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ASSESSMENT OF STRATEGIC INDUSTRIES FOR NAVARRE: THE AUTOMOTIVE SECTOR

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Assessment of strategic industries for Navarre: the automotive sector

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ABSTRACT

The raison d'être of the present study lies in a proposal for collaboration between the Public University of Navarre and the public enterprise SODENA (Sociedad de Desarrollo de Navarra) to analyse the automotive sector in Navarre, which is a priority area for the regional Smart Specialisation Strategies. The timeframe ranges from 2018 to 2020, being this upper limit conditioned by the availability of information in the statistical sources consulted.

The beginning of the work explains the basis of the cited strategies. In the next section, the structure of the automotive value chain is presented, a division emphasised throughout the subsequent regional analysis. Then, the Spanish automotive business is examined, so that it serves as a reference for this industry in Navarre.

The end objective is reflected in the remaining parts of the paper: to determine the weight of the automotive sector in the Navarrese economy and to find relevant data on the assorted companies that make it up. All of this with the purpose of drawing conclusions and establishing a methodology, which is intended to operate as the grounds for future analysis in this field and other Navarrese advantageous economic areas.

KEYWORDS

Automotive sector, value chain, Navarre, Smart Specialisation Strategies.

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Evaluación de industrias estratégicas para Navarra: el sector de la automoción

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RESUMEN

La razón de ser del presente estudio radica en una propuesta de colaboración entre la Universidad Pública de Navarra y la empresa pública SODENA (Sociedad de Desarrollo de Navarra) para analizar el sector de la automoción en Navarra, área prioritaria de las Estrategias de Especialización Inteligente regionales. El horizonte temporal comprende los años 2018-2020, estando este límite superior condicionado por la disponibilidad de información en las fuentes estadísticas consultadas

Al inicio del trabajo se explican las bases de las citadas estrategias. En el siguiente apartado, se presenta la estructura de la cadena de valor de la industria de la automoción, división que se enfatiza a lo largo del posterior análisis regional. Después, se examina el negocio de la automoción en España, de forma que sirva de referencia para este sector en Navarra.

El objetivo final se refleja en las restantes partes del trabajo: determinar el peso de la industria de la automoción en la economía navarra y encontrar datos relevantes sobre las variadas empresas que lo componen. Todo ello con el fin de extraer conclusiones y establecer una metodología, que se pretende que sirva de base para futuros análisis en este ámbito y otras áreas económicas ventajosas de Navarra.

PALABRAS CLAVE

Sector de la automoción, cadena de valor, Navarra, Estrategias de Especialización Inteligente.

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Nafarroako industria estrategikoen balorazioa: automobilgintza sektorea

Leire Bergera Noya

Nafarroako Unibertsitate Publikoa

LABURPENA

Ikerketa honek Nafarroako Unibertsitate Publikoaren eta SODENA sozietate publikoaren arteko lankidetza-proposamenean du jatorria. Honen helburua Nafarroako Espezializazio Adimenduneko Estrategien lehentasunezko eremu den automobilgintza-sektorea aztertzea da. Denbora-horizonteak 2018-2020 urteak hartzen ditu, bere goiko muga kontsultatutako estatistika-iturrietan informazioa eskuragarri egoteak baldintzatua dagoelarik.

Lanaren hasieran, aipatutako estrategien oinarriak azaltzen dira. Hurrengo atalean, automobilgintzaren industriaren balio-katearen egitura aurkezten da, ondorengo eskualde-analisian azpimarratzen den zatiketa. Jarraian, Espainiako automobilgintza sektorea aztertzen da, Nafarroakoaren erreferentzia izan dadin.

Azken helburua lanaren gainerako ataletan islatzen da: automobilgintzak Nafarroako ekonomian duen garrantzia zehaztea eta hau osatzen duten enpresei buruzko datu baliagarriak aurkitzea. Hori guztia ondorioak atera eta etorkizunean hau eta Nafarroako beste eremu ekonomiko onuragarriak aztertzeko oinarri gisa balio dezan metodologia finkatzeko nahiarekin.

HITZ GAKOAK

Automobilgintza sektorea, balio-katea, Nafarroa, Espezializazio Adimendunen Estrategiak.

ESKERTZA

Autoreak lana burutzeko jaso duen laguntza SODENA sozietate publikoari, bereziki Daniel Mazo Sáezi, eta proiektuko zuzendari izan diren Salomé Goñi Legaz eta Cristina Madorrán Garciari eskertzen die.

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1. INTRODUCTION

The automotive sector is widely considered as one of the leading industries in Spain and also in several Autonomous Communities, including Navarre, which recognises it as a priority area in regional Smart Specialisation Strategies.

The objective of this paper is to analyse the Navarrese automotive sector and determine how it contributes to the regional economy. The research results from a proposal for collaboration with the public enterprise SODENA, which seeks relevant information on this territory's strategic areas. The proposition is accepted because of the interest in studying the structure and main magnitudes of such a well-known and significant business for Navarre.

The description of the automotive sector is not as evident as it may seem. Both national and regional researches tend to portray this industry through an approach based on the CNAE classification, which does not provide an adequate framework for today's reality. Their work is limited to the main automotive business CNAE: 29XX ("Manufacture of motor vehicles, trailers, and semi-trailers"), 30XX ("Manufacture of other transport equipment") and 45XX ("Sale and repair of motor vehicles and motorbikes"). Therefore, these studies do not cover the whole automotive activity, as numerous companies with other codes are also part of the same.

Our research performs an analysis centred on the automotive value chain, trying to cover the Navarrese firms in this scheme through an activity-based screening. In this manner, the number of CNAE considered is broadened, as these codes do not operate as the criterion for identifying which firms belong to the automotive sector, but their activity.

The paper is framed within Smart Specialisation Strategies. Their Navarrese model tries to potentiate this territory's most advantageous economic fields, named the automotive. The following section presents the automotive industry's value chain as a conceptual framework for this study. Afterwards, the situation of the sector in Spain is described to move on to focus the research on Navarre.

The majority of the Navarrese outcomes are obtained from a database expressly created for this work, which is employed for analysis, comparison, and conclusions.

The selected time period for the study is 2018-2020, as it covers very different moments for this business and remarks its dynamism. Thus, the results in this work not only situate the automotive sector in an initial epoch of prosperity, but also in a final year of great economic instability due to the Covid-19 pandemic. Since then, this industry is in a declining trend, which is trying to be reversed by those who make it up.

For all the above reasons, this work describes the automotive sector in Navarre in a way that best fits the reality. The outcomes will be useful for Navarrese automotive enterprises and also for public institutions. In fact, the description according to the value chain offers an entire perspective of the automotive sector, without the contribution of some of its members remaining unaccounted.

2. SMART SPECIALISATION STRATEGIES

The Europe 2020 Strategy, devised by the European Commission in 2010, arises to promote "smart, sustainable and inclusive economic growth". It is aimed at reducing regional differences and guaranteeing a balanced development. For this purpose, it integrates industrial, educational, economic and innovation policies and objectives to achieve an efficient spending of public resources, maximise regional advancement and reach an economy based on knowledge (OECD, 2021).

The S3 (Smart Specialisation Strategies) are a model for the economic progress, which involve the concentration of resources on the economic fields in which each territory has a competitive advantage. These strategies were conceived in the European Union, although they have expanded to other countries. In fact, this organisation has defined numerous requisites for regions to receive its funds, being one of them a suitable governance of their Smart Specialisation Strategy.

The post Covid-19 scenario has contributed to the evolution of this approach, opting for the change of the economy through digital and sustainable trends from 2021 to 2027. Multiple regions, including Navarre, have put faith in adding a fourth "S" of sustainability to the S3, searching for an environmentally friendly and human-responsible recovery.

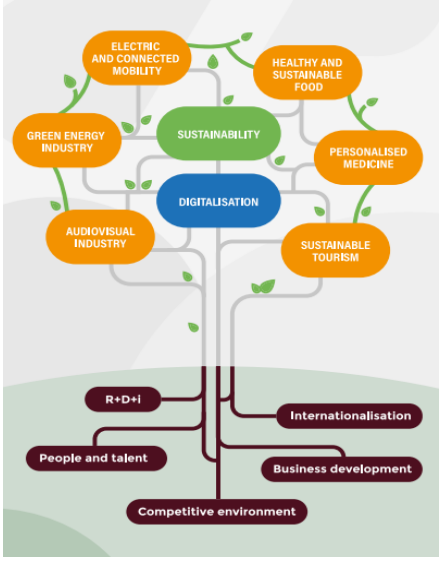
The S4 (Smart Specialisation Strategies for Sustainability) constitute the new agenda of regional economic transformation. They are devoted to promoting the transition towards

an eco-friendly, digital, and inclusive growth variant, which pursue economic development and environmental protection without losing sight of territorial and social cohesion (Gobierno de Navarra, Period 2021 - 2027).

The novel nature of these strategies means that the knowledge about their effectiveness is still scarce. Nevertheless, the investigation carried out by Di Cataldo et al. (2022), professors at the London School of Economics, revealed that the majority of Smart Specialisation approaches are not sufficiently linked to each zone's conditions, which reduces their impact in increasing economic and social capacity.

However, Navarre seems to be moving away from this tendency, as it pursues a manageable number of strategies. As shown in figure 1, the S4 revolves around eight thematic priorities in this Autonomous Community. Six of these activities encompass similar fields to the ones of the S3, including electric and connected mobility. The remaining two programmes comprehend green and digital transition, which impact on all six of the above (Gobierno de Navarra, Period 2021 - 2027).

Figure 1. Navarrese Smart Specialisation Strategy for Sustainability (S4).



SOURCE: Government of Navarre.

As reflected in figure 1, five factors of competitiveness constitute the main areas of work for the proliferation of the expressed thematic priorities, named business development and R+D+i. It is interesting to add that the enforcement of the S4 in Navarre requires public-private collaboration and a constant monitoring plan to ensure its adequate implementation (Gobierno de Navarra, Period 2021 - 2027).

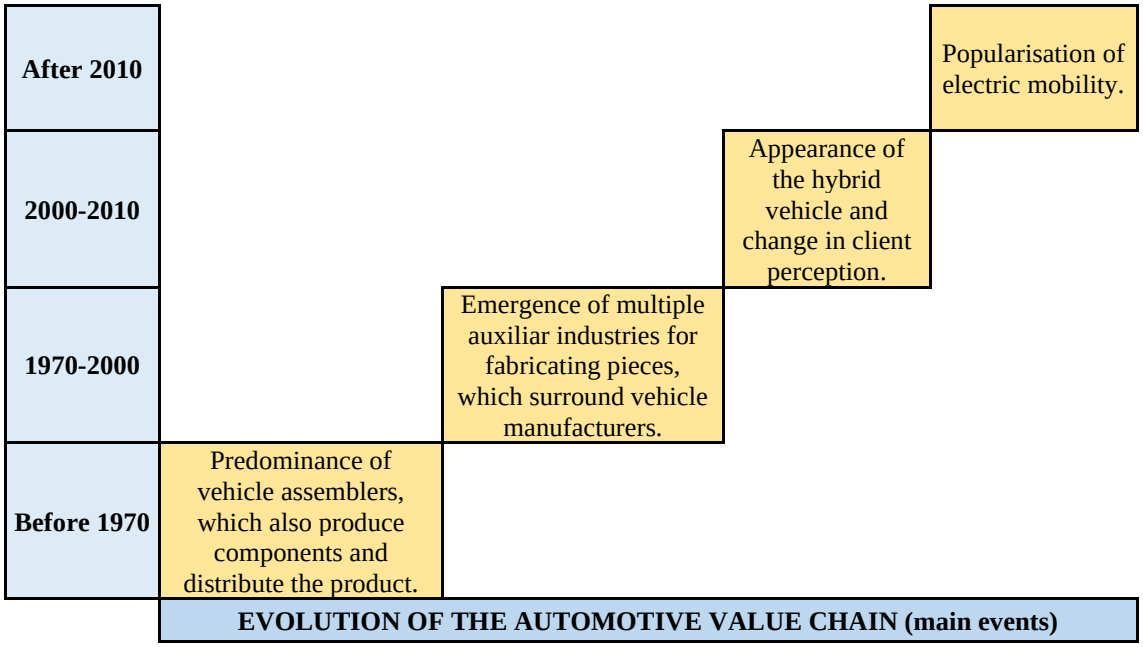
3. THE VALUE CHAIN IN THE AUTOMOTIVE SECTOR

The different agents that make the automotive sector value chain up have configured a system in which each of them contributes to the final vehicle. This scheme is characterised by its dynamism, as it has evolved to take full advantage of the opportunities in its environment.

Martínez and Naranjo (2014) analyse the evolution of this value chain distinguishing diverse stages, which are indicated in figure 2 and explained in depth below.

Until 1970, most of the cars were produced in a single company, with its own fabrication and distribution systems, being auxiliar businesses irrelevant. From 1970 to 2000, the model was the opposite: the vehicle plant became a smaller parent firm, which subcontracted component construction. The pyramidal hierarchy organisation that took shape during this time is still predominant today.

Figure 2. Evolution of the automotive sector's value chain.



SOURCE: Own elaboration, based on data from Martínez and Naranjo.

According to Silver (2016), this structure is built upon assemblers, commonly known as original equipment manufacturers (OEM). However, this designation is a misnomer because, although these businesses produce certain original pieces, their true commitment is designing vehicles, ordering equipment from suppliers, constructing the final good and launching it to the market.

As determined in figure 3, in Spain automobile assemblers reach the sum of 17 and are basically found in the central and northern part of the country. A single factory is located in seven out of the 11 cities. On the contrary, there are four in Barcelona and two in Madrid, Valladolid, and Santander.

Figure 3. Location of vehicle assemblers in Spain.

SOURCE: Cadenas.

Further, it is glimpsed that the last vehicle cannot be achieved without the collaboration of the remaining industry participants. In this way, first-tier suppliers (Tier 1) contribute to the chain by furnishing components directly to assemblers. They are responsible for developing solutions tailored to the finished vehicles, without excessive modifications.

Tier 1 providers cannot function alone, but have to employ numerous parts in order to elaborate their articles. This is where second-tier suppliers (Tier 2) come into play. This type of purveyors are experts in a particular area of making and they contribute to the fabrication of the final vehicle by commercialising the indispensable elements to first-tier marketers. For this purpose, they take advantage of the basic articles and raw materials provided by third-tier suppliers (Tier 3), with whom they are closely linked.

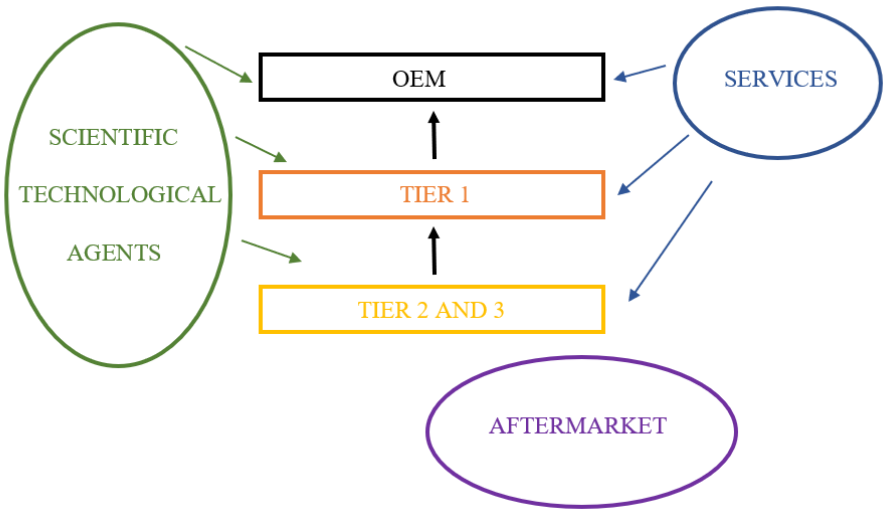
Overall, there must be a full and efficient coordination between assemblers and their Tier 1, Tier 2 and Tier 3 distributors so that the value chain runs appropriately and without interruptions that can compromise production (Knauf Industries - Automotive, 2020).

