipment manufacturers. This is different from the long-established equipment hire businesses that have their own statistical category.

[16] There is a danger that the equipment supplier will promote its own equipment when alternatives may be preferable, and that the client can be "locked in" to this brand and set of products. Indeed, even some specialist KIBS firms may have strong commitments to manufacturers or, more broadly, to particular sets of products and solutions. These dangers need to be examined and discussed by business users and by regulators (especially when setting standards) and other policymakers.

scope to exchange knowledge with other companies – through spillover effects or through agreements and alliances - and contribute to their productive partner environment.

We have noted above that KIBS firms are specialists in supplying knowledge-intensive services, but that such services functions are not exclusive to these firms. Basañez *et al*. (2022) demonstrate that some Basque manufacturing companies also provide such advanced services. While these manufacturers' core competencies are, of course, those required for producing specific sorts of goods; they may, in addition, deploy some of their technological capabilities to produce other outputs -including service functions. One implication is that the design of policies aimed at promoting advanced services should not only focus on KIBS firms; such policies should consider other organizations that do (or might well) supply KIBS-type functions to others: these may be significant repositories of knowledge relevant to other businesses in the locality.

According to Kamp and Alcalde (2014), the Basque Country features a predilection toward technological activities; this is associated with a relatively undersized KIBS segment in management and organization consultancy, and in marketing affairs – together with other forms in commercialization innovations. In this context, the public sector should try to support such disequilibria. Moreover, having seen that the potential of the KIBS subsectors is not being fully valorised, there seems to be a legitimate case for fostering the use of their activities by the manufacturing sector.

On the other hand, in the Basque manufacturing firms embracing service-based competitiveness models, imbalances can be noted in the kind of knowledge-intensive services being deployed (strong accent on scientific/technological activities and weak on non-technological service activities). Therefore, if it is the case that Basque manufacturing firms focus more on use of scientific/technological KIBS and less on P-KIBS and C-KIBS, it could be that they are missing on opportunities to embrace more service-based competitiveness models. Industrial policies might then seek to foster the use of a wider range of KIBS by industrial firms. They should integrate the role of advanced services and KIBS in their policy agendas, as a key ingredient for industrial competitiveness.

4.2. The KIBS in the Basque Country and its international and regional comparison

European regions are classified into 4 groups in the recent editions of the EU's Regional Innovation Scoreboard (*European Commission*, 2022)[17], which is based on data on 21 indicators for 240 regions across Europe. The Basque Country is one of only two Spanish regions classified as "strong innovators" (the other is Madrid; other parts of the country are "moderate" or "emerging" innovators). There are 67 strong innovators in the European database and 68 moderate and 67 emerging innovators. No parts of Spain are classified as "innovation leaders" (there are some 38 of these, mainly in Northern Europe, Germany, and Switzerland). While the authors of this report recognise the importance of knowledge-intensive service activities and exports, such data are not available to them at regional level, and the only indicator they apply that is close to our interest in KIBS concerns employment in both high-tech manufacturing and knowledge-intensive services (a broader category than KIBS, including telecommunications, finance, etc.). Still the classification does suggest that the Basque country might be compared with regions that have a similar description, and possibly those located in countries with no leaders and few other strong innovators. Further research might allow us to example at least some other European regions of this type. At present, we are able to compare the Basque Country against the Madrid region.

The main argument against such a comparison is that the Madrid economy is considerably larger than that of the Basque Country. Our calculations, based on current statistics (real data for 2019. Provisional data for 2020) indicate that Madrid region represents almost 20% of Spanish GDP, while the Basque contribution is some 6% - suggesting that overall, the Basque economy is around 30% of the size of Madrid's. The only major sector larger in the Basque Country is "Agriculture, livestock, forestry and fishing" (NACE section A), which is more than two times larger than that in Madrid. In contrast, KIBS (and some similar services) are smaller in the Basque Country than would be anticipated from the overall contributions to GDP. Overall, Madrid contributes around one half of Spain's turnover from KIBS as a whole,

[17] This report makes several other interesting points, which bear on what regions in other countries might be appropriate for comparisons with the Basque Country. Thus, it notes that all regions identified as "Innovation Leaders" belong to countries identified as "Innovation Leaders" or as "Strong Innovators". Most regions that are Regional Moderate and Emerging Innovators belong to countries identified as Moderate and Emerging Innovators. The report goes on to argue that regional 'pockets of excellence' can be identified in several Moderate Innovator countries (as well as Basque Country and Madrid in Spain, these include Praha in Czechia, Attiki and Kriti in Greece, and Emilia-Romagna in Italy - it would be worth searching for KIBS data on these regions). Additionally, some regional 'pockets of excellence' are located in countries classified as Emerging Innovators (Budapest in Hungary, Warszawski stoleczny in Poland, Bratislavský kraj in Slovakia, and Belgrade in Serbia); these too might make for interesting comparators.

while the Basque Country contribution is around 5%, a tenth of this. The share of Sections M (most KIBS) and N (administrative services) in the market economy (sections A to N) provides a rough-and-ready way of assessing KIBS-intensity. For the Spanish economy in total, in 2019, the Sections M and N together constitute around 22% of the total; for Madrid the figure is around 33%, while for the Basque Country it is just under 18%.

Table 3 delves a little further into this comparison, presenting data for Spain as a whole, and the two regions on several parameters concerning KIBS in 2020. Several features of these data are of interest.

Table 3. KIBS in Spain, in Madrid region and the Basque Country

KIBS Sector	62. Computer Related	69. Legal/Accounting	70. Management Consulting	71. Architecture/ Engineering	72. R&D	73. Advertising/Market Res.	74. Other PST Act.
NUMBER OF FIRMS (Thousands)							
Spain	42.6	164.3	32.6	106.6	9.1	48.0	80.0
Madrid	10.7	32.5	7.6	21.1	1.9	14.5	20.1
Basque Country	2.0	7.4	3.2	5.4	0.4	1.5	3.9
TURNOVER (Millions of euros)							
Spain	34.6	23.2	22.0	26.6	3.2	16.3	7.3
Madrid	18.6	8.1	11.8	11.5	0.9	10.2	2.4
Basque Country	1.3	1.2	1.4	1.7	0.5	0.3	0.3
THOUSANDS EMPLOYED							
Spain	334.8	377.1	173.7	296.1	62.3	116.5	130.4
Madrid	149.4	87.4	71.4	83.5	11.6	48.4	34.3
Basque Country	14.3	17.4	10.3	17.2	7.4	3.6	6.6

Source: Own elaborations based on National Statistics Institute of Spain.

