INNOVATION IN SMES, A COMPARATIVE ANALYSIS BETWEEN JAPAN AND SPAIN

Aichi and Valencia case comparison

Sandra Alegre under the supervision of Dr. Odake Nobutaka at the Nagoya Institue of Technology.

Innovation is one of the most important factors of success inside auto parts industry. This study analyses in detail auto parts' SMEs in Valencia region and Aichi prefecture through a field research.

“I wish to thank the support and guidance of Odake’s Laboratory and to all the companies who collaborated in the study.”

Table of contents

List of Illustrations and Tables

Resumen

En el presente trabajo denominado "Innovation in SMEs, a comparative analysis between Japan and Spain." se estudia la innovación en las PYMEs del sector auxiliar de la automoción teniendo en cuenta uno los factores que ejercen una mayor presión a las empresas para mejorar su eficacia y efectividad, la innovación. Con ella se han conseguido diferentes puntos de vista y formas de actuar y son estas diferencias las que nos brindan la oportunidad de pensar más allá de los estándares.

Según el diccionario de la RAE, la innovación es la creación o modificación de un producto, y su introducción en un mercado. La innovación también puede ser vista como la aplicación de mejores soluciones que cumplan nuevos requisitos o necesidades del mercado, esto se logra a través de productos, procesos, servicios, tecnologías o ideas más eficaces y de fácil acceso a los mercados, las empresas y la sociedad. La innovación hoy en día se ha convertido en uno de los factores claves para conseguir el éxito empresarial, y más en sectores como el de la automoción, que se han convertido en uno de los pilares de la innovación en España. De hecho, el 12% de la inversión total en esta materia corresponde al sector, lo que supone una inversión de 1.600 millones de euros y el segundo puesto en el ranking de la industria española, según datos del INE.

Dentro del sector de la automoción se ha seleccionado de la División 29 de la CNAE-2009 los subsectores Grupo 29.2 Fabricación de carrocerías y Grupo 29.3 Fabricación de componentes, piezas y accesorios para vehículos de motor, que son los correspondientes al denominado sector auxiliar de automoción. El sector de la industria de equipos y componentes para automoción es un elemento clave en la industria del automóvil al concentrar entre el 65 y el 70% de la producción de las piezas que constituyen un vehículo, según consta en el observatorio industrial del Ministerio de Industria. Un automóvil típicamente se compone de 20.000 a 30.000 partes, las cuales, incluso los mayores fabricantes de automóviles, no pueden producir ellos mismos. Los fabricantes, por lo tanto, se ven obligados a externalizar la producción y a la compra de productos terminados (tales como neumáticos, baterías, aparatos de aire acondicionado y sistemas de audio). Esto quiere decir que la industria de componentes está adquiriendo mayor importancia dentro del proceso productivo del automóvil, ya que cada vez se subcontratan y suministran más sistemas completos ya pre-montados.

Por lo tanto todo aquello que acontezca en el sector de productores de vehículos tendrá un efecto directo sobre el sector de componentes. Así, el aumento de la competencia internacional y los efectos de la globalización y la deslocalización de las empresas productoras ejercen una importante presión sobre los fabricantes de componentes. Como respuesta, en los últimos años la estructura productiva del sector ha tendido hacia la concentración geográfica de los fabricantes de componentes en torno a las plantas de producción de las empresas constructoras de automóviles. Por todo ello, las empresas del sector se han visto obligadas a invertir en I+D para ofrecer equipamientos con un valor superior, con el fin de marcar una ventaja competitiva sostenible. Además el sector busca la especialización, es decir desarrollar productos únicos, de alta tecnología, reteniendo la propiedad intelectual de los mismos.

Así se ha tomado como referencia uno de los países líderes en la innovación en el sector, Japón. La industria automotriz de Japón es líder global en todos los aspectos, incluyendo el número de unidades fabricadas y comercializadas, el volumen de ventas, el porcentaje del mercado mundial, la tecnología implementada y la infraestructura industrial. La fusión de los conocimientos de los fabricantes de automóviles en la configuración total del vehículo, y el conocimiento de los fabricantes de piezas ha dado lugar a un sistema de colaboración entre ambos, que se ha expandido incluso en el ámbito de la I+D avanzada ya que ambas partes se han involucrado en el desarrollo conjunto con el fin de garantizar la calidad y reducir los

costos y el tiempo de fabricación de piezas usadas en el desarrollo de modelos específicos.