In addition to the above-mentioned participants, many other firms play a part in this process by virtue of the offering of different services related to the automotive sector, such as industrial maintenance or innovative technology solutions to drive enterprises to success. Moreover, another significant section of the automotive value chain is the market for replacement pieces, which is known as “Aftermarket” (ACAN, 2022).

Finally, Scientific-Technological Agents have their place in this scheme too, whose role ranges from research, development, and innovation to professional training to upgrade the functionality and sustainability of other institutions.

Figure 4 summarises the performance of the automotive industry's value chain. In the centre of the image its main actors are reflected: at the bottom part, Tier 2 & 3 suppliers provide their basic pieces and raw materials to Tier 1 purveyors, which fabricate components that they distribute to vehicle assemblers (OEM). All these participants benefit from the aid of service offerors and Scientific-Technological Agents. Lastly, Aftermarket is separated, as it operates as a secondary market, which installs automobile equipment that needs to be replaced after the car has been sold to the end consumer by the OEM.

Figure 4. The structure of the automotive sector's value chain.



SOURCE: Own elaboration.

From 2000 to 2010, the only changes in the presented value chain were the appearance of the hybrid vehicle and client perception, who began to value design and connectivity. From the year 2010 onwards, electric mobility established its niche in the market, supported by successful hybrid car sales, which are still booming.

The value chain will continue to be shaped as examined before, but it will increasingly integrate the production of hybrid and electric automobiles, creating opportunities for the members of the automotive sector. Actually, this tendency will require a redefinition of manufacturing processes, the development of new engines and batteries, and the introduction of additional security measures.

4. THE AUTOMOTIVE SECTOR IN SPAIN

The following pages are devoted to the analysis of the automotive sector in Spain. The study of this system operates as a background of this same industry in Navarre.

4.1. Weight in the national economy

The automotive industry in Spain tends to be portrayed as one of the most relevant in the country. The Spanish Association of Automobile and Truck Manufacturers (ANFAC) ensures this in its annual reports. Indeed, its paper for 2021 establishes that the operating income of vehicle and component manufacturers represents 7,70% of the Gross Domestic Product (GDP). Moreover, it estimates that, considering the contribution of the remaining sectors related to the automotive one, this number exceeds 10%.

Nonetheless, several studies have disproved these figures. They underline that, although the automotive sector is relevant in the Spanish economy, real data should be employed to support this importance and the economic policies designed based on it.

Asensio and Jiménez (2021) were committed to check the accuracy of the expressed percentages, mainly on the basis of the Gross Value Added (GVA): the value of the products manufactured in a country, net of taxes and intermediate consumptions.

The mentioned two economists took advantage of the national accounts published by the National Statistics Institute (INE) and extracted the GVA of the automotive industry (CNAE 29XX and CNAE 45XX). They divided this amount by the National GVA, but they pointed up that the National GDP could operate as the denominator too. In this manner, they refuted ANFAC's assumption, as they found that the automotive sector constituted a very lower percentage, around about 2,50%.

They suspected that the difference in their result and ANFAC's comes from the treatment of intermediate consumptions. This Association's percentage is higher because it adds the operating income of vehicle assemblers, component manufacturers, and final product distributors, and it divides this sum by GDP. Consequently, as it bases its methodology on the operating income, it does not deduct intermediate consumptions. For instance, the value of a piece sold to an automobile manufacturer whose vehicles are commercialised by a distributor, would be summed three times: as part of the operating income of the producer of this piece, the car constructor, and the final seller.

On the contrary, the calculation of Asensio and Jiménez (2021), based on the GVA, only considers the individual economic contribution of each participant in the value chain. Therefore, it avoids the triplicity incurred by accounting the entire value chain without deducting the value added by upstream participants, which seems to be the error that institutions supporting the earlier quoted 10% commit.

Table 1 reflects the application of this methodology to INE's latest data. However, for this study, it has been decided to extract the GVA for CNAE 29XX ("Manufacture of motor vehicles, trailers and semi-trailers") and CNAE 30XX ("Manufacture of other transport equipment"). These two codes are selected because they are those that The Navarrese Statistics Institute (NASTAT) considers as the automotive business. In this manner, the accuracy of future comparisons between Spain and Navarre is ensured.

The conclusion is similar to that of Asensio and Jiménez (2021). If the sum of the GVA of both CNAE 29XX and CNAE 30XX is divided by GVA, the weight of the Spanish automotive sector ranges from 1,49% in 2020 to 1,57% in 2018. If GDP is taken as the denominator, the automotive industry weights 1,42% in 2018. In any case, irrespective of the denominator used, it is clear that these figures are far from the 10% that is usually considered.

Table 1. Weight of the Spanish automotive sector in the national economy (2018-2020).

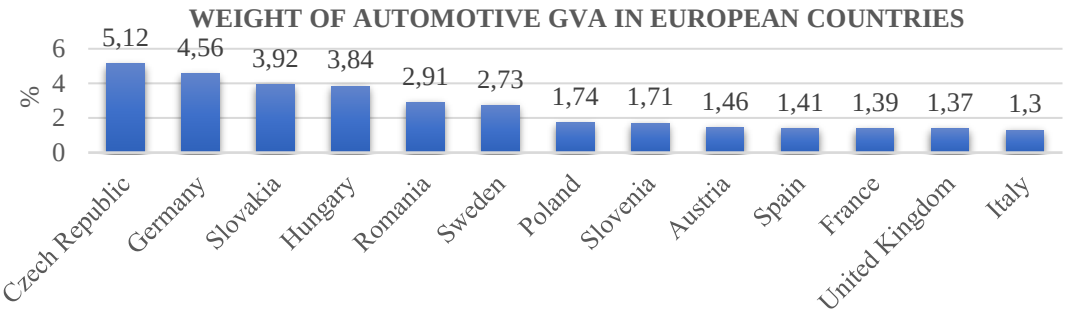
(MILLION EUROS)	**2018**	**2019**	**2020**
GVA Manufacture of motor vehicles, trailers, and semi-trailers (CNAE 29XX).	12.404	12.309	10.767
GVA Manufacture of other transport equipment (CNAE 30XX).	4.745	5.086	4.416
GVA (Gross Value Added).	1.089.420	1.129.619	1.020.065
GDP (Gross Domestic Product).	1.208.248	N.d.	N.d.
Weight of the Spanish automotive sector (GVA). $\frac{GVA\ CNAE\ 29XX + GVA\ CNAE\ 30XX}{GVA}$	**1,57%**	**1,54%**	**1,49%**
Weight of the Spanish automotive sector (GDP). $\frac{GVA\ CNAE\ 29XX + GVA\ CNAE\ 30XX}{GDP}$	**1,42%**	N.d.	N.d.

SOURCE: Own elaboration, based on data from INE.

This methodology has been ratified by other studies, named the analysis published in CaixaBank Research in 2021, in which the automotive sector is also delimited including

CNAE 29XX and CNAE 30XX. This analysis goes one step further, as it compares the contribution of the automotive business to the national economy in European countries. As seen in figure 5, Spain is far from other states, such as Czech Republic and Germany, where the weight is superior due to a high qualified workforce, low labour costs and greater specialisation (Montoriol Garriga & Díaz, 2021).

Figure 5. Weight of automotive GVA in European countries (2018).



SOURCE: Own elaboration, based on data from CaixaBank Research and Eurostat.

4.2. Vehicle production and exports

2021 was expected to be a year of recovery for the automotive industry. Nonetheless, the component crisis damaged this sector, affecting both construction and export rates.

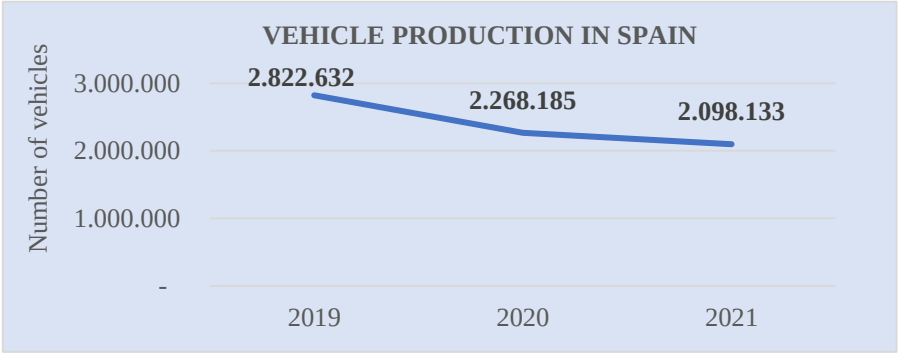
As noted in table 2 and figure 6, in 2021, the manufacture of vehicles reached the sum of 2.098.133 units, 7,50% less than the year before. This reduction is even larger when it is compared to previous times. For instance, fabrication in 2021 declined 25,60% with respect to 2019, a pre-pandemic year in which Covid-19 did not condition this industry.

Table 2. Vehicle production in Spain (2019-2021).

VEHICLE PRODUCTION (Number of vehicles)		
2019	**2020**	**2021**
2.822.632	2.268.185	2.098.133

SOURCE: Own elaboration, based on data from ANFAC.

Figure 6. Vehicle production in Spain (2019-2021).



SOURCE: Own elaboration, based on data from ANFAC.

Moreover, the shortage of pieces and the low demand from European markets, conditioned the volume of national exports. As it can be seen in table 3 and figure 7, the number of vehicles exported shows a downward tendency since 2019. Exports declined 6,70% in 2021 with respect to 2020 and 21,18% compared to 2019.

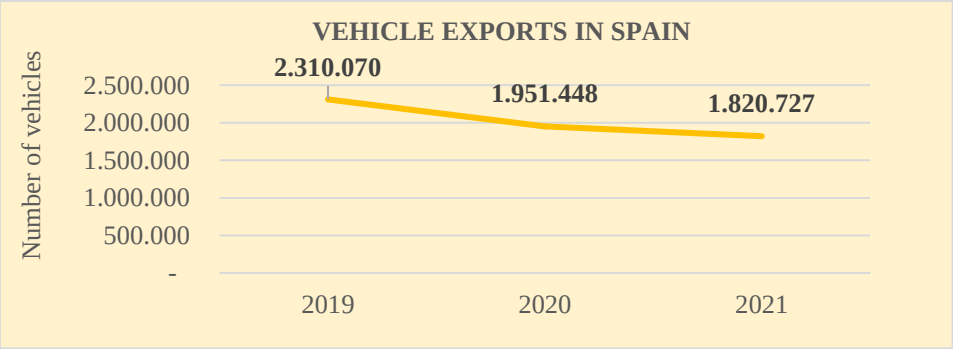
Indeed, the inferior manufacture gave rise to a reduction in shipments to European destinations, which represent nine out of ten of the units delivered outside Spain. Exports in the remaining continents experienced an increase, which came up to 55,30% in Oceania, 40,40% in Africa, and 20,60% in Asia. Even so, these destinations account for only 9,5% of the total and their impact in the last outcome is minimum (ANFAC, 2022).

Table 3. Vehicle exports in Spain (2019-2021).

VEHICLE EXPORTS (Number of vehicles)		
2019	**2020**	**2021**
2.310.070	1.951.448	1.820.727

SOURCE: Own elaboration, based on data from ANFAC.

Figure 7. Vehicle exports in Spain (2019-2021).



SOURCE: Own elaboration, based on data from ANFAC.

4.3. Number of companies and employment

The automotive sector employs a significant number of the Spanish population. Nevertheless, it is striking that this amount is on a downward trend. As for the data from the latest Labour Force Survey, the manufacture of motor vehicles, trailers, and semi-trailers (CNAE 29XX) employed 4,30% less workers in 2021 compared to the year before. Their sale and repair (CNAE 45XX) employed 5,50% less employees. This workforce reduction is the consequence of the Covid-19 pandemic and, principally, of the lack of stock of microchips, which has forced plants to stop production on several occasions (Fleet People, 2022).

It is interesting to analyse this downward tendency in the automotive business' employment in absolute terms. For this purpose, INE's latest data is used.

As expressed in table 4, the firms devoted to the "Manufacture of motor vehicles, trailers, and semi-trailers" (CNAE 29XX) constitute a minority in the industrial sector's businesses, more specifically, around about 1600 companies and more than 0,80%. The quantity of these enterprises has experienced a decline since 2018, being the amount in this last year 4,57% higher than that of 2020.

Table 4. Number of companies and their weight (CNAE 29XX).

	NUMBER OF COMPANIES		
	2018	**2019**	**2020**
Manufacture of motor vehicles, trailers, and semi-trailers (CNAE 29XX - industrial sector)	1.623	1.591	1.552
Industrial sector (total)	195.340	194.406	191.922
Weight of CNAE 29XX over the industrial sector	**0,83%**	**0,82%**	**0,81%**

SOURCE: Own elaboration, based on data from INE.

Besides, the majority of these producers are aimed at the fabrication of pieces to be used by vehicle assemblers. Thus, the national automotive industry is characterised by multiple component constructors that serve a reduced amount of vehicle manufacturers, which are only 17 firms (Cadenas, 2022).

Table 5 reflects the same headings as table 4, but regarding the "Sale and repair of motor vehicles and motorbikes" (CNAE 45XX). However, the presence of these businesses is more numerous in the commercial sector, exceeding 10% in the years 2018-2020, with nearly 77.000 firms. Even though this quantity declined 0,53% from 2019 to 2020, the figure this last year is still superior to that of 2018.

Table 5. Number of companies and their weight (CNAE 45XX).

	NUMBER OF COMPANIES		
	2018	**2019**	**2020**
Sale and repair of motor vehicles and motorbikes (CNAE 45XX - commercial sector)	76.400	77.360	76.947
Comercial sector (total)	744.063	739.923	725.581
Weight of CNAE 45XX over the commercial sector.	**10,27%**	**10,46%**	**10,60%**

SOURCE: Own elaboration, based on data from INE.

On the other hand, with respect to employment in the Spanish automotive sector, table 6 highlights that the production of motor vehicles, trailers, and semi-trailers employed approximately 160.000 people from 2018 to 2020, around 7% of the industrial sector's workers. Furthermore, according to the figures in table 7, more than 306.000 people worked in the commercialisation and repair of motor vehicles and motorbikes during this same time period, practically 10% of the commercial industry.

Table 6. Number of employees and their weight (CNAE 29XX).

	NUMBER OF EMPLOYEES		
	2018	**2019**	**2020**
Manufacture of motor vehicles, trailers, and semi-trailers (CNAE 29XX - industrial sector)	161.721	160.292	159.436
Industrial sector (total)	2.253.476	2.311.811	2.292.568
Weight of CNAE 29XX over the industrial sector.	**7,18%**	**6,93%**	**6,95%**

SOURCE: Own elaboration, based on data from INE.

Table 7. Number of employees and their weight (CNAE 45XX).

	NUMBER OF EMPLOYEES		
	2018	**2019**	**2020**
Sale and repair of motor vehicles and motorbikes (CNAE 45XX - commercial sector)	308.379	323.795	306.986
Comercial sector (total)	3.153.498	3.221.353	3.116.479
Weight of CNAE 45XX over the commercial sector.	**9,78%**	**10,05%**	**9,85%**

SOURCE: Own elaboration, based on data from INE.