First, Madrid seems to be rather overrepresented in terms of the turnover of several types of KIBS, contributing above 50% of the total Spanish turnover in computer services, management consultancy, and advertising/market research. Overall, it contributes about half of Spain's turnover in KIBS, testifying to the attraction of capital cities and metropolis for these service firms. It has over 40% of Spain's employment in these three sectors, which are ones that may need to be located close to head offices. Madrid is low only on R&D services (less than 30% of the total Spanish turnover), which is a sector where the Basque Country is comparatively high – indeed its turnover is around half of that of Madrid's, and its employment is nearly 2/3rds of Madrid's. Legal and accounting, and other professional/scientific/technical services are ones where Madrid is less dominant in Spain, and the Basque Country reaches levels of employment in these industries around 20% of Madrid's (with

turnover ratios somewhat lower). While these services certainly can support innovation and transitions, they are also liable to be ones which have numerous rather traditional service firms, often small-scale and servicing very local markets.

The impression that comes from these data, then, is that – R&D services aside – the Basque Country may be "punching below its weight" – though this needs to be understood in terms of various factors, such as:

- The relatively high share of agricultural and related activities and of extractive and manufacturing industries in the region.
- The relatively low share of informational and financial activities in the region.
- The attractiveness of a global city.
- And, perhaps, the use of "hidden champions" (though we have no intelligence as to whether such champions exist in Madrid or other parts of Spain).

These ideas, with the exception of the last bullet point, echo those of the earlier study by Guerrieri and Meliciani (2009). This examined data for 259 European regions, looking at how far they specialised in business services (computer and related services, R&D services, other business services – close to our definition of KIBS), and how this could be explained, using figures for the year 2005. In terms of employment specialisation[18], Madrid was one of the highest European regions (score of 3.14, below only London and Brussels), while País Vasco scored 1.19 (just above Emilia-Romagna, incidentally), which still counts as more specialised than average. The study concluded that regions specialised in knowledge-intensive industries (who are the main users of business services) are more likely to be specialised in such services; that levels of human capital and technology development are important, as is population density (in particular location of capital cities).

A rather different angle on such matters is provided by other studies of regional specialization that pay attention to KIBS. Schricke *et al*. (2012) studied both the patterns of regional specialization of KIBS and of manufacturing with high and

[18] This is defined as the share of employment in business services over total employment in the region, divided by the average share of employment in these services across all regions' total employment.

medium-high technology (M-HTM) in Europe. These researchers identified four groups of regions, differing in specialization:

- The Basque Country features in the first group. This is made up of those regions specialized in high and medium-high technology manufacturing, but less so in KIBS. This group also contains other Spanish regions such as Navarra, regions of central France, Italian regions (Emilia-Romagna[19], Veneto), and many regions of Eastern Europe.

- The second group is made up of regions specialized both in KIBS and in high and medium-high technology manufacturing. The regions of Catalonia, Lombardy, Upper Bavaria, North Rhine-Westphalia, and those in the southern part of the United Kingdom, belong to this group.

- The third group is made up of those regions that are neither specialized in KIBS nor in manufacturing with high and medium high technology. The regions of southern Spain, southern Italy, are among many other regions belonging to this group.

- Finally, a fourth group of regions, mainly consisting of metropolitan centres, features those specialized in KIBS but not in high and medium-high technology manufacturing: this group includes the regions of Madrid, Lisbon, Rome, and other European capitals belong to this group.

This classification of regions suggests that the Basque Country has much in common with other members of the first group – and given the absence of a metropolis like Lisbon or Madrid, it may be inappropriate to place too much weight on comparisons with such regions. However, it could be speculated that lessons could be learned concerning the performance of the second group, where KIBS and high and medium-high technology manufacturing are both prominent.

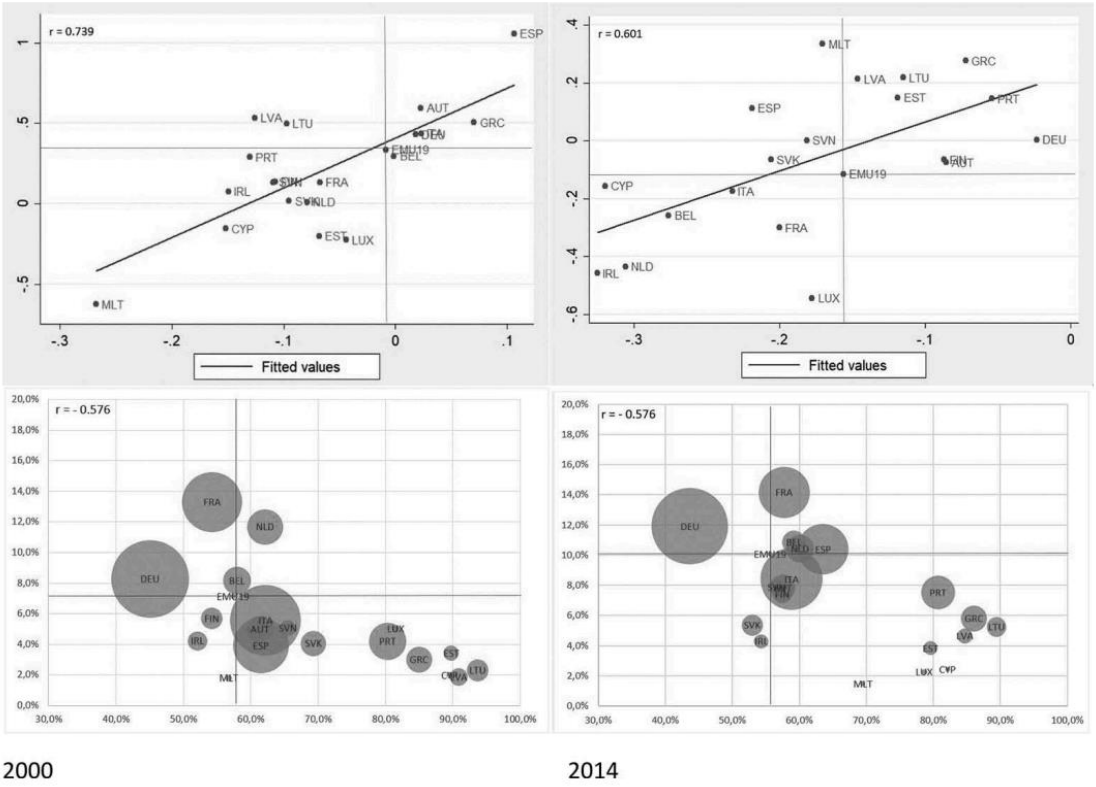
[19] A recent study on effect of KIBS on innovation in manufacturing firms from the Basque Country and Emilia-Romagna, shows that KIBS have positive effects on innovations in manufacturing firms. However, T-KIBS favour technological innovation, while P-KIBS and C-KIBS affect non-technological innovation. In addition, IT services also have a positive relationship with non-technological innovation. Seclen-Luna *et al*. (2022), concludes by highlighting the importance of T-KIBS to confront the challenges of Industry 4.0 and the need for further research to determine the role of KIBS in the context of the Fourth Industrial Revolution.