Si analizamos el papel y el potencial de la innovación en la industria automovilística en España, cabe señalar que España está considerada como un país de primer orden en el campo del ensamblaje, sobre todo gracias a nuestra fortaleza en materia de procesos productivos. No obstante, será difícil que el sector ocupe una posición destacada a nivel internacional o que las plantas españolas sigan consiguiendo proyectos relevantes si no se da un salto en innovación. Todo apunta a que el modelo actual puede mantener la carga de trabajo prevista para los próximos años, pero cabe preguntarse si es sostenible a medio y largo plazo. Para avanzar en este campo es imprescindible contar con mayor apoyo de las administraciones publicas y un refuerzo de las políticas que incentiven la inversión en I+D+i, ya sea mediante apoyos directos, subvenciones, protección intelectual o a través de incentivos fiscales. Además, es importante profundizar en la colaboración entre fabricantes de automóviles y componentes, tanto para dirigirse a las administraciones publicas como para generar sinergias y participar en proyectos conjuntos.

El trabajo propuesto tiene por objeto medir el nivel de innovación tecnológica y organizacional del sector auxiliar del automóvil en ambos países, en concreto el de las pequeñas y medianas empresas, que suponen más del 90% del sector. También se busca comprender el significado que posee la innovación para la empresa y el grado de integración en la cultura y la estrategia empresariales. En la investigación se emplearán 4 líneas principales de trabajo: a) Definición de conceptos a partir de los cuales conseguir una mayor comprensión sobre el tema; b) Estudio y posición de los sectores en ambos países; c) Trabajo de campo: Casos de estudio de empresas japonesas. Y la obtención de los datos a través de un cuestionario cuyas preguntas están fundamentadas en diversos métodos de análisis y medición de la innovación; d) Posteriormente se analizarán los datos realizando un estudio comparativo entre las empresas de Nagoya y Valencia, estableciendo tendencias, conductas y determinando las perspectivas de ambas zonas.

Justificación de las asignaturas relacionadas

Asignatura	Economía Española y Mundial
Capítulo del TFC:	3) El sector de equipos y componentes de automoción
Breve justificación:	Se estudiará el sector tanto en su situación a nivel global (situación económica actual y antecedentes), como a nivel de ambos países objeto del estudio, Japón y España.

Asignatura	Economía Española y Regional
Capítulo del TFC:	3) El sector de equipos y componentes de automoción
Breve justificación:	Se realizará una especial referencia a las regiones de Valencia y Nagoya en el estudio del sector.

Asignatura	Dirección estratégica y política de empresa
Capítulo del TFC:	6) Propuestas de actuación
Breve justificación:	A la hora de elaborar las propuestas de actuación y de definición de objetivos a medio y largo plazo se tendrán en cuenta decisiones que afectarán a la estrategia de las empresas y a sus políticas.

Asignatura	Métodos estadísticos en economía
Capítulo del TFC:	5) Diagnóstico de Resultados
Breve justificación:	Serán necesarios conocimientos estadísticos y econométricos para dar validez a los resultados obtenidos en la encuesta.

Objectives and Methodology

The main objective of this research to measure the level of technological and organizational innovation in Japan and Spain, specifically in the SMEs of the auto parts manufacturing sector. Also understanding the meaning of innovation for the companies and the degree in which innovation is inside the culture and the strategy is one of the main aims.

In order to pursue these objectives six main work lines are followed:

- Definition of Innovation and SMEs concepts.
- Innovation levels in Japan and Spain.
- Study of the automobile and auto parts industry both globally and in both countries.
- Data collection through a questionnaire to SMEs in the areas of Aichi and Valencia.
- Case studies of Aichi companies with different backgrounds.
- Analysis of results of questionnaire and case studies to see future trends, behaviours and perspectives.

Principal aims

Automotive sector accounts for one of the highest rates of R&D expenditure in most of the developed countries. And inside this industry, auto parts manufacturers have a key role by concentrating 65 to 70% of the production of the 30.000 typically pieces that form an automobile. Thus, automakers are forced to outsource a big part of production.