5. THE AUTOMOTIVE SECTOR IN NAVARRE

This section is aimed at the study of the Navarrese automotive industry. Firstly, the weight of this sector in this Autonomous Community's economy, and its imports and exports are examined through official information sources. Afterwards, the methodology is presented, which is based on the value chain and enables a more realistic view of the automotive business in Navarre. This approach is used for the creation of a database with 145 companies, the figures of which are analysed below.

5.1. Weight in the regional economy

To determine the relevance of the Navarrese automotive sector in the regional economy, the procedure applied in section 4.1 is followed. For this purpose, the latest data from The Navarrese Statistics Institute (NASTAT) is employed. Thus, the Gross Value Added

(GVA) corresponding to the automotive industry in this Autonomous Community is divided by the regional GVA in order to obtain the weight of this business at the local level.

The GVA of the Navarrese automotive sector has been computed by NASTAT as the sum of CNAE 29XX ("Manufacture of motor vehicles, trailers and semi-trailers") and CNAE 30XX ("Manufacture of other transport equipment").

As underlined in table 8, nearly one fifth of the Navarrese GVA is attributed to the automotive business from 2018 to 2020. These figures are sufficient to corroborate the tendency that is reflected in regional Smart Specialisation Strategies, which seek to strengthen the areas having a competitive advantage in this Autonomous Community and include the automotive industry among them.

It is interesting to highlight that it is a percentage that remains stable over time, around about 19,44%. Even in times of economic instability, such as the Covid-19 pandemic in 2020, the decline in the weight of this business in Navarre is less than 1%.

Besides, the data in table 8 suggests that there are other leading industries in this Autonomous Community, named those centred on electricity and gas production and distribution, manufacture of metal products, and machinery and mechanical equipment. The first implies approximately 12% of the Navarrese GVA in the studied time period, whereas the second and the third entail 9,59% and 8,55% as an average, respectively. Nevertheless, according to these figures, the automotive sector outperforms them in Navarre, accounting for close to twice as much as the industry in second place.

Table 8. Weight of the Navarrese automotive sector in the regional economy (2018-2020).

(THOUSAND OF EUROS)	**GROSS VALUE ADDED (GVA)**		
	2018	**2019**	**2020**
GVA Manufacture of motor vehicles and other transport equipment (CNAE 29XX + CNAE 30XX)	**974.736,75**	**1.037.768,24**	**921.936,54**
GVA Electricity and gas production and distribution	577.652,61	662.084,16	560.789,24
GVA Manufacture of metal products	498.540,15	509.077,35	440.571,58
GVA Machinery and mechanical equipment	398.996,40	470.080,27	422.576,04
GVA Manufacture of electric and optical equipment	288.539,07	274.609,30	311.179,43
GVA Rubber and plastic industry	281.740,86	260.534,06	251.650,94

GVA Paper industry	210.984,09	212.865,56	190.793,34
GVA Non-metallic minerals	156.434,53	173.964,01	181.166,27
GVA Chemical and pharmaceutical industry	265.255,23	286.639,99	302.341,70
GVA Vegetables (agriculture)	212.206,95	224.401,45	240.303,66
GVA Repair and installation of machinery and equipment	173.279,11	169.027,44	171.170,90
GVA Other food industries	280.013,44	294.604,92	284.263,81
GVA Metallurgy	239.275,12	252.629,45	224.495,00
GVA Beverage and tobacco processing	115.688,11	116.539,63	122.853,11
GVA Others	283.819,16	294.349,72	268.509,26
Navarrese GVA	**4.957.161,58**	**5.239.175,55**	**4.894.600,82**
Weight of the Navarrese automotive sector $\frac{GVA\ CNAE\ 29XX + GVA\ CNAE\ 30XX}{Navarrese\ GVA}$	**19,66%**	**19,81%**	**18,84%**

SOURCE: Own elaboration, based on data from NASTAT.

Finally, when comparing this data with the numbers at the Spanish level expressed in table 1, it can be stated that the automotive sector is more relevant for the Navarrese economy than for the Spanish. In fact, from 2018 to 2020, the contribution of this industry to the national GVA is around about 1,50%, while the percentage with respect to the Navarrese GVA exceeds 18,84%.

This affirmation makes sense considering that the national GVA sums that of all the Autonomous Communities. The majority of them, mainly those in the south of Spain, do not have automotive as their main activity. Consequently, in the national case, the difference between the denominator and the numerator is much bigger, and the weight of the automotive sector very lower.

5.2. Imports and exports

In table 9, the data reported by ICEX suggests that, from 2018 to 2020, the value of exports in the Navarrese automotive industry supersedes 3.672 million euros. The evolution of this number is differentiated by a 20,20% increase in 2019 and a 22,38% fall in 2020, with an amount somewhat lower to that of 2018 because of Covid-19 pandemic and the consequent instability of both international and national markets.

2019 was a historic year regarding exports from Navarre, with the opening to new markets and more regular exporting businesses. The Navarrese automotive sector was the leader in exports, contributing to almost 50% of the regional amount. It was followed by the agrifood sector, representing 13% of Navarrese exports (Navarra.es, 2020).

If a distinction is made between the value of Navarrese exports for automobiles, and for components and accessories, it is worth to underline that in 2018 the former practically doubles the latter, while in 2019 and 2020 it is more than twice as high.

Besides, if these figures are contrasted with the Spanish data analysed in section 4.2 of this paper, it can be affirmed that the tendency is similar, with a peak in 2019 and a decrease in 2020 as a result of the negative impact of the pandemic on the global economy. As for the weight of the value of exports of the Navarrese automotive industry over the quantity of national automotive exports, more than 7% is attributed to the first territory.

Table 9. Exports from the Navarrese automotive sector (2018-2020).

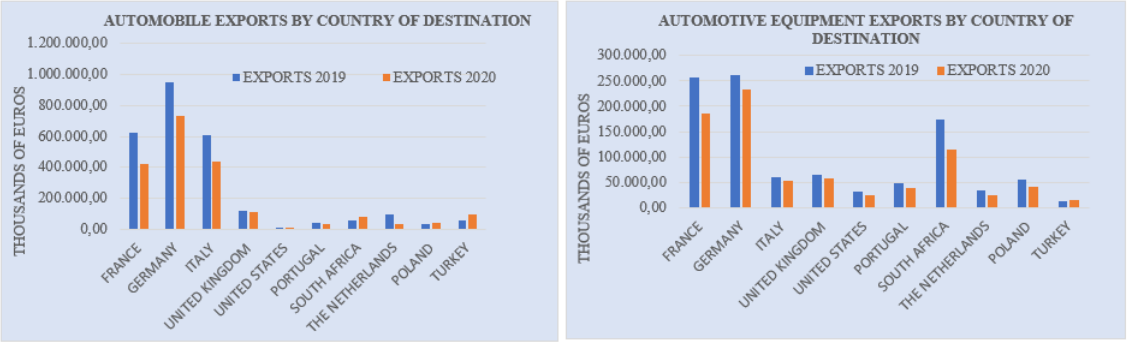
(THOUSANDS OF EUROS)	EXPORTS		
	2018	**2019**	**2020**
Automobiles (Navarrese exports)	2.591.964,78	3.263.588,63	2.623.719,55
Components and accessories (Navarrese exports)	1.344.336,45	1.467.851,12	1.048.921,06
TOTAL NAVARRESE EXPORTS (automotive industry)	3.936.301,23	4.731.439,75	3.672.640,60
TOTAL SPANISH EXPORTS (automotive industry)	56.078.449,53	55.602.624,24	49.133.476,71
Weight of Navarrese exports over national exports	7,02%	8,51%	7,47%

SOURCE: Own elaboration, based on data from ESTACOM.

There is a wide variety of countries of destination for Navarrese automotive exports. Figure 8 determines the ten main states to which Navarrese automobiles are sold according to the value of exports. The leading states both in 2019 and 2020 are Germany, France and Italy, a tendency that is repeated in ICEX's forecasts for 2021 and 2022.

Moreover, the mentioned figure offers this same information, but concerning the value of the exports for Navarrese automotive equipment and accessories. Although Germany and France are again in the lead, the third position is occupied by South Africa. This trend is present in the predictions for the next two years too.

Figure 8. Exports from the Navarrese automotive sector by country of destination (2019-2020).



SOURCE: Own elaboration, based on data from ESTACOM.

On the other hand, with respect to the value of automotive imports in Navarre shown in table 10, the pattern is analogous to that of exports. There is a 16,16% increase in 2019, mainly due to a 22,92% growth in component demand, which was necessary to cope with a year when production was significantly higher. In 2020, the value of imports declined 21,27%, reaching a lower amount than the quantity in 2018.

It is important to clarify that the value of imports for pieces is very superior to that of automobiles. Even in 2018, the year in which the latter was the highest, the value of imports for automotive parts in Navarre is more than 13 times superior. Furthermore, the weight of the value of imports of the Navarrese automotive sector over national automotive imports ranges from 3,46% in 2018 to 4,16% in 2020.

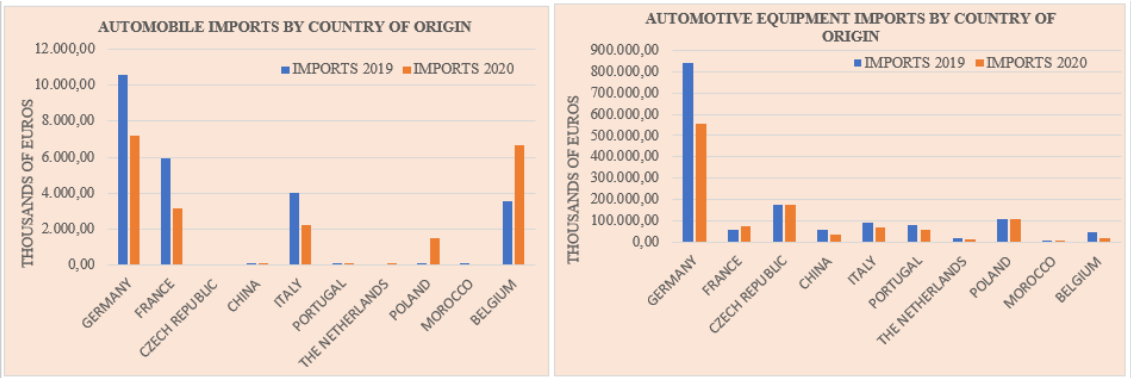
Table 10. Imports by the Navarrese automotive sector (2018-2020).

(THOUSANDS OF EUROS)	IMPORTS		
	2018	**2019**	**2020**
Automobiles (Navarrese imports)	110.628,31	25.886,75	21.591,98
Components and accessories (Navarrese imports)	1.518.379,53	1.866.371,77	1.468.233,39
TOTAL IMPORTS (automotive industry)	1.629.007,84	1.892.258,52	1.489.825,37
TOTAL SPANISH IMPORTS (automotive industry)	47.039.302,04	46.712.655,01	35.825.799,71
Weight of Navarrese imports over national imports	3,46%	4,05%	4,16%

SOURCE: Own elaboration, based on data from ESTACOM.

Figure 9 establishes the ten main countries from which the imports for the Navarrese automotive industry come from. Foreign automobiles were mainly purchased to German, French, Belgian and Italian manufacturers. Additionally, automotive equipment was fundamentally sold by producers in Germany, Czech Republic, and Poland, being the first state the main provider of accessories with a much higher value of German imports.

Figure 9. Imports by the Navarrese automotive sector by country of origin (2019-2020).



SOURCE: Own elaboration, based on data from ESTACOM.

In conclusion, the previous figures reflect that, from 2018 to 2020, the balance of trade in the automotive sector in Navarre is positive because the value of exports is close to 2,5 times superior to that of imports. The value of imports for components is around about 25,69% higher than the number for exports. Thus, the fact that the overall value of Navarrese automotive exports more than doubles imports is the result of the difference in value between vehicle exports and imports, with the first being more than 53 times higher than the second.

5.3. Methodology

As already advanced, the methodology is based on describing the automotive sector in Navarre according to the value chain. In addition, this process covers 27 two-digit CNAE to reflect the entire activity of this business. Thus, it differs from existing studies on the subject, which limit to the main automotive CNAE (29XX, 30XX and 45XX).

The initial step for structuring the data is the identification of the entities that form the Navarrese automotive sector, which sum 145. For this purpose, three documents are cross-checked (Appendix 1): a database on the Navarrese automotive business provided by SODENA and ACAN's (Asociación Clúster de Automoción de Navarra) two lists.

For searching the identified firms' economic figures, the CIF/NIF of all the enterprises, except the three scientific-technological agents, is introduced into SABI. The agents are excluded because they do not fit in the classical business concept and their inclusion in the numerical analysis would distort the results. The data for 2021 is also excluded from the analysis, as the accounting information of many firms for this year is not available.

There are several businesses in the database that operate through diverse delegations. There are also some companies that offer their products to various sectors. Therefore, their data in SABI includes the results of all these divisions and activities. As the analysis is aimed exclusively at the Navarrese automotive sector, the outcomes referring to delegations outside this Autonomous Community and the data corresponding to industries different from the automotive should be eliminated.

To separate the Navarrese data, the proportion of Navarrese workers over the number of employees in SABI is taken as a first correction factor (Appendix 2). Besides, there is a second correction factor to get just the automotive figures: the proportion of this industry over the total amount of industries in which each firm operates (Appendix 3).

Finally, the information concerning investment in R+D+i is not available in SABI and is requested by SODENA to the Navarrese Government. It is important to clarify that there may be more investment than that obtained through the calculation explained in Appendix 4. Actually, there are automotive businesses that have not solicited this concrete aid, that might have only benefited from other financial support for R+D+i, that only request tax deduction, that invest in R+D+i without third party aids, or that make an investment in R+D+i without identifying it as such.

5.4. Description by value chain position, location and CNAE

The automotive sector in Navarre in the present day is described below based on the database composed for this work and according to three criteria: value chain position, location and CNAE.

As remarked in table 11, this industry is formed by 145 firms. Nearly half of them, more precisely 46,21%, are Tier 2 & 3 distributors. They are aimed at the production of raw materials and components to be used by Tier 1 suppliers, which account for 17,93% and sell their equipment to vehicle assemblers (OEM).

The second bigger group focuses its activity on the offering of diverse services to facilitate the performance of OEM, Tier 1, and Tier 2 & 3 participants. It reaches the sum of 27 enterprises that imply 18,62% of the regional automotive industry. Additionally, the market for replacement pieces accounts for 11,72%, with 17 companies.

Only five firms are devoted to the manufacture of the final vehicle, being 3,45% of this sector. This scheme is completed with three entities that are classified as Scientific-Technological Agents and represent 2,07%. It is necessary to clarify that they are not included in the classical firm concept, but are public institutions or technological centres that support the value chain's remaining actors in research and development activities.