Further research might well move on from the rather static comparisons presented above and consider the dynamics of change over time. One study suggesting that such dynamics are important is presented by Antonioli *et al*. (2020).[20] They are only able to work with data at the national level – input-output data that tells us how much of the output of one industry an input to each of the other industries in an economy (or to final consumption) is. These data show how dependent different industries are on each other. Over the period 2000-2008 there was an increase in all countries in KIBS integration into manufacturing industries (Figure 4 and 5). But these authors concludes that there was a general slowdown in the growth of KIBS integration into manufacturing subsystems the period 2008–2014.

KIBS integration decreased in the 'leading group' countries (those with greatest levels of integration across the earlier period). This was especially the case for the Netherlands, while Germany shows a very low drop. In most of a second group of countries, the 'following group' displays a fairly steady share of KIBS; however, Spain and Ireland differ, with Spain substantially increasing its level of KIBS integration, while Ireland seems to collapse to a low level in 2014. The 'lagging group' of countries (Cyprus, Estonia, Greece, etc) remains well the following and especially the leading group. These are countries with limited integration of KIBS into manufacturing; differences in performance remain strong, without evident signs of convergence (even though the KIBS sectors tend to grow in all countries). EMU (European Monetary Union) does not seem to have pushed EU member states toward a process of less specialization and structural and real convergence.

[20] Perhaps because this study is engaging with a conversation about how far KIBS are contributing the apparent loss of work in manufacturing, the study examines the contribution of KIBS in terms of hours of labour entering into manufacturing production.

Figure 4. Integration of KIBS and Manufacturing (LT and MLT) in 2005 and 2014



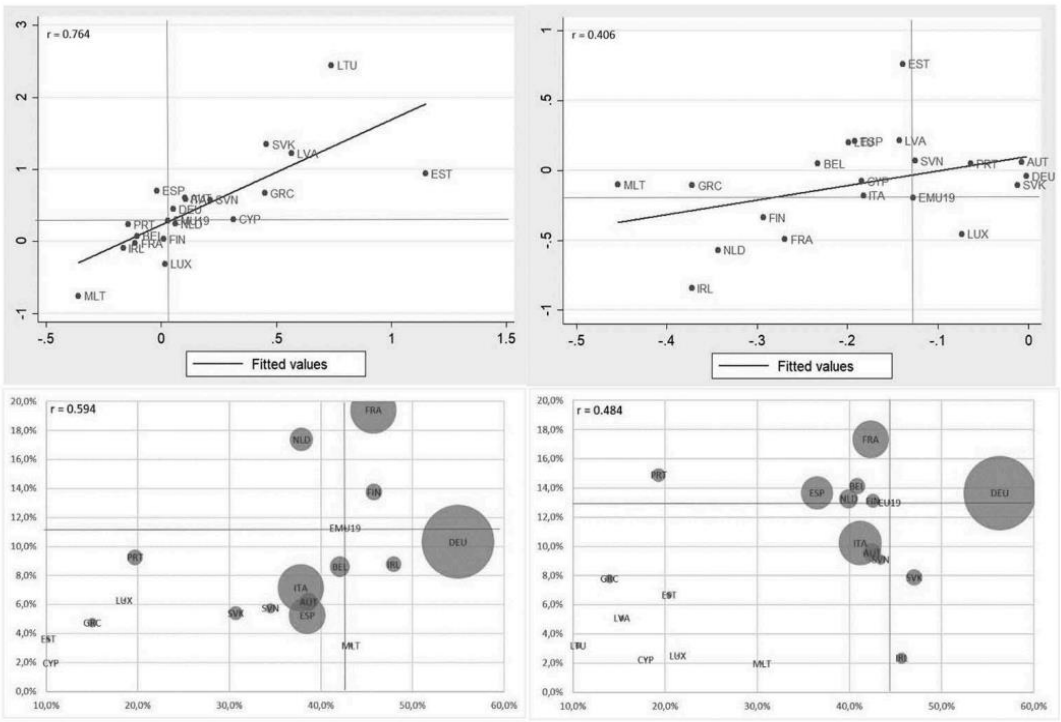
Top graphs: rate growth of hours worked in the manufacturing subsystem and in the integrated KIBS. 2000-2008 (left), 2008-2014 (right) in Low and Medium-Low Technology industries. Bottom graphs: KIBS integration in the manufacturing sub-system for LT and MLT industries (% of hours worked) in 2000 (left) and 2014 (right).

Source: Antonioli *et al*. (2020).

The evidence discussed above can be interpreted in terms of a core/periphery model, in which Germany, France, and the Netherlands (also Belgium, to some extent), are the core 'leading countries' of the EU. Peripheral countries, include a southern group of followers, which the eastern 'Germanized' countries (e.g., Slovakia and Slovenia) are becoming more similar to, in terms of KIBS integration. A set of 'non-Germanized' eastern countries (e.g., Latvia and Estonia) – together with Greece, which is a special case – constitute the 'lagging group'. Analysis of more recent input-output data will be needed to see how far such trends persist, but so far, we are able to observe different trends for the four largest countries. France and Spain are characterized by a strong tertiarization process accompanied by a large decrease in the weight of manufacturing subsystem. Italy also features a reduction in manufacturing production, but it remains, along with Germany, one of the leading manufacturing countries in the EU. Germany, however, is exceptional in that it combines a high manufacturing weight with a high level of KIBS integration. Germany seems to have

attained a sustainable equilibrium between a high level of growth in KIBS integrated to manufacturing, with the weight of manufacturing in the economy remaining unchanged compared to the pre-crisis period. This trends to support the idea that KIBS integration into manufacturing systems can strengthen the latter, suggesting that the business services play a leading role in the development of the manufacturing sector, and supporting the conclusions of other studies as to this effect (Ciriaci and Palma, 2016). The implication is that KIBS can contribute to the competitiveness of the manufacturing sector and of the overall production system.

Figure 5. Integration of KIBS and Manufacturing (MHT and HT) in 2005 and 2014



Top graphs: Rate growth of hours worked in the manufacturing subsystem and in the integrated KIBS. 2000-2008 (left), 2008-2014 (right) in Medium-High Technology and High Technology industries.
Bottom graphs: KIBS integration in the manufacturing sub-system for MHT and HT industries (% of hours worked) in 2000 (left) and 2014 (right).

Source: Antonioli *et al*. (2020).