Nowadays with the effects of outsourcing, national and international competition and automakers pressure to reduce costs, component manufacturers are pushed to invest in R&D and enter the market thought the specialization if they want to survive.

Aichi prefecture accounts for the largest concentration of automobile-related industries in Japan, and it is an area with one of the highest degrees of innovation. Moreover, Japan is considered a world reference in terms of innovation in the automobile industry. On the other hand, Spain is considered as a key country in the assembling field, in addition, automakers located in Spain are increasing its production; however it would be difficult for Spain to have a strong international position if it does not take a leap forwards in innovation. In particular, Valencia region stands out for its big port, key to international transactions. The port of Valencia is the first in Spain (and among the top ten in Europe) in terms of container traffic. Sea transport is critical for international commerce in an outermost country such as Spain; that is why government and port authorities are contributing to reduce taxes to encourage automobile traffic by sea.

In Valencia is located a Ford factory, that in 2014 was one of the plants with a biggest production increase and project planning. This factory exports most of its production and automobile exports are one of the key activities for Valencia's international commerce.

In Aichi prefecture, Toyota's head office attracted hundreds of auto parts manufacturers creating the "Toyota pyramid" and making Aichi the biggest and most important area for automobile industry of Japan and one of the world's largest concentrations of automotive and automotive-related companies.

By studying both regions trends and behaviours can be established to understand the strengths and weaknesses of both areas.

Study population

SMEs of the auto parts sector in the province of Valencia and Aichi Prefecture were selected to study their levels of innovation.

The auto parts sector was selected for its high content of R&D and innovation, and within it was chosen as the target of study SMEs as they represent 99% of the economic units of the sector in both countries.

Literature Research

Through literature research first we will discuss the concepts of innovation and SMEs. Thereby we will expand the compression of two of the key concepts for the study. After, innovation levels in both countries were compared to understand current situation and the differences that exist on that matter. Finally, automobile industry was analysed from a global and national perspective.

In the end different types of literature and sources of information were consulted to help the researcher expand its point of view and understanding of the research problem.

Field Research

To gather more specific information about innovation in the auto parts industry of the Aichi prefecture and the province of Valencia, a questionnaire and interviews to different SMEs where carried out. Through field research we got real and direct information of SMEs of the auto parts industry to get a better understanding of the degree of innovation integration in the companies.

The questionnaire

The questionnaire is an online questionnaire made with Google's tool "Drive". It aims to gather first hand information about basic issues related with innovation.

Link below is for the English version of the questionnaire:
http://goo.gl/forms/48t1JuaYd9

Innovation questions are based in the Innovation survey conducted by the Spanish national institute of statistics, which at the same time is based in the Oslo manual indicators, the most widely used guideline to measure innovative performance.

Questionnaire is divided in 4 main parts:

1. Company's Competitive strategies: where we seek to understand which are the key strategies for the company to compete in the market and if R&D activities are carried out.
2. Innovation activities within the company: first some questions to know which is the degree of innovation integration in the company's culture are made. Then the main part of the questionnaire is to ask if the company developed one of the three proposed types of innovation: product innovation, process innovation or organizational innovation, and what aimed the company to develop it. Finally companies are asked about cooperation for the innovation activities with different types of partners.
3. Barriers and perspectives: What barriers and disincentives perceived the company when innovating or restrained innovation.
4. Company profile: General information about the company.

To determine the population sample to be analysed in the province of Valencia, the "Sistema de Análisis de Balances Ibéricos" (SABI) was consulted, which is a database of the financial market that examines and gathers general information and annual accounts (balance sheets and qualitative data) of more than 980,000 Spanish and Portuguese companies. The data is updated daily and the info gathered from those companies is the one deposited in the Commercial Register.

A muster of 65 SMEs was obtained and contacted by telephone. They were informed about the research and were asked to provide an email to send the online questionnaire.

In the case of Aichi prefecture companies were selected through personal contacts and asked to facilitate a contact email to send the link to the online questionnaire.

Case studies

Three companies of Aichi prefecture were selected to make a deeper case study. They were chosen for its innovative background and their growth prospects. Visits to the company and interviews with company's management were arranged to get a better understanding of the company's point of view on the market.