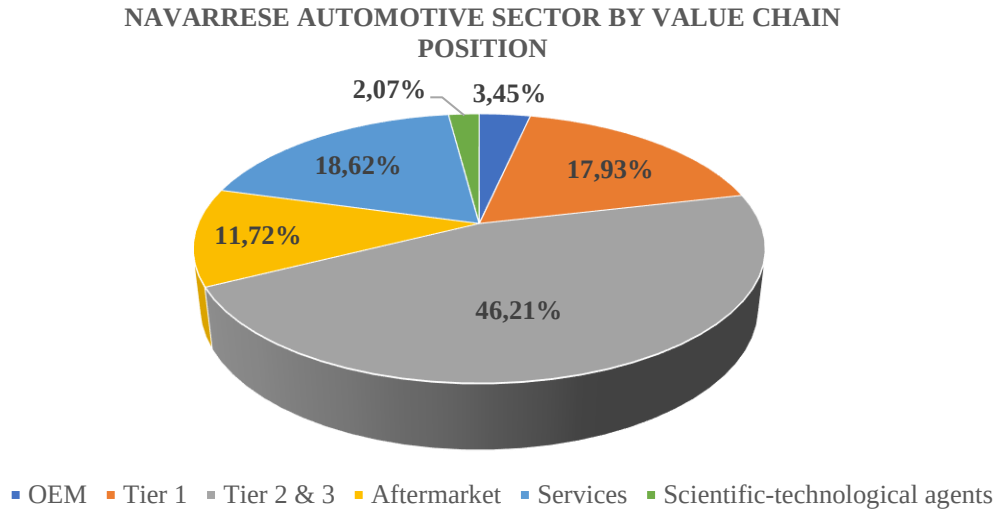
Table 11. Navarrese automotive sector by value chain position (2022).

	NAVARRESE AUTOMOTIVE SECTOR BY VALUE CHAIN POSITION						
POSITION	**OEM**	**Tier 1**	**Tier 2 & 3**	**Aftermarket**	**Services**	**Scientific-technological agents**	**TOTAL**
NUMBER OF FIRMS/ ENTITIES	5	26	67	17	27	3	145
%	3,45%	17,93%	46,21%	11,72%	18,62%	2,07%	100,00%

SOURCE: Own elaboration, based on data from SODENA and ACAN.

As it can be seen in figure 10, the Navarrese automotive industry is distinguished by the predominance of enterprises that manufacture and distribute materials and components for assembling the final vehicle. In fact, if both Tier 1 and Tier 2 & 3 positions are added, they imply more than half of this sector. This conclusion coincides with that of the Spanish automotive industry, where automobile assemblers are also a minority in a sector that mainly constructs parts to be used by them.

Figure 10. Navarrese automotive sector by value chain position (2022).



SOURCE: Own elaboration, based on data from SODENA and ACAN.

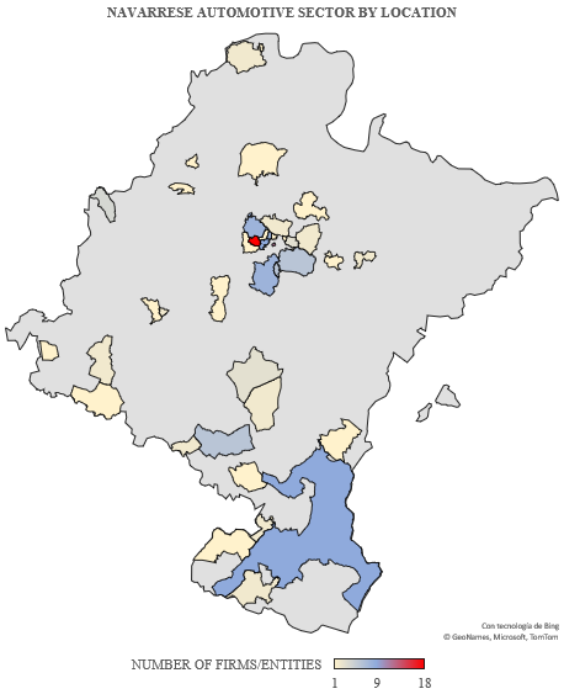
On the other hand, figure 11 determines how these companies are spread throughout Navarre. It is essential to bear in mind that the information of interest for this paper is given by the colours employed to remark each zone. Actually, they reflect the number of entities in each location, irrespective of the square kilometres involved.

In the areas remarked in light yellow there are between one and three firms. The number of enterprises increases as the colour becomes bluer, reaching nine companies when it is darker. Finally, the places with the highest concentration of firms are shown in red.

As it can be seen in figure 11, the majority of the actors in the Navarrese automotive sector are concentrated in the Region of Pamplona, specifically, 94 companies, which account for 64,83%. In fact, the central part of the map is differentiated with dark blue and red, implying the presence of a large number of entities in a small part of the territory.

Therefore, just 35,17% of the enterprises are located in other zones of this Autonomous Community. It should be pointed up that the majority of them are situated in the south of Navarre, principally in Peralta and Tudela, where there are six and nine firms, respectively. On the contrary, there are only a few companies in the northern part, being Lesaka, with two entities, where the concentration is the highest.

Figure 11. Navarrese automotive sector by location (2022).



SOURCE: Own elaboration, based on data from Axesor, Empresite el Economista, Iberinform, Einforma

Besides, concerning the CNAE criterion, if the four-digit classification is considered, there is a total of 55 different codes among Navarrese automotive sector participants. This very detailed study makes the variety of numbers greater, making it difficult to identify enterprises engaged in similar activities. Consequently, table 12 groups the firms having the same two-digit CNAE, presents the quantity of enterprises that are distinguished by each and highlights the most repeated ones in orange.

The outcomes go in line with the industry that is being analysed in this paper. Indeed, 33,10% of the businesses are characterised by CNAE 29XX ("Manufacture of motor vehicles, trailers, and semi-trailers") and 8,28% by CNAE 45XX ("Sale and repair of motor vehicles and motorbikes"), which are two of those than tend to be associated with the automotive sector.

The remaining most reiterated codes refer to the manufacture of rubber and plastics (CNAE 22XX), representing 11,72%; the production of metals (CNAE 25XX), entailing 11,03%; and the construction of machinery and other equipment (CNAE 28XX), implying 5,52%. The number of companies described by these codes suggests the significance of material and piece manufacturers in the Navarrese automotive industry, an aspect that is also concluded if the sector is examined according to the number of firms in each value chain position.

Table 12. Navarrese automotive sector by CNAE (2022).

NAVARRESE AUTOMOTIVE SECTOR BY CNAE (2 NUMBERS)			
CNAE	**DESCRIPTION**	**NUMBER OF FIRMS/ ENTITIES**	**%**
15XX	Leather and footwear industry.	1	0,69%
17XX	Paper industry.	1	0,69%
20XX	Chemical industry.	2	1,38%
22XX	Manufacture of rubber and plastic products.	17	11,72%
23XX	Manufacture of other non-metallic mineral products.	2	1,38%
24XX	Metallurgy: manufacture of iron, steel, and ferro-alloy products.	2	1,38%
25XX	Manufacture of metal products, except machinery and equipment.	16	11,03%
26XX	Manufacture of computer, electronic and optical products.	4	2,76%
27XX	Manufacture of electric material and equipment.	2	1,38%
28XX	Manufacture of machinery and equipment not elsewhere specified.	8	5,52%
29XX	Manufacture of motor vehicles, trailers, and semi-trailers.	48	33,10%
30XX	Manufacture of other transport equipment.	1	0,69%
32XX	Other manufacturing industries.	1	0,69%

33XX	Repair and installation of machinery and equipment.	2	1,38%
45XX	Sale and repair of motor vehicles and motorbikes.	12	8,28%
46XX	Wholesale trade and intermediaries, except of motor vehicles and motorcycles.	4	2,76%
49XX	Land and pipeline transport.	3	2,07%
52XX	Warehousing and storage activities related to transport.	2	1,38%
62XX	Programming, consultancy, and other computer-related activities.	2	1,38%
64XX	Financial services, except insurance and pension funds.	2	1,38%
70XX	Head office activities; management consultancy.	1	0,69%
71XX	Architectural and engineering technical services; technical testing and analysis.	4	2,76%
72XX	Research and development.	3	2,07%
81XX	Building services and gardening activities.	1	0,69%
82XX	Office administrative activities and other auxiliary business activities.	2	1,38%
85XX	Education.	1	0,69%
88XX	Social activities without accommodation.	1	0,69%
TOTAL	-	145	100,00%

SOURCE: Own elaboration, based on data from Axesor, Empresite el Economista, Iberinform, Einforma.

Finally, table 13 goes one step further and combines both criteria: value chain position and CNAE. In this manner, it is examined whether the descriptions of the CNAE that stand out most fit into the value chain groups of the enterprises having that same code. Moreover, the most reiterated business profile in each CNAE is remarked in orange.

On the one hand, there is a concordance between the two factors. For example, the enterprises differentiated by CNAE 28XX that refers to the production of machinery and other equipment are mostly service offerors and Tier 2 & 3 suppliers, while those having code 45XX pertain to Aftermarket, as they manufacture and sell replacement pieces.

On the other hand, the most repeated firm profile refers to Tier 2 & 3 companies aimed at the "Manufacture of motor vehicles, trailers, and semi-trailers" (CNAE 29XX), with 20 businesses that represent 13,79% of the automotive industry in Navarre.

The second most reiterated type is that of Tier 2 & 3 distributors dedicated to the production of rubber and plastic products (CNAE 22XX), which account for 16 enterprises and reach 11,03% of the sector. The third position is occupied by firms that also belong to the cited value chain stage, but are devoted to the construction of metals (CNAE 25XX), with 12 companies implying 8,28%.

Table 13. Navarrese automotive sector by CNAE and value chain position (2022).

NAVARRESE AUTOMOTIVE SECTOR BY CNAE AND VALUE CHAIN POSITION					
CNAE	**DESCRIPTION**	**NUMBER OF FIRMS/ ENTITIES**	**%**	**VALUE CHAIN POSITIONS**	**NUMBER OF FIRMS/ ENTITIES IN EACH VALUE CHAIN POSITION**
22XX	Manufacture of rubber and plastic products.	17	11,72%	Tier 1	1
				Tier 2 & 3	**16**
25XX	Manufacture of metal products, except machinery and equipment.	16	11,03%	Tier 1	2
				Tier 2 & 3	**12**
				Services	2
28XX	Manufacture of machinery and equipment not elsewhere specified.	8	5,52%	Tier 2 & 3	3
				Aftermarket	1
				Services	**4**
29XX	Manufacture of motor vehicles, trailers, and semi-trailers.	48	33,10%	OEM	4
				Tier 1	14
				Tier 2 & 3	**20**
				Aftermarket	8
				Services	2
45XX	Sale and repair of motor vehicles and motorbikes.	12	8,28%	OEM	1
				Tier 1	1
				Tier 2 & 3	1
				Aftermarket	**8**
				Services	1

SOURCE: Own elaboration, based on data from SODENA, ACAN, Axesor, Empresite el Economista, Iberinform, Einforma.

5.5. Employment

Table 14 reflects that the employment in the Navarrese automotive industry ranges from 18.769 employees in 2018 to 16.206 workers in 2020 and presents a downward trend.

2018 is considered a unique year of growth in terms of employment for this sector, mainly because of the increase in vehicle registrations and the manufacture of new models (Catalán, 2018). Nonetheless, there is a 7,53% decline in 2019, when employment was impacted by a higher automation of the sector and the need for less manpower (Morrás, 2019). 2020 is also characterised by a reduction in this industry's workforce, this time by 6,62%. In spite of the consequences of the economic instability caused by Covid-19 pandemic situation, the decline this last year is nearly 1% less than the year before.

It is necessary to highlight that not all the positions in the value chain have been affected in the same way. Among the groups that depart from the pattern of employment decline

discussed above, the Aftermarket stands out, as it is the only position that presents an upward tendency during the three years. Perhaps, this opposite trend is due to an epoch of delay in vehicle renewal, with an increasing demand of spare parts (ANFAC, 2022).

Furthermore, if these figures are compared with those of the Spanish automotive sector, presented in section 4.3 of this paper, it can be concluded that both employment tendencies coincide, with a decrease in this industry's national workforce since 2019. Ultimately, the earlier presented factors that have led to this decline are not isolated elements affecting only Navarre, but Spain as a whole. It can be added that the workforce of this Autonomous Community represents approximately 3,68% of the national.

Table 14. Employees in the Navarrese automotive sector (2018-2020).

	NUMBER OF EMPLOYEES		
VALUE CHAIN POSITION	**2018**	**2019**	**2020**
OEM	5.048,79	5.311,28	4.781,32
Tier 1	6.972,73	5.465,06	5.231,15
Tier 2 & 3	5.668,65	5.439,40	4.717,20
Aftermarket	484,76	506,50	910,06
Services	594,74	634,38	567,10
TOTAL (by year)	18.769,67	17.356,62	16.206,83

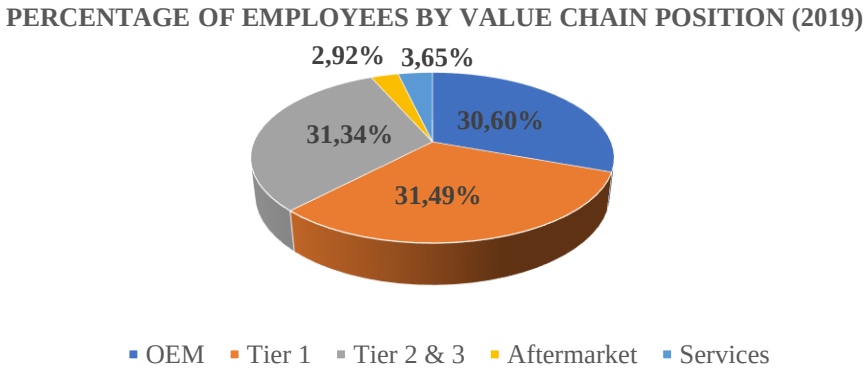
SOURCE: Own elaboration, based on data from SABI.

Figure 12 shows the percentage of workers by value chain position for 2019. It has been decided to take this year's outcomes as a reference from this section onwards. Actually, it offers an adequate perspective of the automotive business because it is in the middle between the beneficial epoch of 2018 and the Covid-19 pandemic distortion of 2020.

Two of the most numerous groups in entities, Tier 2 & 3 and Tier 1, are the ones that generate the most employment, exceeding 31%. However, it is striking that the latter, with 26 companies, employs slightly more people than the former, with 67. The reason responds to the size of the enterprises: among Tier 1 suppliers the average number of workers per firm is approximately 220, whereas in the case of Tier 2 & 3 providers it is around about 76.

In addition, it should be noted that these two positions are closely followed by OEM, which employ 30,60% of this sector with only five companies. This result is principally due to the contribution of Volkswagen Navarra SA, with around about 4.750 employees from 2018 to 2020. Finally, the remaining participants imply a minimal part of the Navarrese automotive industry's employment, as they are not involved in the main activity of this sector, but rather in more secondary aspects.

Figure 12. Percentage of employees in the Navarrese automotive sector (2019).



SOURCE: Own elaboration, based on data from SABI.

5.6. Revenue and net income

Table 15 expresses that revenues in the Navarrese automotive industry vary from 7.462 million euros in 2018 to 6.291 million euros in 2020. This figure remained quite stable during the examined first two years, with a 6,21% increase in 2019. Nevertheless, it declined 20,62% in 2020 due to the production stoppages because of the pandemic situation. This same tendency is suggested for the Spanish automotive sector, analysed in section 4.2 of this paper, which has experienced a downward trend in production since 2019.

Table 15. Revenues in the Navarrese automotive sector (2018-2020).