The evidence provided by the previous analysis also permits to draw some policy implications. On the contrary, a real divergence in the dynamic of productive structures is apparent from examination of the extent of KIBS integration in manufacturing. This process leads toward a low(er) degree of business cycle synchronization among EMU countries, with negative economic consequences given

the EMU institutional arrangement (De Grauwe, 2016), which call fiscal for union and/or risk sharing policies, and for some revision of the stringent rules of the Stability and Growth Pact. Second, the evidence suggests some specific lines of intervention for an industrial renaissance in the EMU area:

- Identify and promote best practices to reinforce manufacturing/services relations.

- Strengthen the prerequisites that facilitate exploitation of the potentials of manufacturing/KIBS integration, especially, for countries lagging behind the leaders in terms of integration (for example, with policies to foster IT adoption and implementation, and transitions to a low-carbon economy); such policy implications probably apply to lagging regions within countries that are otherwise forging ahead.

- Foster manufacturing growth in those industries that better integrate KIBS, these are mainly HT-MHT industries, but do not neglect traditional largely LT-MLT industries.

5. Conclusions and policy recommendations

5.1. Conclusions

The discussion above makes it clear that KIBS are an increasingly important component of modern economies. Some play significant roles in the routine functioning of other sectors. Furthermore, at least some KIBS contribute to the distribution and application of knowledge and expertise across the economy, and this can support innovation of all sorts. This includes the sorts of innovative solution necessary to make the most of the challenges and opportunities presented by digitalisation, and those associated with sustainability and the transition to low- or zero–carbon modes of production and consumption and circular economy structures. Policy attention has traditionally been very much justified by concerns about "market failures" such as trade barriers and information asymmetries between suppliers and consumers. More recently the notion of "system failures" has come into play, particularly where KIBS contributions to innovation are concerned.[21]

The links between KIBS and innovation have been a major theme in academic research on KIBS, and, where KIBS have been a specific focus of policy attention, this theme is also central.[22] Often the reasons for policy attention relate to fears that a country is falling behind in its development of KIBS industries – or that businesses in specific regions in a country (usually more peripheral regions) are disadvantaged by relative lack of access to local KIBS, or to KIBS that are located in metropolitan areas.

The discussion above has also repeatedly drawn attention to the diversity of KIBS, both in terms of the variety of types of knowledge across different KIBS industries, and the coexistence of large and often international businesses with a preponderance of SMEs and microbusinesses in many KIBS sectors, while there are many generic policy issues, one size may not fit all KIBS. Furthermore, some KIBS industries may

[21] For a review that focuses on market failure issues, but touches on system failure, see Kox and Rubalcaba (2007). Discussion of both approaches is taken further in Rubalcaba *et al.*, (2010). Policy recommendations for the EU and member states, and for business managers, are articulated in the High Level Group on Business Services (2014) *Final Report* European Commission available at https://ec.europa.eu/docsroom/documents/4981/attachments/1/translations This also contains detailed discussions around the themes of innovation; instruments; internal market; internationalization and skills, paying attention – among other things – to emerging challenges from China and the USA. The most recent review of policy issues concerning KIBS is by Leoni and Lopez-Odriozola (2023).

[22] Early in this century, Finland, in particular was home to much policy interest in KIBS (and more generally, services innovation) – see for example Toivonen and several studies by Kuusisto.

be due particular attention because of their contributions to particular policy objectives, in particular locations. With these points in mind, a brief review of policy issues is presented below.

5.2. Public policy recommendations

Many of the issues that confront policymakers where KIBS are concerned are matters that apply to other parts of the economy. For example, most KIBS firms are SMEs, so more general SME-focused policies will have relevance to KIBS. Policies dealing with attracting inwards investment, and promoting exports, encouraging innovation (for example) can bear upon KIBS, and KIBS are an element of broader cluster policies - though often KIBS are overlooked, and the policies are shaped more by knowledge and representation of other sectors, such as manufacturing. (This last point may be particularly relevant in locations where KIBS are relatively underdeveloped – such as seems to be the case for the Basque Country[23]). KIBS can have important roles in regional and urban innovation systems, and efforts to shape these systems, including establishment of "living laboratories" and smart specialisation will need to integrate KIBS as intermediaries, sources, and beneficiaries of innovation. Thus, more awareness of KIBS and the specificities of KIBS sectors of concern, and of their potential roles with respect to developmental and transition goals, is important to develop.

Features of the broader policy framework, and the goals that it is intended to pursue, also impinge upon KIBS. For example, when there are efforts to nurture local businesses as opposed to relying upon international firms, or (not necessarily in contrast to this) the aim is to encourage international businesses to establish locally based expertise. KIBS may also play a role in helping in the implementation or delivery of broad policy goals – for instance, some KIBS may provide assistance in the digitalisation or "greening" of local economies, and some can even support policy formulation as well as assessment and evaluation of projects and programmes. The message of this preamble is: it will often make sense to consider what impact policies of various kinds may have upon those industries (including public services) that use

[23] That being said, it is impressive to note that the Recommendation Report produced in 2021 by the European Expert Group on Clusters, specifically mentions Bilbao's S-Fabrik Alliance as a model for one of its recommendations concerning Reskilling and upskilling of the workforce (European Expert Group on Clusters (2021) *Recommendation Report*. Luxembourg: Publications Office of the European Union, ISBN 978-92-76-30280-3 doi: 10.2873/025534 Catalogue number ET-02-21-200-EN-N at https://clustercollaboration.eu/sites/default/files/news_attachment/European%20Expert%20Group%20on%20Clusters%20-%20Recommendation%20Report.pdf)

KIBS or provide KIBS-type services.[24] The phrase "policies of various kinds" is intended to indicate that relevant policies may fall under numerous domains, often involving different government departments. It will be important to take into account – and to attempt to coordinate, or at least not to foster contradictions between – initiatives in such fields as innovation, industrial, trade, education and training, and even cultural policy.

Multilevel governance structures (national, regional, subregional, urban authorities, etc.) should be enabled and encouraged to work together. Stakeholders from different sectors, locations, and government departments may need to be consulted and engaged in policy development and implementation. Change in an industrial and innovation ecosystem cannot simply be ordered by one or other party – it is something that will require coproduction from many organisations and individuals.

Turning to KIBS policies, these can be considered from both supply and demand sides – in terms of KIBS themselves (supply), and of their clients (demand). We outline the range of policies that can be considered here in three tables, which are intended to provide a rapid overview of the different areas where policy can influence the contribution of KIBS to economic life. The first of these Tables (Table 4) concerns the demand side –the clients of KIBS. If KIBS are to play a significant constructive role in the development of an innovation system, it is important for clients to understand the scope of this role and make informed choices accordingly.