Data analysis

After gathering all the information, data obtained in the questionnaire was analysed and compared, and in combination with the literature research, case studies and interviews conclusions and trends were drawn to establish possible future actions.

Innovation

Nowadays a company lives involved in creating new forms and new uses to satisfy a society that changes needs constantly. Currently one of the most commonly used terms related to business success is "*Innovation*" usually associated with genius, chance, to the inspiration of a moment, creativity, or imagination; although important, these are just some of the components that are part of a much broader concept.

Innovation processes differ according to the economic sector, the field of knowledge, the type of innovation, the historical period and even the country, but a necessary condition for innovation, whether technological, commercial or organizational, are positive results. Business performance comes from a balance between exploitation activities and exploration or innovation activities. Each sector and company must find its equilibrium considering the competitive conditions of their environment.

Companies must develop the ability to survive by constantly reinventing the company over time. The pressure in all markets is very intense, as products and processes have an ever-shorter life and the tastes of users are rapidly changing.

The study of the relationship between technological phenomena and their importance in economic growth originated with Joseph Schumpeter (1883-1950) who defined in 1934 the concept of innovation along with invention and dissemination as the three key progress states. For Schumpeter invention was something new, while innovation concerned the action of providing a resource the capacity to create wealth.

The Green Paper prepared by the European Commission in 1995 contains the First Action Plan for Innovation of the European Commission and has one of the most used definitions of innovation, in the paper innovation is defined in a broad sense as the renovation and expansion of the range of products and services and the associated markets; the establishment of new methods of production, supply and distribution; the introduction of changes in management, work organization, working conditions and training for workers (European Commission, 1995).

At present, the common use of the term "innovation" has taken different meanings recognizing that it is a process that involves many more things but, if you look closely, continues to relate to the original definition of Schumpeter. And in most of the definitions we can see that two central elements are accentuated on innovation: originality of solutions and commercial success, to this we can add another element: offer a greater degree of user benefit. All these elements when used properly contribute to the development of the company's competitive advantage reaping market opportunities.

Classification and innovation types

Innovation is very difficult to classify, given that it is very different depending on the industrial sector, the degree of innovation, technology, etc. But there are some established and widely accepted definitions. The following are the most common classifications:

According to its origin

- **Technological innovations** comprise new products and processes and significant technological changes of products and processes. Technological

innovations are typically characterised by developing or using new technologies, i.e. new technical knowledge and technical inventions.

- **Non-technological innovations** are usually associated with organisational and marketing innovation. Examples include first-time use of product placement in movies or television programmes, implementation of a significant change in the design of a furniture line to give it a new look and widen its appeal, first-time introduction of training programmes to create efficient and functional teams that bring together staff from different backgrounds or areas of responsibility, and first-time implementation of an anonymous incident reporting system to encourage the reporting of errors or hazards in order to identify their causes and reduce their frequency (Euroepan Commission, 2005)

Degree of novelty of innovation

- **Incremental innovation:** Incremental product innovation concerns an existing product or process whose performance has been significantly enhanced or upgraded. This again can take two forms: a simple product or process may be improved (in terms of improved performance or lower cost) through use of higher performance components or materials, or a complex product or process which consists of a number of integrated technical subsystems may be improved by partial changes to one of the subsystems.
  It is characterized by having a lower risk and more likely to materialize in the short term. Is unlikely to provide a dramatic change in business performance. However, sustained innovation in this area is required to fuel continuous improvement in both product and process-related aspects of a business. This is required to prevent a company from falling behind its competitors and ensuring its prospects for long-term survival.

- **Disruptive Innovation:** Innovations that create products or processes through application of a completely new technology, or through a technological fusion. They are innovations that create new products or processes that cannot be understood as a natural evolution of the existing ones. It is characterized by having a commercial risk with an often costly but if successful it can bring many benefits. It can turn an industry on its head, creating new bases of performance, new competitors and new business models. Disruptive innovation often comes from outside an industry and is frequently technology based - the result of long R&D exercises.

Nature of innovation

In its latest version, the Oslo Manual (OECD, 2005), publication that contains guidelines for collecting and using data on industrial innovation, according to the nature of innovation, distinguishes four types of innovation: (1) product innovations, (2) process innovations, (3) marketing innovations, and (4) organizational innovations.