(THOUSANDS OF EUROS)	REVENUES		
VALUE CHAIN POSITION	**2018**	**2019**	**2020**
OEM	3.226.293,76	3.824.166,62	3.020.805,43
Tier 1	2.150.686,28	2.060.624,15	1.606.542,00
Tier 2 & 3	1.610.658,16	1.577.040,70	1.243.113,40
Aftermarket	366.578,17	359.981,31	331.829,64
Services	107.483,88	103.102,63	88.367,63
TOTAL (by year)	7.461.700,25	7.924.915,41	6.290.658,10

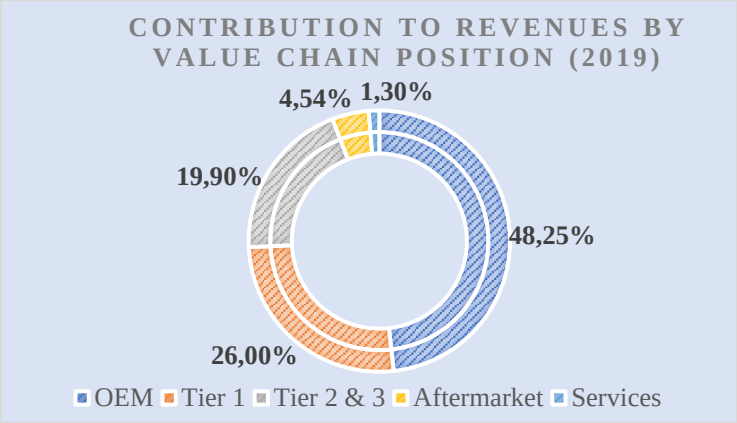
SOURCE: Own elaboration, based on data from SABI.

In figure 13, the outcomes for 2019 are again taken as a reference to analyse the contribution of each value chain stage to revenues. The position that contributes the most to revenues is OEM, with 48,25%. Therefore, nearly half of the automotive industry's sales are attributed to only five businesses, which are devoted to vehicle assembling. What is more, 47,10% of this number corresponds to a single enterprise, which is none other than Volkswagen Navarra SA.

The second value chain group in this ranking is Tier 1, which accounts for 26,00% of the sector's revenues. It is closely followed by Tier 2 & 3 that make a contribution of 19,90%. Lastly, the percentage of sales that corresponds to the remaining actors is minimum: the market for replacement pieces reaches 4,54%, while service offerors represent 1,30%.

These figures come as no surprise, as those participants that focus on vehicle and equipment manufacturing, the main activities of the automotive industry, are the ones that generate 94,16% of its revenues in Navarre.

Figure 13. Contribution to revenue by value chain position in the Navarrese automotive sector (2019).



SOURCE: Own elaboration, based on data from SABI.

With regard to net income in the Navarrese automotive sector, table 16 reflects a downward trend since 2018. Even though the figures in 2018 and 2019 are quite alike, around about 230 million euros, there is a 56,39% decrease in 2020. This percentage determines how critically the Covid-19 pandemic impacted on profits. Actually, as already mentioned, revenues declined 20,62%, but the fall in profits in relative terms more than doubled it, which implies that costs at this time were much higher. It is worth to add that, in 2020, value chain positions, named Tier 1 and Services, registered losses.

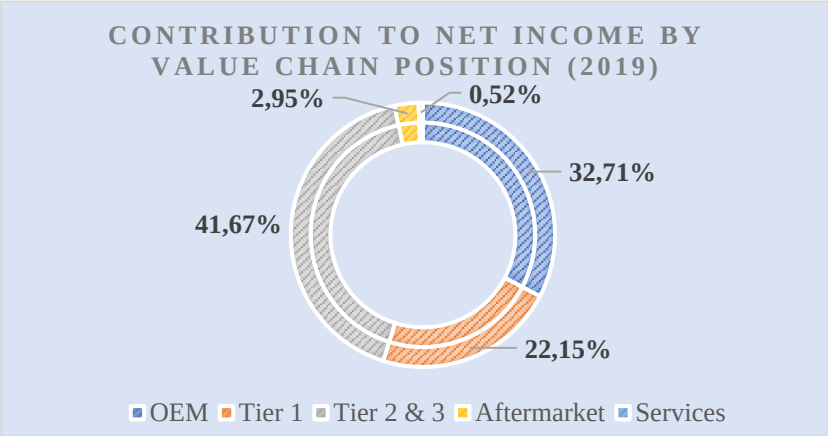
Table 16. Net income in the Navarrese automotive sector (2018-2020).

(THOUSANDS OF EUROS)	NET INCOME		
VALUE CHAIN POSITION	**2018**	**2019**	**2020**
OEM	62.446,41	74.820,20	63.800,92
Tier 1	78.359,31	50.677,94	- 23.038,06
Tier 2 & 3	90.755,25	95.334,54	56.954,15
Aftermarket	6.124,50	6.742,35	2.960,33
Services	761,08	1.196,38	- 899,42
TOTAL (by year)	238.446,55	228.771,41	99.777,92

SOURCE: Own elaboration, based on data from SABI.

On the subject of the contribution to net income in the Navarrese automotive industry for 2019, figure 14 shows a change in the ranking compared to that for revenues. Tier 2 & 3 suppliers, with a 41,67%, are the leaders in net income. They are followed by OEM, accounting for 32,71% and Tier 1 providers, which reach 22,15%. The idea highlighted above is again repeated, as the remaining sector participants account for less than 3,50% of net income. Consequently, the more residual nature of their activity for the automotive industry is also reflected in their lower contribution to total profits.

Figure 14. Contribution to net income by value chain position in the Navarrese automotive sector (2019).



SOURCE: Own elaboration, based on data from SABI.

5.7. Gross value added (GVA)

Table 17 informs about the gross value added (GVA) of the analysed companies. This variable refers to the additional utility of products as a result of their transformation process. It is believed that automotive industries have a high GVA because vehicle and component manufacturing requires complex production processes and intensive knowledge (López, 2018).

The GVA of the Navarrese automotive sector varies from 1.374,79 million euros in 2018 to 1.128,04 million euros in 2020. This number shows a downward trend since this first year, accounting for a 17,95% decline compared to 2020. This reduction is due to the impact of the Covid-19 pandemic situation and subsequent production stoppages.

When analysing these outcomes by value chain position, it can be stated that the pattern reflected in other sections of this work is repeated. The participants that contribute the most to the automotive industry's GVA are OEM, Tier 2 & 3 distributors, and Tier 1 suppliers. Therefore, the actors that perform secondary activities for the automotive sector

or those also involved in industries other than the automotive, Aftermarket and service offerors, are far behind the former and present the lowest percentages.

Table 17. Gross Value Added in the Navarrese automotive sector (2018-2020).

(THOUSANDS OF EUROS)	GROSS VALUE ADDED (GVA)		
VALUE CHAIN POSITION	**2018**	**2019**	**2020**
OEM	452.210,50	515.753,94	445.224,51
Tier 1	440.241,17	365.194,70	272.500,89
Tier 2 & 3	417.503,48	424.299,41	345.117,40
Aftermarket	32.865,18	33.987,57	39.391,65
Services	31.966,69	34.690,51	25.807,37
TOTAL (by year)	1.374.787,02	1.373.926,13	1.128.041,82

SOURCE: Own elaboration, based on data from SABI.

It is worth to contrast the figures in our database on GVA with NASTAT's information, presented in section 5.1. Table 18 serves as a reference to situate the automotive industry outlined in this work. NASTAT includes the GVA of CNAE 29XX and CNAE 30XX to refer to the automotive business in Navarre, whereas in our database 25 further two-digit CNAE codes are considered, which lead to the GVA amounts of the last line in table 18.

Firstly, if in our database the GVA of the same two CNAE that NASTAT applies is calculated, there are differences in the outcomes for 2019 and 2020, being the values lower in the first case. However, the result for 2018 is practically the same.

Secondly, this work has tried to show a broader picture of the automotive industry, with a methodology based on the automotive value chain. Thus, this approach is not limited to CNAE 29XX and CNAE 30XX, as there are numerous businesses that are not distinguished by these two codes, but belong to the Navarrese automotive sector.

If the GVA in our database for all the CNAE is compared with NASTAT's data, it seems that in the last there is an underestimation of the GVA of the automotive business, as these two codes are not sufficient to cover all its activity. What is more, according to our figures, the percentage of the automotive industry not computed by this official source accounts for 29,10% in 2018, 24,47% in 2019, and 18,27% in 2020.

The conclusion to be drawn from the above is that the definition of the automotive sector by means of CNAE 29XX and CNAE 30XX implies that part of its value is not captured.

Table 18. GVA comparison between NASTAT and our database (2018-2020).

(THOUSANDS OF EUROS)	GROSS VALUE ADDED		
SOURCE OF INFORMATION	**2018**	**2019**	**2020**
NASTAT (CNAE 29XX + CNAE 30XX)	974.736,75	1.037.768,24	921.936,54
OUR DATABASE (CNAE 29XX + CNAE 30XX)	974.639,68	961.215,38	786.207,45
OUR DATABASE (ALL THE CNAE)	1.374.787,02	1.373.926,13	1.128.041,82

SOURCE: Own elaboration, based on data from NASTAT and SABI.

5.8. Net profit margin, productivity, and debt-to-equity ratio

Table 19 shows the average net profit margin of the companies in each value chain stage from 2018 to 2020. It is calculated dividing net income by revenues and reflects the percentage of sales that finally results in benefits. It should be added that the firms having losses have not been considered for these calculations.

According to these figures, it can be stated that the net profit margin for OEM is the lowest, with less than 2,16% in the studied timeframe. Although these enterprises tend to be the participants with the highest amounts in revenues, they operate with significant costs too, which lead to a lower net income and a smaller margin. Besides, Tier 1 suppliers and Tier 2 & 3 distributors are characterised by a higher net profit margin, exceeding 3,43% and 4,37%, respectively. The remaining industry actors are those having the highest ratio: Aftermarket managed to reach 6,92% in 2018, while the maximum for service offerors was 6,67% in 2019.

In conclusion, the automotive sector presents quite low net profit margins among its businesses and a general declining trend because of the 56,39% reduction in benefits due to Covid-19 pandemic. However, this industry has been capable of superseding revenues of 6.291 thousand of euros from 2018 to 2020, which has resulted in entities having the capacity to afford high costs and still make considerable profits in absolute terms.

Table 19. Net profit margin in the Navarrese automotive sector (2018-2020).

(%)	NET PROFIT MARGIN		
VALUE CHAIN POSITION	**2018**	**2019**	**2020**
OEM	1,82%	1,37%	2,16%
Tier 1	4,54%	3,50%	3,43%
Tier 2 & 3	4,37%	5,05%	4,92%
Aftermarket	6,92%	4,60%	4,78%
Services	6,50%	6,67%	5,94%

SOURCE: Own elaboration, based on data from SABI.

Besides, table 20 remarks the average productivity of the firms in the automotive sector by value chain position from 2018 to 2020. This variable assesses the efficiency of the workforce. It is calculated as the division between gross value added (GVA) and the number of employees.

The figures determine that Aftermarket and OEM are the most efficient, with an average productivity of 74.350 and 73.940 euros per worker, respectively. They are closely followed by Tier 1 providers, with approximately 71.000 euros per employee, and Tier 2 & 3 suppliers, with 70.390 euros per worker. The amount for service offerors is the lowest, with around about 59.800 euros per employee.

The numbers in 2020 show a declining trend compared to those in 2018, being the amounts lower for all the value chain stages. Consequently, the impact of the economic instability generated by Covid-19 is again reflected in this variable because of the earlier expressed 17,95% reduction in GVA.

Table 20. Productivity in the Navarrese automotive sector (2018-2020).

(THOUSANDS OF EUROS)	**PRODUCTIVITY**		
VALUE CHAIN POSITION	**2018**	**2019**	**2020**
OEM	81,34	75,20	65,28
Tier 1	78,10	72,92	61,97
Tier 2 & 3	71,85	73,63	65,68
Aftermarket	77,14	71,13	74,77
Services	60,04	61,45	57,90

SOURCE: Own elaboration, based on data from SABI.

Finally, table 21 expresses the average debt-to-equity ratio from 2018 to 2020 of the businesses in the automotive sector by value chain position. As the term suggests, it is the proportion of both non-current and current liabilities over equity. This magnitude evaluates the long-term risk of an enterprise's capital structure.

What deserves to be highlighted from this data is that the participants in the automotive industry tend to have a debt-to-equity ratio that exceeds one. This suggests that they generally finance their operations by borrowing money, rather than by the equity from their shareholders. Thus, they are distinguished by a more aggressive growth strategy.

These outcomes go in line with the fact that asset heavy businesses, such as the automotive, are usually differentiated by higher debt-to-equity ratios. In fact, they need more debt to finance large expenditures in infrastructure and machinery for manufacturing their products (Tamplin, 2022).

Table 21. Debt-to-equity ratio in the Navarrese automotive sector (2018-2020).

(THOUSANDS OF EUROS)	DEBT TO EQUITY RATIO		
VALUE CHAIN POSITION	**2018**	**2019**	**2020**
OEM	3,80	0,81	1,73
Tier 1	1,87	1,98	2,16
Tier 2 & 3	1,44	1,39	1,19
Aftermarket	2,48	2,37	2,10
Services	1,85	2,15	1,84

SOURCE: Own elaboration, based on data from SABI.

5.9. Investment in R+D+i (Research, Development, and innovation)

The investment in R+D+i carried out by the firms in the Navarrese automotive sector is estimated according to the procedure expressed in the methodology and results in the figures of table 22. From 2018 to 2020, their real investment on the basis of the Navarrese Government's aid awards to individual and cooperative R+D and strategic projects ranges from 1.513 thousand euros in 2019 to 4.389 thousand euros in 2020. The figures are quite similar in 2018 and 2020, whereas there is a significant decline in 2019.

In 2018, ACAN (Navarrese Automotive Cluster Association) raised the need to increase investment in R+D+i, which it was believed to be a tool for the growth of the industry. It argued that, the investment efforts of automotive businesses were mainly aimed at processes, not at products, which required support for improvement (ACAN, 2018).

In 2020, the Navarrese Government's Department of Economic and Business development potentiated the investment in R+D+i among Navarrese entities. It aided companies in the priority sectors identified in that year's Smart Specialisation Strategy. The objective was to help enterprises on the implementation of high-impact R+D+i initiatives for the most advantageous Navarrese economic areas. The most benefited sector was the automotive, which received 25,66% of the aid. It was followed by renewable energies and health, with 19,03% and 17,70%, respectively (Navarra.es, 2020).

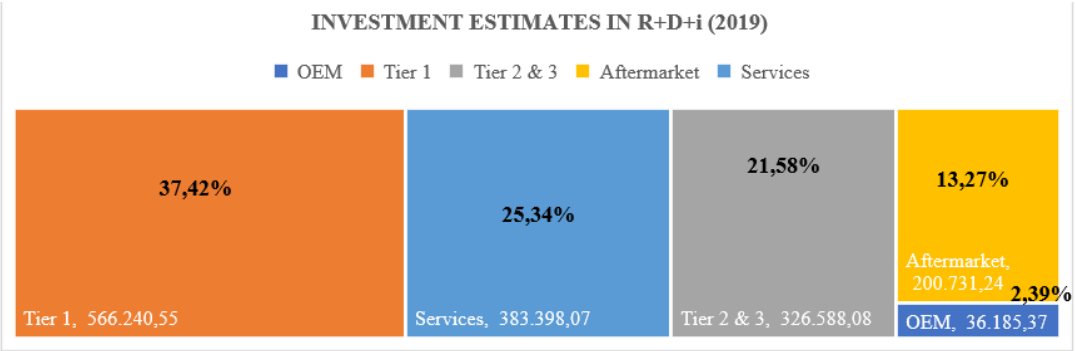
Table 22. Estimates for the investment in R+D+i of the Navarrese automotive sector (2018-2020).