Table 4. Policies for (potential) KIBS Clients

Policy Area	Example Policies	Policy Goals	Notes
Education/training	Include teaching about KIBS and their use into business and management courses – including special courses for executives.	Assist management with making choices about: - Whether (and which) KIBS to use to support their business processes; - Whether their internal capabilities for using (or themselves producing) such services are adequate or need reinforcing; - Whether they might themselves be capable of selling or bundling some	Opportunity to invite KIBS managers as well as some client managers to provide case studies. Important for raising knowledge-intensity of business in general. Important for clients to have "absorption capacity" to make adequate use of KIBS,

[24] As noted in Box 1 and the discussion of "hidden champions", KIBS-type services may be supplied by firms in other sectors of the economy, for example businesses of all types – and public bodies such as Universities, Public Research Institutes, and government laboratories - may provide consultancy, testing, training, or similar services (usually as a secondary function, alongside their main missions in production, education, etc.).

		such services in addition to their current products.	and to learn from this experience.
R&D policy	Provide support for clients of KIBS who wish to work with them in EU framework and other research and innovation programmes. Provide support for firms wishing to use KIBS to support their innovation efforts.	Enable clients to benefit from KIBS knowledge and innovation and draw on these in their own innovative activity.	Client firms should be aware of the need to engage in coproduction with KIBS, so as to acquire new useful knowledge (and partnerships) that they can build on subsequent to specific projects.
Business information services	Facilitate social networks allowing for clients to exchange experience about use of KIBS. Support schemes for accreditation of KIBS on quality of service.	Provide clients with a tool for reducing information asymmetries when procuring KIBS.	Risks of malicious reviews, of "gaming" the system, of libel claims when reviews are poor.
Public procurement	Government and public bodies to develop frameworks governing use of KIBS to support or provide public services. Include provisions to support SMEs and encourage innovation on part of KIBS suppliers.	Enable state bodies to access and apply flexible and specialised knowledge resources efficiently, improving outcomes and effectiveness of public services.	Important to maintain democratic oversight and accountability of services, and to avoid "hollowing-out" of state capabilities to design and deliver public policies.

Source: Own elaboration.

Governmental organisations at different levels have different policy levers that they can operate to encourage KIBS activity that can contribute to the overall prosperity and sustainability of cities, regions, and countries. Some policy frameworks may be made at international (e.g., EU) level, but there can still be issues of local implementation (For example, enforcement of rules governing Intellectual Property may be more or less assiduous; participation in Horizon Europe and other programmes may be facilitated by local institutions). Several policy areas are common to most or even all KIBS, and these are outlined in Table 5 (Many of these policies will also be relevant to related industries such as the creative industries and knowledge-intensive sectors such as telecommunications).

Table 5. Policies Applicable to a Wide Range of KIBS

Policy Area	Example Policies	Policy Goals	Notes
Education/training	Support high-quality technical and professional higher education, and vocational education and training (VET). Foster placements and exchange of knowledge and people between KIBS and higher education and VET systems.	Make local high-skill workforce available for KIBS moving to the area, as well as extant KIBS firms; assisting KIBS in general meet the challenges of new technologies and regulatory demands; enable KIBS to expand their activities.	Important for securing role of producers, as well as agile users, of new knowledge.
R&D policy	Provide support for KIBS who wish to participate in EU framework and other research and innovation programmes. Foster joint research between KIBS and higher education institutions.	Enable KIBS to access state-of-the-art knowledge, build international links, and engage in innovation. Also, to establish links with more academic knowledge producers.	Important for enabling local KIBS to thrive in the face of international competition; may be especially so for SMEs.
Urban and regional policies	Establish attractive environments for KIBS firms to locate in (e.g., cultural features, transport and communications links, meeting points and coworking facilities). Assess scope for KIBS contribution to innovation ecosystems, and whether this warrants support for infrastructure (e.g., telecommunications, office facilities).	Enhance city/region as a base for KIBS and related inward investment. Create conditions for development of KIBS clusters and networking.	Richard Florida's claims about the attraction of the "creative class" to particular locations may have weight here. Established facilities may have great weight in attracting KIBS to metropolitan centres (in addition to the "pull" of client proximity). This can, of course, disadvantage other locations.
SME policies	Where appropriate, support the fostering of spin-offs from Higher Education and other public bodies (e.g., Public Research Institutes).	Facilitate knowledge flows between academic expertise and applications in business and public services.	Part of the third mission" of universities. May be particularly important in fields where much cutting-edge strategic research is underway, e.g., biomedicine. Avoid "hollowing out" of functions of

			public organisations and/or subjecting them to short-term market forces that undermine core missions and may even mean loss of competences to private firms.

Source: Own elaboration.

In Table 6, we outline a number of policy issues that are, mainly, applicable only to a few types of KIBS. Probably the most frequently discussed policy topic, relevant mainly to specific types of KIBS, concerns barriers to trade that exist in relation to P-KIBS (legal and accountancy services, for example – and some activities that have C-KIBS features, such as architectural services)[25]. These are barriers connected to professional accreditation and the recognition of competences, which sometimes limit the ability of experts qualified in one country to practice in a second country. The rationale for accreditation and qualification is mainly one of consumer protection, reflecting information asymmetries that apply concerning KIBS use. The concern is that entry barriers and trade barriers are liable to be established that limit competition (and, potentially, slow innovations while inflating costs and not necessarily guaranteeing better service quality).[26] Policies may seek to remove barriers by liberalising provision of services, and sometime measures such as rules governing advertising of services.[27]

Table 6. Policies relevant to specific areas of KIBS activity

Policy Area	Example Policies	Policy Goals	Notes
Competition/Professional Accreditation	Liberalisation of rules governing who can practice in a professional field, regulations concerning advertisements for specific classes of KIBS activity.	Reducing entry and trade barriers to allow for more competition (with implications for innovation and productivity) and, in some cases, reduction of	Impact of policy changes on service quality needs assessment.

[25] While most T-KIBS feature relatively few requirements for occupational qualifications, there are exceptions here too, such as civil engineers.

[26] For some recent contributions on these topics, see Koumenta *et al*. (2019), and Bambalaite *et al*. (2020).

[27] Note that such actions can have unintended consequences, such as proliferation of legal services and strident marketing of what in English are known as "ambulance chasing" lawyers, encouraging customers to seek compensation for accidents and alleged medical neglect, for example.

	Endorsement of specific types of professional qualification, agreements on professional self-regulation, establishment of apolitical standards/ ethics bodies.	information asymmetries with clients.	
Sustainability	Provide support for firms wishing to use KIBS to support improve their environmental performance. Involvement of KIBS in circular economy initiatives.	Accelerate access to information about achieving more sustainable business processes. (e.g., reducing resource use, eliminating waste, remediation, and clean-up).	Relevant for use of KIBS providing consultancy, engineering, architectural, testing, auditing, and related services.
Digitalisation/ Information society	Provide support for firms wishing to use KIBS to support improve their adoption/application of new digital technologies.	Enable KIBS to accelerate digitalisation of business.	Especially relevant for use of computer services and related. Support may involve financial incentives, awareness campaigns, etc.
Intellectual Property	Enforcement of regulations concerning copyright, design rights, patents, trademarks, etc. Support SMEs, in particular, with acquisition of IPRs.	Enable value appropriation in localities where creative ideas and services are developed.	Especially relevant for computer services (software, website design etc) and C-KIBS. Note that IPR is a contentious topic. While lack of understanding of the value of IOPR can disadvantage creators, in some areas, property rights may be used to stifle invention or gain super profits.