- **A product innovation** is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics. Product innovations can utilize new knowledge or technologies, or can be based on new uses or combinations of existing knowledge or technologies.

- **A process innovation** is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software. Process innovations can be intended to decrease unit costs of production or delivery, to increase quality, or to produce or deliver new or significantly improved products.

These first two classifications are included in the field of **technological innovation**, which is derived from the use of technology as a means to introduce a change in the company.

- **A marketing innovation** is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing. Marketing innovations are aimed at better addressing customer needs, opening up new markets, or newly positioning a firm's product on the market, with the objective of increasing the firm's sales.

- **An organizational innovation** is the implementation of a new organizational method in the firm's business practices, workplace organization or external relations. Organizational innovations can be intended to increase a firm's performance by reducing administrative costs or transaction costs, improving workplace satisfaction (and thus labour productivity), gaining access to non-tradable assets (such as non-codified external knowledge) or reducing costs of supplies.

Source of innovation

Classification is determined by the source of innovation:

- **Technology push:** Driven by technology.
- **Market-pull:** Driven by the market.

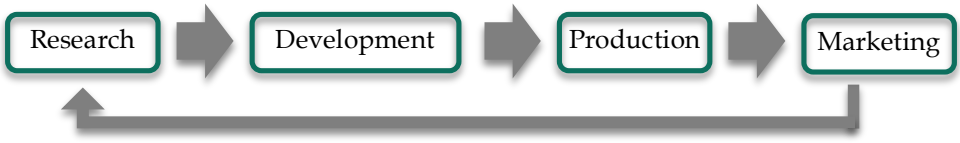
Research and development (R&D)

The company develops innovation by two different ways: by acquiring it externally, or trough in-house research and development (R&D). According to Freeman (1975) Research and Development is a creative work undertaken on a systematic basis that aims to increase scientific and technical knowledge and its subsequent use in new applications. It is the mechanism to generate technologies and own in-house expertise with which the company intends to enhance or develop their products, processes and services.

R&D is of all the activities included in technological innovation the only way to generate new technology. Its drive and execution transcends the business network, extending to universities and research centres (Salazar León, 2012).

However not all companies can bear the investment of an R&D department and it is not possible to develop in-house all the knowledge to execute innovation, so in that case acquired technology is used.

R&D has been many years the focus of research to evaluate the capacity for innovation. The dominant conception established the existence of a natural linear sequence (Fig. 1) starting in basic research and concluding with the introduction of products in the market. While linear model was dominating, there was a strong tendency to associate "innovation" with "research and development", so that they became synonyms.



Prepared by the author.
Fig. 1: Linear Model

Innovation has evolved from linear to interactive models stating that technical change does not occur in a perfectly linear sequence, but through feedback loops within this system. Furthermore there is no specific starting point for the innovation process and there's a continuous interaction among all the actors (the market, companies, governments, etc.) that may dynamically balance the innovation process from market-pull to technology-push, depending on the interactions with all the stakeholders (Vaibmu, 2012).

National Innovation System

The national innovation systems approach stresses that the flows of technology and information among people, enterprises and institutions are key to the innovative process. Innovation and technology development are the result of a complex set of relationships among actors in the system, which includes enterprises, universities and government research institutes (Salazar León, 2012). It consists therefore in elements that interact in the production, dissemination and use of new and economically useful knowledge (Lundvall, 1992)

In general, three factors (Furman, 2002) explain the innovative capacity of a country split into three levels of analysis: national, regional and sectorial. These elements are:

1. The common infrastructure to support innovation (national analysis).
2. The specific development environment of major industrial clusters (regional and sectorial analysis).
3. The quality of the ties between the two above.

It is recognized that in the innovation system not only scientific research organizations are important but also all interactions that occur between those involved is highlighted: information flows, competition for resources, alliances and specializations.

The characteristics of NIS (Salazar León, 2012) can be summarized as:

- The companies are part of a network of public institutions and the private sector whose activities and interactions initiate, import, modify and diffuse new technologies.
- NIS consists of (formal and informal) connections between institutions.
- NIS includes intellectual resources flows between institutions.