(EUROS)	INVESTMENT IN R+D+i		
VALUE CHAIN POSITION	**2018**	**2019**	**2020**
OEM	439.315,01	36.185,37	40.116,42
Tier 1	655.541,30	566.240,55	1.407.449,84
Tier 2 & 3	1.414.569,02	326.588,08	1.179.291,18
Aftermarket	390.117,20	200.731,24	352.805,67
Services	1.412.843,57	383.398,07	1.409.952,95
TOTAL (by year)	4.312.386,10	1.513.143,31	4.389.616,06

SOURCE: Own elaboration, based on data from the Navarrese Government.

With regard to the investment on the cited basis by value chain position for the selected reference year 2019, figure 15 remarks that Tier 1 suppliers invested the most in R+D+i, reaching 37,42% of the total. The second position was for automotive service offerors, with 25,34%, and the third for Tier 2 & 3 providers, with 21,58%. The groups that invested the least were Aftermarket and OEM, accounting for 13,27% and 2,39%, respectively.

Figure 15. Investment estimates in R+D+i for 2019.



SOURCE: Own elaboration, based on data from the Navarrese Government.

6. CONCLUSIONS

In this paper, the automotive sector is analysed, as it is a strategic and highly relevant area to the economy of Navarre.

According to NASTAT's data and in the studied timeframe 2018-2020, it represents more than 18,84% over regional GVA. Nevertheless, this body underestimates the Navarrese automotive business's figures because it only considers CNAE 29XX and 30XX for referring to it. Conversely, the database developed for this work covers a further 25 two-digit CNAE, being its GVA calculation more than 22% superior to that of the official source. This conclusion is very relevant for possible decision making by the agents involved in the automotive business.

This broader description of the automotive sector in Navarre is part of the added value of this study, which is based on the value chain methodology. Its objective is to include the whole automotive industry in this territory. Thus, it focuses on covering all the firms that contribute to the end vehicle through an activity-based screening, not having the CNAE classification as the unique criterion. In this manner, the guideline for this work has been to identify the Navarrese Tier 1, 2 and 3 suppliers that produce components; the OEM

that assemble automobiles; the firms in the market for replacement pieces; the enterprises offering services to them all; and the scientific-technological agents that mainly provide automotive R+D+i support.

On the other hand, this research presents the figures from the most significant official sources of the sector both in Spain and Navarre.

It is widely believed that this activity implies nearly 10% of the national GVA. However, numerous studies have refuted this assumption and proved that it counts less than 2%. Section 4.1 of this work applies their methodology to INE's latest data and reaches the same conclusion: although the automotive industry is relevant for the Spanish economy, there is an overestimation of its weight.

This study has decided to go one step further and has employed this methodology to contrast the weight of the Spanish and Navarrese automotive sectors. For ensuring accuracy, the GVA of the same two CNAE (29XX and 30XX) is used. The results of the comparison are striking because, while the proportion of the Spanish automotive business over the national GVA is less than 2%, the Navarrese share over regional GVA is more than nine times superior.

Nonetheless, this distinction makes sense when remembering that the national GVA includes all the Autonomous Communities. The majority of these territories, principally those in the south of Spain, do not have automotive activity. This makes the difference between the national automotive GVA and the entire national GVA much bigger and the weight of the Spanish automotive sector inferior. Consequently, it can be stated that, even though it is a significant economic area for both Spain and Navarre, its relevance is even superior in the latter.

This importance of the automotive industry has remained despite the declining trend it has been experiencing since 2019. Actually, the Covid-19 pandemic generated economic instability and forced automotive plants to stop production. The recovery since then has been slow, as the microchip crisis has been added as a handicap for this business. In this scenario, the automotive sector must invest in exploring new opportunities, such as electric mobility.

The studied magnitudes of the Navarrese automotive industry justify this significance and its contribution to the regional economy.

Firstly, it is necessary to bear in mind its structure. This business is characterised by 64,14% of component suppliers and just 3,45% of vehicle manufacturers. The main activities of automotive firms in Navarre are the production of plastic, metal, rubber, and machinery; motor vehicle fabrication; and their sale and repair.

If 2019 is again taken as a reference year, as it is the middle point between an epoch of prosperity for this sector and Covid-19's hard consequences, the following outcomes should be remarked.

The number of employees of the Navarrese automotive industry was nearly 17.400. The higher number of workers belonged to Tier 1 providers, Tier 2 & 3 distributors and OEM. These groups were also the most efficient in 2019, with an annual productivity that exceeded 72.900 euros per employee. Furthermore, this business managed to supersede revenues of 7.900 million euros in Navarre.

Lastly, this study not only provides valuable insights on the Navarrese automotive sector, but also lays a foundation that can operate as a starting point for future works. Actually, it would be interesting to develop this paper through the analysis of other economic variables, named further ratio calculations or comparisons according to enterprise sizes. Besides, it would be positive to contrast the figures of official information sources and the study's database regarding more magnitudes, such as the number of companies or employees in this industry.

Moreover, it is also possible to make comparisons between the main Spanish Communities where the automotive business predominates, for example, Cataluña and Valencia. This study can operate as a guide for coming works focusing on other fields too, for example, electric mobility, or even on other Navarrese advantageous economic areas.

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8. APPENDICES

8.1. Appendix 1: Procedure for the identification of Navarrese automotive firms

The initial step for structuring the data is the determination of the firms that form the Navarrese automotive sector. For this purpose, three different documents are used:

- The Excel file "EMPRESAS NAVEAC", more concretely, the tab "Resultados Totales". It was provided by SODENA.
- The booklet "La Cadena de Valor del Sector de la Automoción en Navarra". It was elaborated by ACAN (Asociación Clúster de Automoción de Navarra).
- ACAN's webpage, more precisely, the section in which its associates are listed. https://clusterautomocionnavarra.com/asociados/

These three sources are cross-checked to obtain the number of companies in the Navarrese automotive sector by value chain position. These enterprises are registered on the tab "Listado de Empresas" of "BASE DE DATOS AUTOMOCIÓN". The information on each entity's activity is consulted on webpages named "Empresite el Economista", "Axesor", "Einforma", "Iberinform", or each firm's own site. Meanwhile, this tab is filled with the headings expressed below:

1) "Razón social": name of the enterprise.

2) "CIF/NIF": identification codes for legal and natural persons.

3) "Situación": the state of the company in 2022. If it is currently operating in the industry, it is classified as "activa". However, if it is not, it is characterised as "cerrada", "disuelta", "extinguida", "en liquidación", depending on the specific closeness stage in which the firm is.

   All these last entities are separated at the bottom part of the tab "Listado de Empresas" and are highlighted in red. This distinction is made because they are not going to be included in the Navarrese automotive sector's description, which is done for the year 2022. Nevertheless, they are reflected in this first tab because they have been operating in at least one of the years 2018-2020, and, therefore, they will be considered for the later numerical analysis.

4) “Ubicación” and “CCAA”: specific location and Autonomous community in which each company is situated. The last item is always Navarre.

5) “Actividad (breve descripción)”: explanation of the activity to which each firm is devoted to ensure that it is related to the automotive industry.

6) “Cadena de valor” and “Cadena de valor número”: this first column contains the position that each entity occupies in the automotive sector’s value chain. The second column assigns a number to each of these value chain positions in order to operate with the data in an easier way.

7) “CNAE (código)” and “CNAE (texto)”: they reflect the CNAE number through which the activity of each enterprise is categorised in this National Classification of Economic Activities, as well as the written description of each code.

8) “Fuente”: as reflected in table 23, it expresses which of the earlier cited three documents is used to identify the company.

Table 23. Document to which each expression in the column "Fuente" corresponds.

EXCEL EXPRESSION	DOCUMENT
“Excel NAVEAC”	Excel file “Excel Empresas NAVEAC 2021”, more concretely, the tab “Resultados Totales”.
“Cadena de valor (libro rojo)”	The booklet “La Cadena de Valor del Sector de la Automoción en Navarra. Indicadores”.
“ACAN”	ACAN’s webpage, more precisely, the section in which its associates are listed.

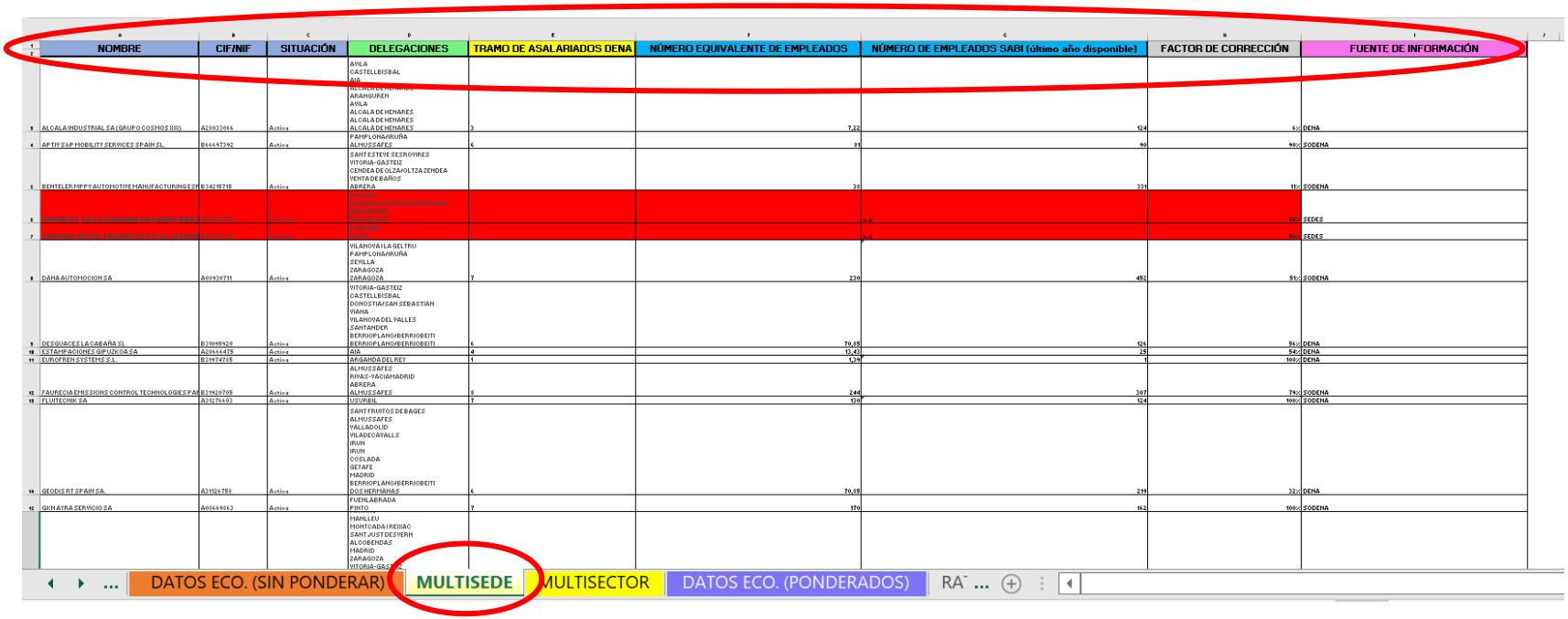
SOURCE: Own elaboration.

9) “Enlaces de utilidad”: the links from which the information of each business has been obtained are attached.

8.2. Appendix 2: Procedure for businesses with multiple delegations

The information gotten through this process is presented in the tab “Multisede” of the Excel file “BASE DE DATOS AUTOMOCIÓN”, shown in figure 16. The main objective is to establish a correction factor for companies having multiple delegations depending on the proportion of Navarrese workers over the entire workforce informed in SABI.

Figure 16. Tab "Multisede".



SOURCE: Own elaboration, based on data from SODENA, DENA and online resources.

For de determination of the number of employees in Navarre in each of the mentioned cases, two fundamental sources are used apart from SABI and the Internet:

- The Excel file “DENA”, which has been provided by NASTAT. It contains the employee segment in which the majority of Navarrese firms are situated.
- The Excel file “EMPLEADOS SEGÚN SODENA”, facilitated by SODENA, which contains the specific number of employees of some of the companies.

STEP 1. Fill the name of the businesses having multiple delegations, their CIF, state, delegations, and last number of employees in the new tab by using the information from the tabs “Listado de empresas” and “Datos eco. (sin ponderar)”.

STEP 2. Complete the column “Número equivalente de empleados” of the tab “Multisede” with the data offered in the Excel file “EMPLEADOS SEGÚN SODENA”.

STEP 3. As not all the number of Navarrese employees is available in the last document, the Excel file “DENA” is used. The column “Tramo de asalariados DENA” of the tab “Multisede” is completed with the worker segment expressed in figure 17. Bear in mind that, although all the column “Tramo de asalariados DENA” is filled, in various cases this information is not used as the exact employee number is already known.

Figure 17. Employee segment in Navarrese companies.

(na)stat Instituto de Estadística de Navarra Nafarroako Estatistika Erakundea

Gobierno de Navarra Nafarroako Gobernua

Listado de empresas con sede social en Navarra a 1 de enero de 2022
Fuente: Nastat, Directorio de Empresas de Navarra

NIF	Razón social	Sigla dirección	Calle	Portal	Resto de domicilio	Código postal	Código de municipio	Municipio	Código de entidad	Entidad	Cnae-09 a dos	Teléfono	Cnae-09 a cuatro dígitos	Tramo de asalariados
000275074	ZUNZUNEGUI,VALERO DE BERNABE,CARLOS	Calle	AOIZ	0	-4-IZ	31004	201	PAMPLONA / IRUÑA	0002		86		8623	1
000390064	GONZALEZ,MARTINEZ,INES	Calle	GUNDEMARO	9	3ºA	31340	163	MARCILLA	0001		56		5630	0
000402205	SEGURADO,LOZANO,SONSOLES NIEVES	Calle	SAN FRANCISCO JAVIER	1	BAJO	31570	215	SAN ADRIÁN	0001		82	948670853	8219	0
000645008	FERRER-BONSOMS,MILLET,IGNACIO JOSE	Calle	LAKUNTZEA	7		31180	907	ZIZUR MAYOR / ZIZUR NAGUSIA	0001		69		6910	0
000648013	PEREZ,ANDRES,FRANCISCO JAVIER	Calle	RECOLETAS	6	-4-	31001	201	PAMPLONA / IRUÑA	0002		71	636426688	7111	0
000657628	ALONSO GOMEZ ISABEL		ALMAGRO	13		28010	079	DESOJO	0001		86		8622	1
000666966	GOMEZ,ALONSO,ASCENSION	Avenida	PIO XII	41	DR-8-E	31008	201	PAMPLONA / IRUÑA	0002		66		6622	0
000667063	JIMENEZ,DOMINGUEZ,ELENA	Plaza	YAMAGUCHI	10	4 DR	31008	201	PAMPLONA / IRUÑA	0002		47		4773	1
000694705	MOYA FERNANDEZ ISIDORA		ALEJANDRO VILLEGAS	50		28043	079	DESOJO	0001		85		8510	3