Source: Own elaboration.

In conclusion, the topic of KIBS in general deserves attention from policymakers. These industries have much to offer and are liable to be of increasing importance in the economic transitions that lie ahead. Some specific KIBS are likely to be of particular interest to a particular region, and within a region particular city may well vary in terms of which KIBS are deemed critical. Policy design and implementation is

very much a matter for local leadership and will reflect multi-level governance structures. Thus, the policy outlines presented above will require much local specification to be effective; and the "policy mix" will be important, so that policies are co-ordinated and synergistic; this will also require that they be sensibly organised over time (since some activities will be dependent on the outcomes of other activities).[28]

Building on the demonstrated strengths of the Basque economic model is bound to be the fundamental starting point. These strengths will include capabilities in emerging industries – it is striking that País Vasco is ranked as one of the EU's top twenty regions in terms of these industries by the European Observatory for Clusters and Industrial Change (2019).[29] KIBS can support successful development of these industries, and they can contribute significantly to transformation of the whole economy as a result of the opportunities that these industries present and the challenges posed by climate change and other forces. Policies should be formulated, implemented, and assessed in terms of these contributions – enabling KIBS to take their place in the Basque Country's evolving innovation ecosystem.

[28] In this context, the experience of the AS-Fabrik -Bilbao Alliance (aiming at smart specialisation in advanced services supporting the digital transformation of industry) is a local case that should be examined for lessons for other KIBS initiatives. This included efforts at skills development, establishing new infrastructure, network-building, and more. See, for example, material at https://www.uia-initiative.eu/en/uia-cities/bilbao

[29] Naumanen (2019). Particular strengths are noted in the following emerging industries: advanced packaging; "blue growth" (oceans, freshwater, etc), logistical services, and mobility technologies. This is not to say that other emerging areas should be discounted: the report lists medical devices, environmental industries, experience industries, biopharmaceuticals, digital industries, and creative industries.

References

ABOAL, D.; GARDA, P.; VAIRO, M. (2015): Políticas de innovación en servicios y su impacto en ALC. En Aboal, D., Crespi, G. & Rubalcaba, L. (Eds). La innovación y la nueva economía de servicios en América Latina y el Caribe Retos e implicaciones de política, pp. 163-187. Centro de Investigaciones Económicas (CINVE), Banco Interamericano de Desarrollo (BID). Montevideo, Uruguay.

ALBIZU, M.; ESTENSORO, M.; FRANCO, S. (2022): Vocational Education and Training and Knowledge Intensive Business Services: a promising relationship in the digital era. Foresight and STI Governance Journal, Vol. 16, No. 2, pp. 65-78.

AMANCIO, I.R.; DE SOUSA MENDES, G.H.; MORALLES, H.F.; FISCHER, B.B.; SISTI, E. (2022): The interplay between KIBS and manufacturers: a scoping review of major key themes and research opportunities, European Planning Studies, Vol. 30, No.10, pp. 1919-1941.

ANTONIOLI, D.; DI BERARDINO, C.; ONESTI, G. (2020): Specialization and KIBS in the Euro area: a vertically integrated sector perspective. International Review of Applied Economics, Vol. 34, No. 2, pp. 267-290.

ASPETEG, J.; BERGEK, A. (2020): The value creation of diffusion intermediaries: Brokering mechanisms and trade-offs in solar and wind power in Sweden. Journal of Cleaner Production, Vol. 251, 119640.

BAMBALAITE, I.; NICOLETTI, G.; VON RUEDEN, C. (2020): Occupational entry regulations and their effects on productivity in services: Firm-level evidence, OECD Economics Department Working Papers, No. 1605, OECD Publishing, Paris, https://doi.org/10.1787/c8b88d8b-en

BANCO MUNDIAL (2012): Promoción de la competitividad y las industrias innovadoras. Visión general. Políticas de innovación: una guía para los países en Desarrollo. Conferencia, Políticas de Innovación (ed.), Una guía para los países en Desarrollo.

BASAÑEZ, A.; BARRUTIA, J.; RODRÍGUEZ, A. (2022): Are there small-scale «hidden KIBS»? Exploring the "KIBS function" of hidden champions in terms of technological capabilities. Ekonomiaz, Vol. 102, No. 2, pp. 124-149.

BELOUSOVA, V.; BONDARENKO, O.; CHICHKANOV, N.; LEBEDEV, D.; MILES, I. (2022): Coping with Greenhouse Gas Emissions: Insights from Digital Business Services. Energies, Vol. 15, 2745.

BODEN, M.; MILES, I. (eds.): Services, Innovation and the Knowledge Economy, London, Continuum.

BROWN, P.; BOCKEN, N.; BALKENENDE, R. (2019): Why do companies pursue collaborative circular oriented innovation? Sustainability, Vol. 11, pp. 1-23.

CABIGIOSU, A. (2019): Innovation in Knowledge Intensive Business Services: The Digital Era. Oxon and New York: Routledge.

CEDEFOP (2014): Macroeconomic benefits of vocational education and training (Research Paper No. 40), Luxembourg: Publications Office of the European Union.

CHICHKANOV, N. (2022): Patterns of Knowledge-Intensive Business Services Use Across Europe. Foresight and STI Governance, Vol. 16, No. 1, pp. 22-33.

CIRIACI, D.; PALMA, D. (2016): Structural Change and Blurred Sectoral Boundaries: Assessing the Extent to Which Knowledge-intensive Business Services Satisfy Manufacturing Final Demand in Western Countries. Economic Systems Research, Vol. 28, No. 1, pp. 55–77.

COOKE, P. (2011): Green innovation. In P. Cooke, B.T. Asheim, and R. Boschma (Eds). Handbook of regional innovation and growth, (pp. 434–446). Cheltenham: Edward Elgar Publishing.

DE GRAUWE, P. (2016): Economics of Monetary Union. Oxford: Oxford University Press.

DE MARCHI, V.; MOLINA-MORALES, X.; MARTÍNEZ-CHAFER, L. (2022): Environmental innovation and cooperation: A configurational approach. Technological Forecasting and Social Change, Vol. 182, 121835.

DE PROPIS, L.; BAILEY, D. (2020): Industry 4.0 and Regional Transformations. (1st ed.). Routledge.