The NIS will become the centre of innovative processes in each of the nations where the system exists, as well as affect the nature and pace of relations between these countries. For policy-makers, an understanding of the national innovation system can help identify leverage points for enhancing innovative performance and overall competitiveness (Organization for economic co-operation and development, 1997).

The Oslo Manual

The Oslo Manual, first published in 1992, belongs to the commonly called "Frascati Family", consists of a series of manuals published by the OECD to develop methodologies for the development of indicators. Among them, the Oslo Manual is responsible for measuring innovation, and is the most widely used guideline document in the world to publicize innovative performance of firms (Euroepan Commission, 2005). In it a number of recommendations are outlined to generate innovation indicators that capture the innovative behaviour of firms in many ways.

Attitude of companies towards innovation

The true value of a business or a company is measured by the ability to sustain earnings over time (Salazar León, 2012). Companies need to develop organizational conditions that conduce and generate an innovative effort. Innovation is a systematic effort, which requires the existence of appropriate processes and tools for its existence. And one of the important aspects when assessing the innovative activities of companies is the extent to which they include technology and the search for competitiveness in their strategies (Ramís, 2005).

Prepared by the autor on the basis of data supplied by Juan Ramís, Curso sobre gestión de la Innovaciñon. ESADE, 2005

Fig. 2: Innovative company fundamentals

From the business point of view the ability to innovate is a critical aspect of its strategy for growth, thus, the results of innovation depend on the perception of external opportunities, available resources and capabilities, the implementation and operation of technology and the ability of management (Valverde, 1998).

So it is essential to be clear that if you are not in constant pursuit of innovation, the existence of the company is endangered. Furthermore, as Internet and globalization widen the sea of new ideas, innovation is to select and implement the right ideas and put them on the market in record time (Palmisano, 2006).

The Oslo Manual (Euroepan Commission, 2005) presents a classification of companies based on innovation and forms the profile of three types of companies:

- **1) The innovative company** is usually a leader in its sector and is considered well positioned to competition. They are positive about the ability to innovate in the future and give priority to market forces as stimulators of innovative activities. They manly carry out product innovation, but have experience in processes and organizational innovation. They possess strong internal R&D capacity.

- **2) The potentially innovative company** is estimated to be less well positioned than the one above and to have an attitude of 'wait' for the future. They mainly carry out organizational innovations related to technology, in which they generally have previous experience. They consider organizational innovations a requirement to reach product innovation, and they often consider a combination of this with process innovation. His experience is not focused on products for the market, and they have little internal R & D capacity.

- **3) Non-innovative company** has neither previous experience in innovation nor consider adopting innovation processes in the near future. They consider themselves poorly positioned in its sector and do not believe that innovation is relevant in it.

An important starting point for any analysis of how firms face technology is to recognize that there are different types of companies with different strategies. Each category has limitations and strengths that are of great importance when analysing their willingness to innovation (EOI escuela de negocios, 2001).

SMEs

Although the definition of SME varies between countries it is undeniable that SMEs are one of the most important parts of the economies of most countries. Therefore the health of this sector is an indicator of the health of the whole country and it is important that governments develop policies that favour this segment, i.e. policies to encourage innovation, outsourcing and integration.

Zevallos (Zevallos, 2000) in his analysis argues that SMEs represent 90 to 99% of all economic units in most of the countries; this makes them directly responsible for most of the economy in developed countries, its contribution to employment ranges between 49% and 79% and its contribution to GDP between 30% and 66%. Due to these figures, SMEs have been subject of many studies and will be the objective of this study when analysing innovation in the auxiliary automotive sector.

The main challenges for SMEs (Salazar León, 2012) are: consolidate their position in the marketplace; modernize the organizational structure; forming a solid business group in the country; promote a scenario in the country that offers the best conditions to develop new business; keep in mind that competitiveness means a sustainable benefit to the business as a result of a better quality, innovation and productivity.

Among the salient features of these businesses are the following (Anzola, 1993) (Rodríguez, 1996).