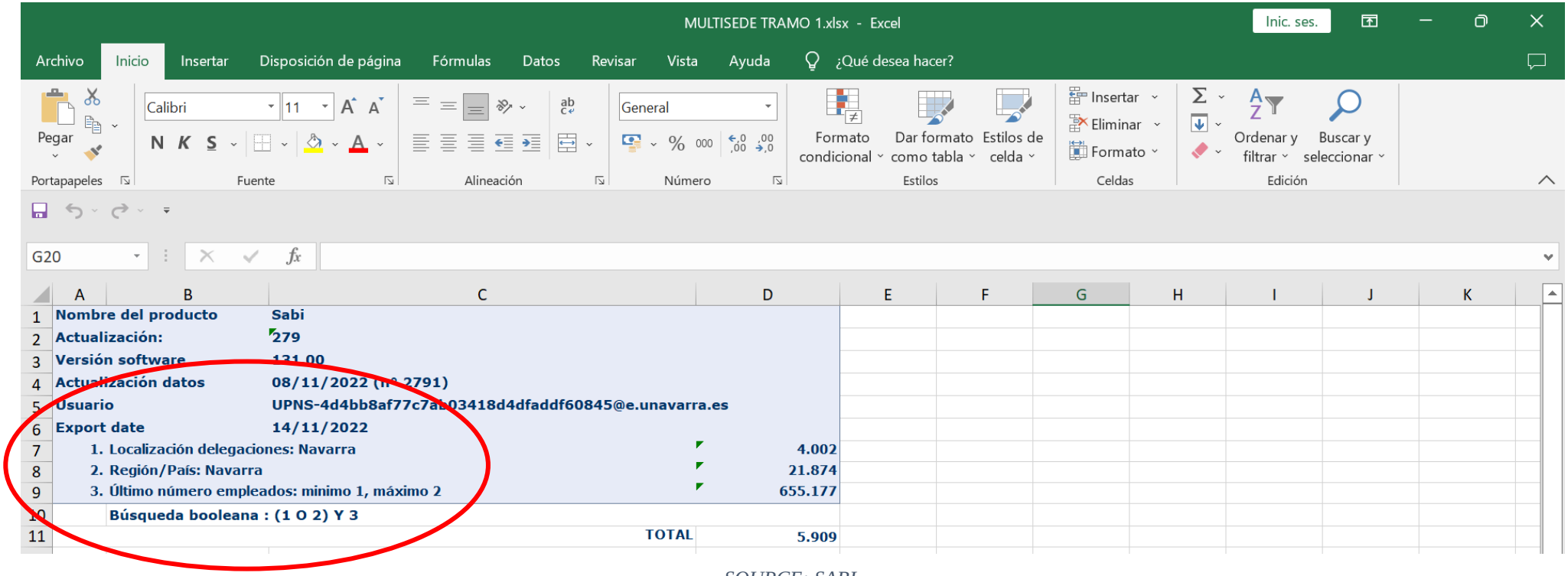
Tramo de asalariados	Etiqueta
0	Sin personas asalariadas
1	De 1 a 2 personas asalariadas
2	De 3 a 5 personas asalariadas
3	De 6 a 9 personas asalariadas
4	De 10 a 19 personas asalariadas
5	De 20 a 49 personas asalariadas
6	De 50 a 99 personas asalariadas
7	De 100 a 249 personas asalariadas
8	250 o más personas asalariadas

SOURCE: DENA.

Nonetheless, this Excel file only provides information concerning the segment of employees, but not the specific worker quantity in Navarrese delegations. So as to get this concrete number, an approximation is made with the mean of employees in Navarrese companies having each of these employee segments.

This data is obtained from SABI, by requesting the last number of employees of Navarrese companies or businesses having delegations in Navarre with each worker segment. The documents downloaded from SABI are named “Multisede tramo X” (from 1 to 8). For further clarification, figure 18 shows the research petition for segment 1.

Figure 18. Research petition for "Multisede tramo 1".



SOURCE: SABI.

The mean of employees of the firms in each “Multisede tramo X” Excel file is calculated at the bottom of their second tab. These numbers are introduced for completing the missing values in the column “Número equivalente de empleados” of the tab “Multisede” of the Excel file “BASE DE DATOS AUTOMOCIÓN”.

STEP 4. Despite all these sources of information, the number of workers of some of the firms is still missing and needs to be completed by searching it online. The consulted links are attached in the tab “Multisede”.

STEP 5. Calculate the correction factor for each business:

$$\text{Correction factor (multiple delegations)} = \frac{Number\ of\ employees\ in\ Navarrese\ delegations}{Total\ number\ of\ employees\ in\ SABI} \text{ x } 100$$

STEP 6. The number of Navarrese employees of Borgers SAU, Caucho Metal Productos II SL, Kautex Textron Ibérica SL, and SMP Automotive Technology Ibérica SL has not been found. The correction factor is calculated as follows for missing numbers:

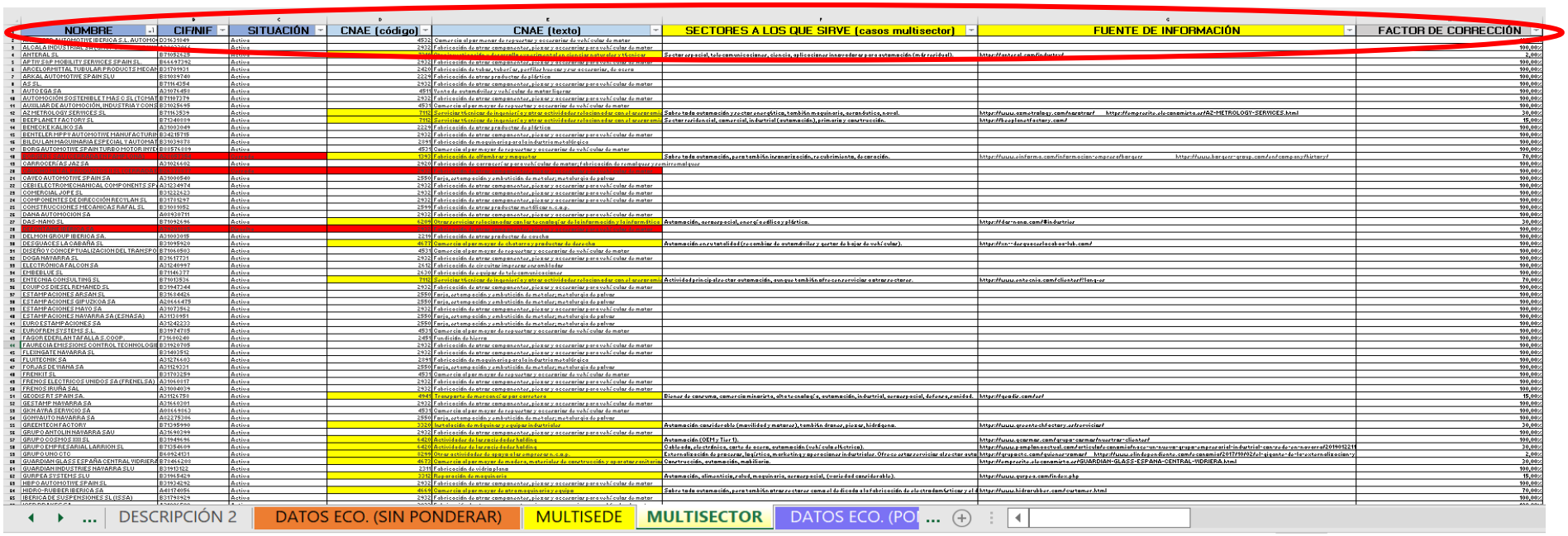
$$\text{Correction factor (missing values)} = \frac{Number\ Navarrese\ delegations}{Total\ number\ of\ delegations\ in\ SABI} \text{ x } 100$$

STEP 7. Introduce the correction factor 100% for firms that operate only in Navarre.

8.3. Appendix 3: Procedure for companies operating in multiple sectors

The data obtained through this procedure is shown in the tab "Multisector" of the Excel file "BASE DE DATOS AUTOMOCIÓN", which can be seen in figure 19. The main purpose is to determine a correction factor for companies operating in multiple industries depending on the proportion of the automotive sector over the total number of industries.

Figure 19. Tab "Multisector".



NOMBRE	CIFNIF	SITUACIÓN	CNAE (código)	CNAE (texto)	SECTORES A LOS QUE SIRVE (casos multisector)	FUENTE DE INFORMACIÓN	FACTOR DE CORRECCIÓN
ALCALA INDUSTRIAL 2000		Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
ANTERAL SL	B71052425	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor	Sector aeronáutico, telecomunicaciones, ciencia, aplicaciones innovadoras para automoción (más recientes).	http://anteral.com/industrial	2,00%
APTIV ESP MOBILITY SERVICES SPAIN SL	B44447342	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
ARCELORMITTAL TUBULAR PRODUCTS MECAN	B31709931	Activa	2420	Fabricación de tubos, tuberías, perfiles huecos y sus accesorios, de acero			100,00%
ARKAL AUTOMOTIVE SPAIN SLU	B15959740	Activa	2229	Fabricación de otros productos de plástico			100,00%
AS SL	B71164254	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
AUTOEGA SA	A31074458	Activa	4511	Venta de automóviles y vehículos de motor ligeros			100,00%
AUTOMOCIÓN SOSTENIBLE TMAS C SL (TCHAT	B71917179	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
AUXILIAR DE AUTOMOCIÓN, INDUSTRIA Y CONS	B31025695	Activa	4531	Comercio al por mayor de repuestos y accesorios de vehículos de motor			100,00%
AZ METROLOGY SERVICES SL	B71163539	Activa	7112	Servicios técnicos de ingeniería y otras actividades relacionadas con el asesoramie	Sobre toda automación y control energético, también maquinaria, aeronáutica, naval.	http://www.azmetrology.com/inventario/ http://empresite.eleconomista.es/AZ-METROLOGY-SERVICES.html	30,00%
BEEPLANET FACTORY SL	B71240189	Activa	7112	Servicios técnicos de ingeniería y otras actividades relacionadas con el asesoramie	Sector residencial, comercial, industrial (automación), primaria y construcción.	http://beeplanetfactory.com/	15,00%
BENECKE KALIKO SA	A31003049	Activa	2229	Fabricación de otros productos de plástico			100,00%
BENTELER HIPPI AUTOMOTIVE MANUFACTURIN	B31419719	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
BILDU LAN MAQUINARIA ESPECIAL Y AUTOMAT	B31929178	Activa	2956	Fabricación de maquinaria para la industria metalúrgica			100,00%
BORG AUTOMOTIVE SPAIN TURBO MOTOR INVE	B88576689	Activa	4531	Comercio al por mayor de repuestos y accesorios de vehículos de motor			100,00%
[redacted]	[redacted]	[redacted]	1393	Fabricación de alfombras y moquetas	Sobre toda automación, pero también ingeniería, recubrimiento, decoración.	http://www.einforma.com/informacion-empresa/berger/ http://www.berger-group.com/en/company/history/	70,00%
CARROCERÍAS JAZ SA	A31024402	Activa	2920	Fabricación de carrocerías para vehículos de motor; fabricación de remolques y semirremolques			100,00%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	100,00%
CAYEO AUTOMOTIVE SPAIN SA	A31000540	Activa	2599	Forja, estampación y embutición de metales; metalurgia de polvos			100,00%
CEBI ELECTROMECHANICAL COMPONENTS SP	A31234974	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
COMERCIAL JOPE SL	B31222423	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
COMPONENTES DE DIRECCIÓN RECYLAN SL	B31751197	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
CONSTRUCCIONES MECANICAS RAFAL SL	B31651952	Activa	2599	Fabricación de otros productos metálicos n.c.o.p.			100,00%
DANA AUTOMOCION SA	A08320711	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
DAZ-NANO SL	B71092696	Activa	6209	Otros servicios relacionados con las tecnologías de la información y la informática	Automación, aeronáutica, energía, médica y plástica.	http://daz-nano.com/#industries	20,00%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	100,00%
DELMON GROUP IBERICA SA	A31003019	Activa	2219	Fabricación de otros productos de caucho			100,00%
DESGUACES LA CABAÑA SL	B31095920	Activa	4677	Comercio al por mayor de chatarra y productos de desecho	Automación en su totalidad (recambiar de automóviles y quitar de bajas de vehículos).	http://on-desguacesleasebacktub.com/	100,00%
DISEÑO Y CONCEPTUALIZACION DEL TRANSPO	B71060503	Activa	4531	Comercio al por mayor de repuestos y accesorios de vehículos de motor			100,00%
DOGA NAVARRA SL	B31617721	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
ELECTRÓNICA FALCON SA	A31240997	Activa	2612	Fabricación de circuitos impresos ensamblados			100,00%
EMBELLIE SL	B71461377	Activa	2630	Fabricación de equipos de telecomunicaciones			100,00%
ENTECNIA CONSULTING SL	B71013534	Activa	7112	Servicios técnicos de ingeniería y otras actividades relacionadas con el asesoramie	Actividad principal es otsar automación, aunque también ofrecen servicios a otras sectores.	http://www.entecnia.com/clientes/?lang=es	70,00%
EQUIPOS DIESEL REHAMED SL	B31947344	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
ESTAMPACIONES ARSAN SL	B31644624	Activa	2599	Forja, estampación y embutición de metales; metalurgia de polvos			100,00%
ESTAMPACIONES GIPUZKOA SA	A20644478	Activa	2599	Forja, estampación y embutición de metales; metalurgia de polvos			100,00%
ESTAMPACIONES MAYO SA	A31073952	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
ESTAMPACIONES NAVARRA SA (ESNASA)	A31031951	Activa	2599	Forja, estampación y embutición de metales; metalurgia de polvos			100,00%
EURO ESTAMPACIONES SA	A31242233	Activa	2599	Forja, estampación y embutición de metales; metalurgia de polvos			100,00%
EUROFREN SYSTEMS S.L.	B31974705	Activa	4531	Comercio al por mayor de repuestos y accesorios de vehículos de motor			100,00%
FAGOR EDERLAN TAFALLA S.COOP.	F31609240	Activa	2451	Fundición de hierro			100,00%
FAURECIA EMISSIONS CONTROL TECHNOLOGIE	B31620705	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
FLEXNGATE NAVARRA SL	B31403512	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
FLUITECNIK SA	A31276603	Activa	2899	Fabricación de maquinaria para la industria metalúrgica			100,00%
FORJAS DE VIANA SA	A31129231	Activa	2599	Forja, estampación y embutición de metales; metalurgia de polvos			100,00%
FRENKIT SL	B31703289	Activa	4531	Comercio al por mayor de repuestos y accesorios de vehículos de motor			100,00%
FRENOS ELECTRICOS UNIDOS SA (FRENELSA)	A31060017	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
FRENOS IRUÑA SAL	A31004029	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
GEODIS RT SPAIN SA.	A31126759	Activa	4941	Transporte de mercancías por carretera	Bienes de consumo, comercio minorista, alta tecnología, automación, industrial, aeroespacial, defensa, canidad.	http://facedir.com/es/	15,00%
GESTAMP NAVARRA SA	A31640201	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
GKN AXTA SERVICIO SA	A08169163	Activa	4531	Comercio al por mayor de repuestos y accesorios de vehículos de motor			100,00%
GOHYAUTO NAVARRA SA	A82275306	Activa	2599	Forja, estampación y embutición de metales; metalurgia de polvos			100,00%
GREENTECH FACTORY	B71295990	Activa	3320	Instalación de máquinas y equipos industriales	Automación considerable (maxilidad y material), también drones, piezas, hidrógeno.	http://www.greentechfactory.es/servicios/	30,00%
GRUPO ANTOLIN NAVARRA SAU	A31690399	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
GRUPO COSMOS III SL	B31949696	Activa	6420	Actividades de las sociedades holding	Automación (OEM y Tier 1).	http://www.gcarmar.com/grupo-carmar/nuestros-clientes/	100,00%
GRUPO EMPRESARIAL LARRION SL	B71354609	Activa	6420	Actividades de las sociedades holding	Cableado, electrónica, corte de acero, automación (robótica/colaborativa).	http://www.grupolarrion.es/nosotros/	20,00%
GRUPO UNOTO	B60924531	Activa	8299	Otras actividades de apoyo a las empresas n.c.o.p.	Externalización de procesos logísticos, marketing y apoyo a empresas industriales. Ofrecen otros servicios a sector auto	http://grupouno.to/ http://www.einforma.com/informacion-empresa/grupo-uno-to-navarra-sociedad-limitada/	2,00%
GUARDIAN GLASS ESPAÑA CENTRAL VIDRIERA	B78466280	Activa	4673	Comercio al por mayor de madera, materiales de construcción y aparatos sanitarios	Construcción, automación, mobiliario.	http://empresite.eleconomista.es/GUARDIAN-GLASS-ESPANA-CENTRAL-VIDRIERA.html	20,00%
GUARDIAN INDUSTRIES NAVARRA SLU	B31932522	Activa	2299	Fabricación de vidrio plano			100,00%
GURPEA SYSTEMS SLU	B31965429	Activa	3320	Reparación de maquinaria	Automación, alimentación, salud, maquinaria, aeroespacial, (variedad considerable).	http://www.gurpea.com/index.php	15,00%
HBPO AUTOMOTIVE SPAIN SL	B31934292	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%
HIDRO-RUBBER IBERICA SA	A46174696	Activa	4649	Comercio al por mayor de otros enseres y equipo	Sobre toda automación, pero también otras sectores como el de diseño de la fabricación de electrodomésticos y el	http://www.hidrorubber.com/customer.html	70,00%
IBERICA DE SUSPENSIONES SL (ISSA)	B31795929	Activa	2932	Fabricación de otros componentes, piezas y accesorios para vehículos de motor			100,00%

DESCRIPCIÓN 2 | DATOS ECO. (SIN PONDERAR) | MULTISEDE | MULTISECTOR | DATOS ECO. (POI ...