DIAZ, F.J.; BASTEIN, T.; TUKKER, A. (2019): Business model innovation for resource-efficiency, circularity and cleaner production: what 143 cases tell us. Ecological Economics, Vol. 155, pp. 20-35.

DOLOREUX, D.; SHEARMUR, R.; KRISTENSEN, I. (2023): KIBS as knowledge sources for innovation in rural regions. Journal of Rural Studies, Vol. 99, pp. 53–61.

ESCRIG-OLMEDO, E.; FERNÁNDEZ-IZQUIERDO, M.Á.; FERRERO-FERRERO, I.; RIVERA-LIRIO, J.M.; MUÑOZ-TORRES, M.J. (2019): Rating the raters: Evaluating how ESG rating agencies integrate sustainability principles. Sustainability, Vol. 11, No. 3, p. 915.

ESTENSORO, M.; ALBIZU, M.; MURCIEGO, A.; PELETIER, C. (2022): Localización de los Servicios Empresariales Intensivos en Conocimiento en regiones manufactureras: el caso del País Vasco y sus entornos urbanos. Ekonomiaz, Vol. 102, No. 2, pp. 98 – 123.

EUROPEAN COMMISSION (2022): Regional Innovation Scoreboard 2021. Enterprise and Industry, Luxembourg.

FARINELLI, F.; FERNANDEZ-STARK, K.; MENESES, J.; MENESES, S.; MULDER, N.; REUSE, K. (2017): Use of knowledge-intensive services in the Chilean wine industry. Series International Trade 16, ECLAC.

GEELS, F.W. (2019): Socio-technical transitions to sustainability: A review of criticisms and elaborations of the Multi-Level Perspective. Current opinion in environmental sustainability, Vol. 39, pp. 187-201.

GOBIERNO VASCO (2021): Plan de desarrollo industrial e internacionalización 2021-2024. Vitoria-Gasteiz.

GUERRIERI, P.; MELICIANI, V. (2009): Internationalization, Technology and Business Services Specialization in Europe. Ponencia presentada en Italy's External Competitiveness. Roma, 24 y 25 de noviembre.

KAMP, B.; ALCALDE, H. (2014): Servitization in the Basque Economy. Strategic Change, Vol. 23, pp. 359–374.

KIVIMAA, P.; BOON, W.; HYYSALO, S.; KLERKX, L. (2019): Towards a typology of intermediaries in sustainability transitions: a systematic review and a research agenda. Research Policy, Vol. 48, No. 4, pp. 1062-1075.

KOUMENTA, M.; PAGLIERO, M.; ROSTAM-AFSCHAR, D. (2019): Effects of regulation on service quality: Evidence from six European cases European Commission, https://data.europa.eu/doi/10.2873/910094

KOX, H.; RUBALCABA, L. (2007): Policy Implications. Chapter 15 in L. Rubalcaba and H. Kox (eds) Business Services in European Economic Growth London: Palgrave Macmillan.

KUUSISTO, J.; VILJAMAA, A. (2004): Knowledge-intensive business services and coproduction of knowledge–the role of public sector. Frontiers of E-business Research, Vol. 1, pp. 27-31.

KUUSISTO A.; KUUSISTO J. (2007): Use of knowledge intensive business services by SMEs–some policy implications. SC-Research, Lappeenranta: Lappeenranta University of Technology.

LEONI, L.; LOPEZ-ODRIOZOLA, U. (2023): Policies for Knowledge-Intensive Business Services, in Gallouj, F., Gallouj, C., Monnoyer, M-C., Rubalcaba, L., and Scheuer, M. (eds) Elgar Encyclopedia of Services Cheltenham: Edward Elgar.

LI, X.; GAGLIARDI, D.; MILES, I. (2020): Variety of Innovation Processes in R&D Service Firms. R&D Management, Vol. 50, No. 2, pp. 173-187.

LUNDVALL, B-A.; BORRAS, S. (1997): The Globalising Learning Economy: Implications for Innovation Policy. European Communities (TSER report EUR 18307), Luxembourg.

MARIN A.; STUBRIN, L. (2015): Innovation in natural resources: new opportunities and new challenges. The case of the Argentinean seed industry. UNU-MERIT, Working Paper Series, Number 15.

MARTINEZ-FERNANDEZ, C.; MILES, I.; WEYMAN T. (2011): The Knowledge Economy at Work: Skills and Innovation in Knowledge Intensive Service Activities. Edward Elgar, Cheltenham, UK and Northampton, MA, USA.

MIGNON, I. (2017): Intermediary -user collaboration during the innovation implementation process. Technology Analysis and Strategic Management, Vol. 29, No. 7, pp. 735-749.

MILES, I. (2023): "KIBS in Innovation Systems", in Gallouj, F., Gallouj, C., Monnoyer, M. C., & Rubalcaba, L. (Eds.). Elgar Encyclopedia of Services. (pp. 439-455), Edward Elgar Publishing.

MILES, I.; BELOUSOVA, V.; CHICHKANOV, N. (2018): Knowledge-Intensive Business Services: Ambiguities and Continuities. Foresight, Vol. 20, No. 1, pp. 1-26.

MILES, I.; BELOUSOVA, V.; CHICHKANOV, N.; KRAYUSHKINA, Z. (2021): Knowledge intensive business services in time of crisis: the coronavirus pandemic. Foresight, Vol 23, No. 2, pp. 125-153.

MIOZZO, M.; MILES, I. (2015): "The Internationalisation of Knowledge-Intensive Services" (Chapter 8, pp. 171-190). In Archibugi and Fileppi (Eds): Handbook of Global Science, Technology, and Innovation. London: Wiley-Blackwell.

NAUMANEN, M. (2019): The European Observatory for Clusters and Industrial Change Emerging industries: Driving strength in 10 cross-sectoral industries, Luxembourg: Publications Office of the European Union at: https://op.europa.eu/en/publication-detail/-/publication/2df01178-207d-11ea-95ab-01aa75ed71a1/language-en

NIESTEN, E.; JOLINK, A. (2020): Motivations for environmental alliances: generating and internalizing environmental and knowledge value. International Journal of Management Review, Vol. 22, No. 4, pp. 356-377.

OECD (2007): Summary report of the study on globalisation and innovation in the business services sector, (Globalisation and Structural Adjustment) resented to the OECD's 2007 Ministerial Council Meeting Paris: OECD at: https://www.oecd.org/sti/38619867.pdf

—(2010): OECD Reviews of Regional Innovation: Catalonia, Spain 2010. OECD Publishing, Paris.

—(2011): OECD Reviews of Regional Innovation: Basque Country, Spain 2011. OECD Publishing, Paris.

O´HIGGINS, C.; FREIJE, I.; DE LA CALLE, A.; MARTÍNEZ, A. (2022): Barriers to internationalization of creative KIBS: insights from the Basque Country. Ekonomiaz, Vol. 102, No. 2, pp. 50-73.

ORKESTRA (2022): Informe de Competitividad del País Vasco 2022: Las bases de la competitividad en una época de incertidumbre. Instituto Vasco de Competitividad, Fundación Deusto. Bilbao.

PAALLYSAHO, S.; KUUSISTO, J. (2008): Intellectual property protection as a key driver of service innovation: an analysis of innovative KIBS businesses in Finland and the UK. International Journal of Services Technology and Management, Vol. 9., No. 3-4, pp. 268-284.

PACE, L.A.; MILES, I. (2020): The influence of KIBS-client interactions on absorptive capacity-building for environmental innovation. European Journal of Innovation Management, Vol. 23, No. 4, pp. 553-580.

PEREIRA, A.; VENCE, X. (2021): The role of KIBS and consultancy in the emergence of Circular Oriented Innovation. Journal of Cleaner Production, Vol. 302, 127000.

PYKA, A.; STÖBE, L.F. (2023): "Green Platforms Services for Sustainability" in Gallouj, F., Gallouj, C., Monnoyer, M. C., & Rubalcaba, L. (Eds.). Elgar Encyclopedia of Services. Edward Elgar Publishing.

RUBALCABA, L.; GALLEGO, J.; HERTOG, P.D. (2010): The case of market and system failures in services innovation. The Service Industries Journal, Vol. 30, No. 4, pp. 549–566.

SCHRICKE, E.; ZENKER, A.; STAHLECKER, T. (2012): Knowledge-intensive (business) services in Europe. Project Financed by the 6th Framework Programme for Research, European Commission. Brussels.

SECLEN-LUNA, J.P.; BARRUTIA, J. (2018): KIBS and innovation in machine tool manufacturers. Evidence from the Basque Country. International Journal of Business Environment, Vol. 10, No. 2, pp.112–131.

—(2019): Gestión de la Innovación Empresarial: Conceptos, Modelos y Sistemas. Fondo Editorial Pontificia Universidad Católica del Perú.

SECLEN-LUNA, J.P.; MOYA-FERNÁNDEZ, P.J. (2020): Exploring the relationship between KIBS co-locations and the innovativeness of manufacturing firms in Latin-America. Journal of Regional Research, Vol. 48, No. 3, pp. 69-84.

SECLEN-LUNA, J.P.; MOYÁ-FERNÁNDEZ, P.; BARRUTIA, J.; FERRUCI, L. (2022): Innovation in Micro Firms Builders that Built Machine Tool: Effects of T-KIBS on Technological and Non-technological Innovations. Review of Business Management, Vol. 24, No. 1, pp. 144-158.

SPÖTTL G.; WINDELBAND L. (2021): The 4th industrial revolution – its impact on vocational skills. Journal of Education and Work, Vol. 34, No. 1, pp. 29–52.

SUSSKIND, R.; SUSSKIND, D. (2015): The Future of the Professions: How Technology will Transform the Work of Human Experts. Oxford University Press, Oxford UK.

TETHER, B.S.; MINA, A.; CONSOLI D.; GAGLIARDI D. (2005): A literature review on skills and innovation. How does successful innovation impact on the demand for skills and how do skills drive innovation? (Commissioned Report), London: Department of Trade and Industry.

TOIVONEN, M. (2007): Innovation policy in services: The development of knowledge–intensive business services (KIBS) in Finland. Innovation, Vol. 9, No. 3-4, pp. 249-261.

VOLLMER, M.K.; RHEE, T.S.; RIGBY, M.; HOFSTETTER, D.; HILL, M.; SCHOENENBERGER, F.; REIMANN, S. (2015): Modern inhalation anaesthetics: Potent greenhouse gases in the global atmosphere. Geophysical Research Letters, Vol. 42, No. 5, pp. 1606-1611.

WOOD, P.A. (2006): The regional significance of knowledge-intensive services in Europe: KISINN and after. Innovation, 19 (1), 51–66.

XU, X.; STRÖM, P. (2016): The transformative roles of Knowledge-Intensive Business Services in developing Green ICTs: Evidence from Gothenburg, Sweden. In A. Jones, Ström, P., Hermelin, B., Rusten, G. (Eds): Service and the Gren Economy, (pp. 99-124). Palgrave Macmillan, London.

ZIEBA, M. (2021): Knowledge-Intensive Business Services. In Understanding Knowledge-Intensive Business Services: Identification, Systematization, and Characterization of Knowledge Flows (pp. 49-90). Cham: Springer International Publishing.

ZUBIAURRE, A.; ZABALA K.; SISTI, E. (2022): Innovation and internationalization in KIBS and the manufacturing sector: a comparative assessment of the Basque Country and Catalonia. Ekonomiaz, Vol. 102, No. 2, pp. 26-49.

Anexes

Table A.1. KIBS in Spain from 2018 to 2020

Spain KIBS	2018		2019		2020	
	Employees	Value added	Employees	Value added	Employees	Value added
(62) Computing services	293560	15234921	310036	16917151	331450	16986120
(69) Legal and accounting services	361190	12839429	372802	13951611	365253	13741139
(70) Management services, Headquarters	135153	8628598	149547	10783096	162065	10801267
(71) Architecture and engineering services	293402	11578049	302271	12946558	295610	11897230
(72) Research and development services	53924	2306194	61293	2754896	61856	3067699
(73) Advertising and market research	124200	4861074	122917	4910693	114958	4314557
Total KIBS	**1261429**	**55448265**	**1318866**	**62264005**	**1331192**	**60808012**

Note: Value-added at factor cost, in €.
Source: Own elaborations based on National Statistics Institute of Spain.
Available at: https://ine.es/jaxiT3/Datos.htm?t=36180 (accessed 10/04/2023).

[back to text]

Table A.2. KIBS in the Basque Country from 2018 to 2020

Basque Country KIBB	2018		2019		2020	
	Employees	Turnover	Employees	Turnover	Employees	Turnover
(62) Computing services	13369	1240773	13198	1240642	14307	1273364
(69) Legal and accounting services	17833	1124549	18095	1270079	17386	1234129
(70) Management services, Headquarters	9135	1088429	9555	1029840	10265	1434447
(71) Architecture and engineering services	17497	1851373	17689	1982962	17153	1733566
(72) Research and development services	7126	376120	7417	415236	7373	450184
(73) Advertising and market research	4023	318932	3620	315519	3606	275831
Total KIBS	**68983**	**6000176**	**69574**	**6254278**	**70090**	**6401521**

Source: Own elaborations based on National Statistics Institute of Spain. Available at: https://ine.es/jaxiT3/Tabla.htm?t=36188 (Accessed 10/04/2023).

[back to text]