SOURCE: Own elaboration, based on data from "Empresite el Economista", "Axesor", "Einforma", "Iberinform", or each firm's own site.

For this purpose, a new tab is created in the Excel file "BASE DE DATOS AUTOMOCIÓN", named "Multisector". The columns devoted to the name of the business, CIF, state, and CNAE (code and text) are filled from the already created tab "Listado de empresas". The remaining three columns (sectors, source of information and correction factor) are completed with the criteria expressed below.

For the entities having CNAE codes 22XX, 23XX, 24XX, 255X, 259X, 26XX, 27XX, 28XX, 29XX, and 45XX, which refer to the automotive sector or the manufacturing of materials, a 100% correction factor is given, as they are considered fully automotive.

The activity of the businesses having CNAE codes different from the earlier cited ones is analysed. For this purpose, the sources of information pasted in the column "Fuente de información" are consulted. The correction factor is determined as shown in table 24.

Table 24. Correction factor for firms operating in multiple sectors.

NUMBER OF SECTORS	CORRECTION FACTOR (%)
Only automotive sector.	100%
The automotive sector is predominant, but the enterprise collaborates with other industries too.	70%
The firm operates equally in two sectors, being one of those the automotive industry.	50%
The company works for five or less industries, being one of those the automotive sector.	30%
The business operates in more than five sectors, being one of those the automotive industry.	15%
Different sectors constitute the main activity of the enterprise, with products offered to the automotive sector being very residual.	2%

SOURCE: Own elaboration.

Lastly, it is important to clarify that the tab "Datos eco. (ponderados)" of the Excel file "BASE DE DATOS AUTOMOCIÓN" is filled with the information in the tab "Datos eco. (sin ponderar)" multiplied by both correction factors (the first for multiple delegations and the second for multiple sectors). The only variables that remain the same (not being multiplied by both correction factors) are the percentage of exports and the three ratios (net profit margin, productivity, and debt-to-equity).

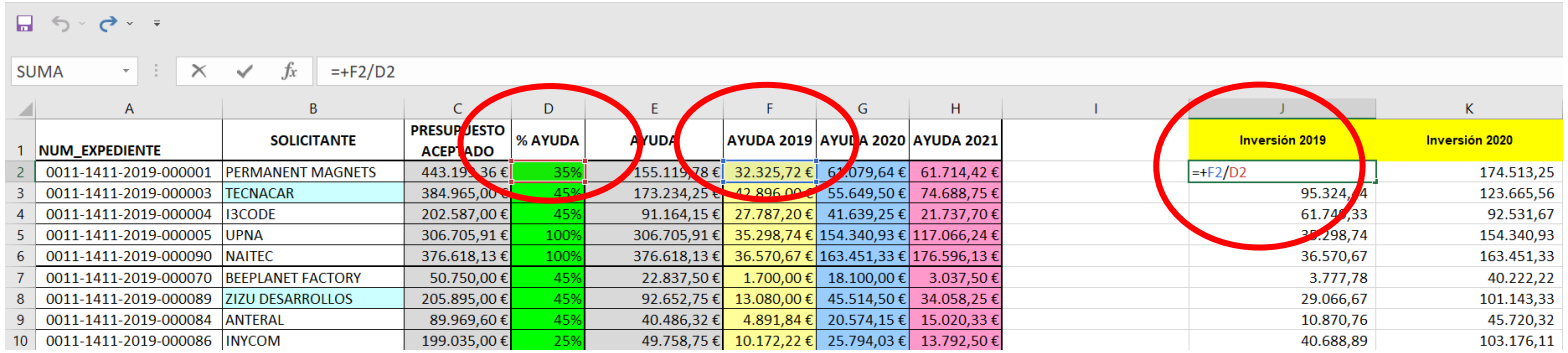
8.4. Appendix 4: Calculation of the investment in R+D+i

The steps for the calculation of each company's investment in R+D+i are expressed below. The Excel File used for so is "I+D+i EMPRESAS NAVARRA". This document informs about the financial aid for individual and cooperative R+D and strategic projects given to firms from this Autonomous Community from 2018 to 2021 by the Government of Navarre. These numbers are classified by owner ("Titular") and file number ("Número de expediente").

STEP 1. As shown in figure 20, divide the quantity of the annual financial aid by the percentage of the aid given in order to get the investment in each case.

$$\text{Financial aid} = (\text{Total investment}) \times (\%\ \text{of financial aid}) \rightarrow \text{Total investment} = \frac{Financial\ aid}{\%\ of\ financial\ aid}$$

Figure 20. Calculation of the investment in R+D+i for each individual and cooperative R+D and strategic projects.



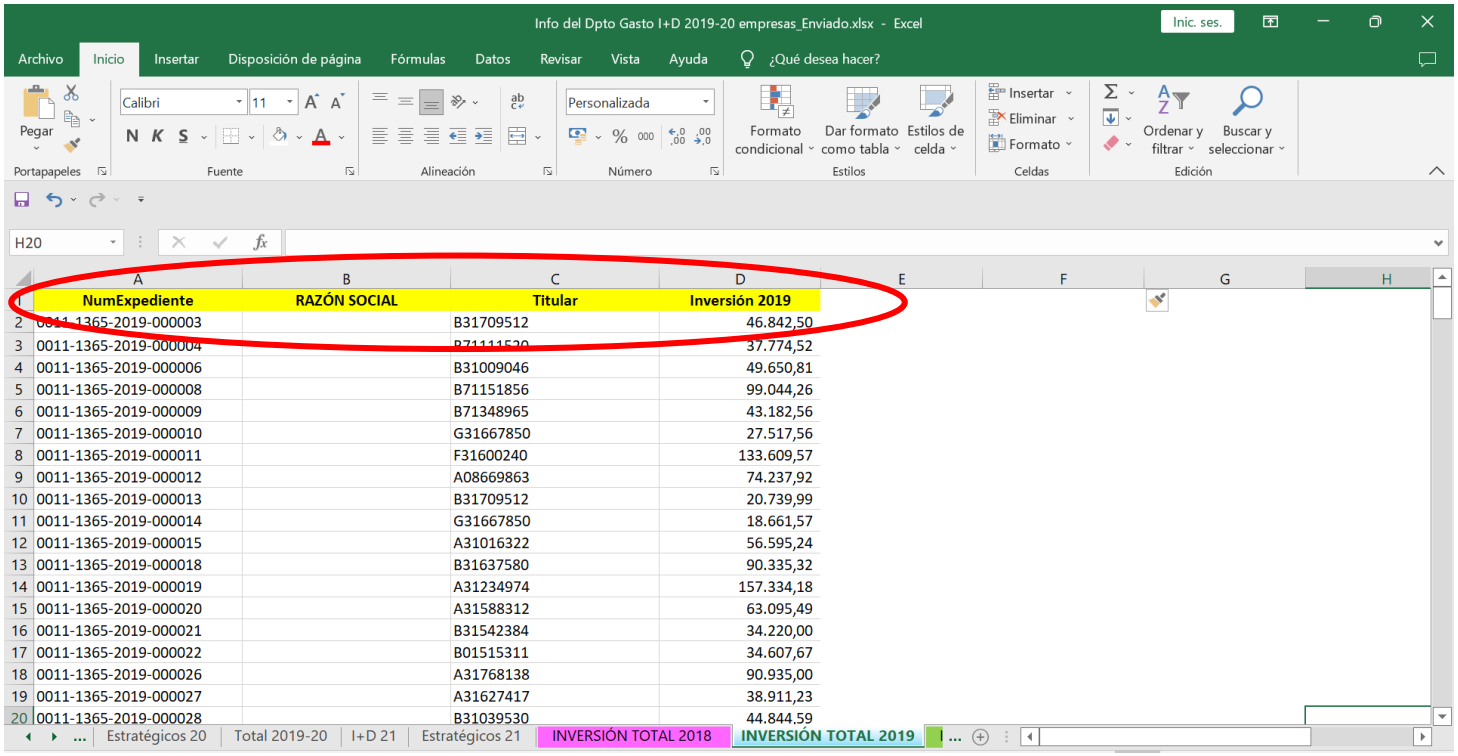
SUMA | =+F2/D2

	A	B	C	D	E	F	G	H	I	J	K
1	NUM_EXPEDIENTE	SOLICITANTE	PRESUPUESTO ACEPTADO	% AYUDA	AYUDA	AYUDA 2019	AYUDA 2020	AYUDA 2021		Inversión 2019	Inversión 2020
2	0011-1411-2019-000001	PERMANENT MAGNETS	443.19[illegible]36 €	35%	155.11[illegible]78 €	32.325,72 €	61.079,64 €	61.714,42 €		=+F2/D2	174.513,25
3	0011-1411-2019-000003	TECNACAR	384.965,00 €	45%	173.234,25 €	42.896,00 €	55.649,50 €	74.688,75 €		95.324,[illegible]4	123.665,56
4	0011-1411-2019-000004	I3CODE	202.587,00 €	45%	91.164,15 €	27.787,20 €	41.639,25 €	21.737,70 €		61.74[illegible],33	92.531,67
5	0011-1411-2019-000005	UPNA	306.705,91 €	100%	306.705,91 €	35.298,74 €	154.340,93 €	117.066,24 €		3[illegible].298,74	154.340,93
6	0011-1411-2019-000090	NAITEC	376.618,13 €	100%	376.618,13 €	36.570,67 €	163.451,33 €	176.596,13 €		36.570,67	163.451,33
7	0011-1411-2019-000070	BEEPLANET FACTORY	50.750,00 €	45%	22.837,50 €	1.700,00 €	18.100,00 €	3.037,50 €		3.777,78	40.222,22
8	0011-1411-2019-000089	ZIZU DESARROLLOS	205.895,00 €	45%	92.652,75 €	13.080,00 €	45.514,50 €	34.058,25 €		29.066,67	101.143,33
9	0011-1411-2019-000084	ANTERAL	89.969,60 €	45%	40.486,32 €	4.891,84 €	20.574,15 €	15.020,33 €		10.870,76	45.720,32
10	0011-1411-2019-000086	INYCOM	199.035,00 €	25%	49.758,75 €	10.172,22 €	25.794,03 €	13.792,50 €		40.688,89	103.176,11

SOURCE: Government of Navarre.

STEP 2. Create a new tab devoted to the whole investment of each year. In the Excel file “I+D+i EMPRESAS NAVARRA”, they have been named “Inversión total 20XX” (for the years 2018-2021). Paste all the file numbers, company names, owners, and annual investments in their specific tab, as it can be seen in figure 21. The owner (CIF) is an indispensable information that is missing in some cases and should be completed.

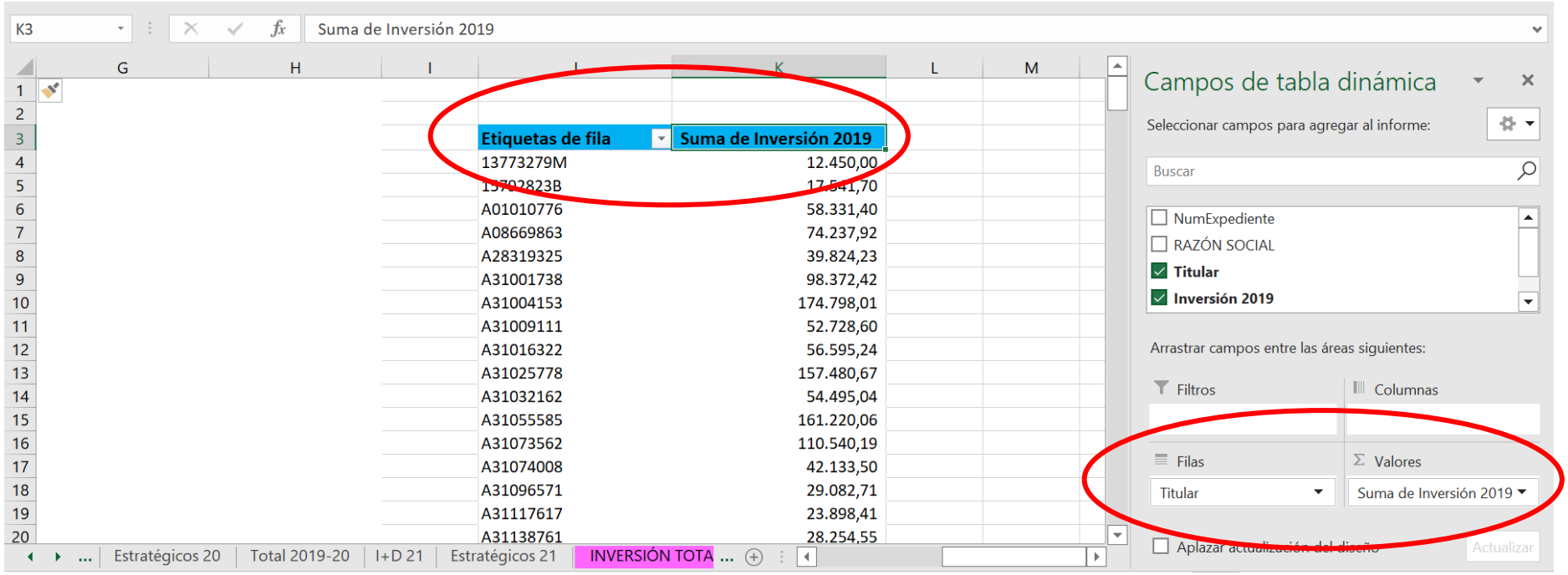
Figure 21. Example of the tab "Inversión total 20XX".



SOURCE: Government of Navarre.

STEP 3. Elaborate a dynamic table by owner (CIF) in each of the earlier expressed “Inversión total 20XX” tabs, so that the annual investment of each business is grouped as shown in figure 22.

Figure 22. Dynamic table for grouping the annual investment in R+D+i by entity.



SOURCE: Government of Navarre.

STEP 4. Use the annual investment by CIF from each dynamic table to complete the “Inversión en I+D+I” columns from the tab “Datos eco. (sin ponderar)” of the Excel “BASE DE DATOS AUTOMOCIÓN”.