- An individual or a small group of people provides the capital (in many cases members of a family).
- They have reduced staff, thus personal as a close contact with the director of the company; this is a plus for small businesses because that facilitates communication.
- Managers or executives are often also the owners; they manage and have control of all activities. Consequently the business objectives reflect the owner's personal goals.
- The activities are predominantly centred in local market.
- They have a horizontal structure with few managers and a close contact between the owner and the operational area. This type of structure is efficient for decision-making, but limits the amount of information received for more complex decisions; therefore, these businesses seek outside help from professionals to gather and understand the information they need for decision-making.
- They exist in all sectors and often venture into various industrial lines.
- Most of these companies tend not to change their place of operations, i.e. they remain in the same place where they started. They try to keep their market and to have a close relationship with its customers, as the owner believes that this would maintain loyal customers.
- Have limited financial means, they do not have sufficient technical and financial support from government or private institutions, the requirements of most credit institutions are too many, so that some SMEs grow mainly through the reinvestment of utilities.
- Constantly require structuring consulting and tax planning, so the professional services received must combine the company objectives with the ones of the owners.

SMEs in Europe

Micro, small and medium-sized enterprises (SMEs) play a central role in the European economy. There are around 23 million SMEs and they provide 75 million jobs and represent 99% of all enterprises (European Commission, 2003). But at the same time they are one of the most vulnerable groups, therefore, support for SMEs is one of the European Commission's priorities.

The European Commission wrote the first common definition of SME in 1996. And this definition has been widely applied throughout the European Union. On May 2003, the Commission adopted a new definition in order to take account of economic developments since 1996.

According to the OECD the category of micro, small and medium-sized enterprises (SMEs) is made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding 50 million euro, and/or an annual balance sheet total not exceeding 43 million euro.

The table below shows that the European Commission has made three different divisions: Micro, Small and Medium-sized company, this helps to establish various policies attending to the category of the company:

Company category	Employees	Turnover or	Balance sheet total
Medium-sized	< 250	≤ € 50 M	≤ € 43 M
Small	< 50	≤ € 10 M	≤ € 10 M
Micro	< 10	≤ € 2 M	≤ € 2 M

Fig. 3: European Commission division of companies

Prepared by the author on the basis of data supplied by OECD

SMEs in Spain

In Spain the situation is similar to the rest of Europe, SMEs account for 99,9% of business and almost 75% of employees. Therefore SMEs are major players in Spanish economy and an indicator of economy's health, especially due to the large share of workforce. Special attention should be put in microenterprises that account for 40% of the Spanish private sector workforce and 28% of value added.

	Number of enterprises		Number of employees		Value added	
	Number	Proportion	Number	Proportion	Billion €	Proportion
Micro	2.129.549	94,4%	4.206.346	40,4%	122	27,7%
Small	109.212	4,8%	2.041.958	19,6%	83	19,0%
Medium-sized	14.016	0,6%	1.384.445	13,3%	77	17,5%
SMEs	2.252.777	99,9%	7.632.749	73,4%	282	64,2%

Fig. 4: SMEs estimates for 2013

Produced by DIW Econ, based on 2008–11 figures from the Structural Business Statistics Database (Eurostat).

Spanish SMEs specialization in low-tech manufacturing and less-knowledge-intensive services is weighing on the competitiveness of the overall economy. High value added sectors such as high-tech manufacturing and knowledge intensive services are still under-represented in terms of the number of firms, employment and value added.

Innovation policies for SMEs in Spain

Policies for SMEs in Spain can be regulated by the European community, the state, or by each one of the 17 regions; therefore it is a complex system in which a large number of policies are distributed in different policy areas such as: infrastructure, finance, labour market, environment, internal management, relations between companies, entrepreneurship and innovation. We will focus on the system related to the latter.

Spanish national innovation system is regulated in the "Libro Blanco" where 5 subsystems are identified:

- Public administration.
- Public R&D system.
- Support infrastructures for innovation.
- The companies.
- The environment.

Focusing on the national strategy for innovation, The Secretariat of State for R&D and Innovation developed the "Spanish national strategy for science, technology and innovation". During the period 2013-2016 its main aim is: Facing simultaneously and continuously the design of actions towards the promotion and coordination of the innovation process, ranging from the generation of ideas till entering the market for new products and/or processes, improving life quality and welfare of the citizenry.

In it different actions to invigorate R&D programs and projects are sett, furthermore, different financing instruments to support R&D projects were made available.

The different agents inside the Spanish innovation system have also key contributions to the national innovation strategy. The most important agents are:

- *Centre for Industrial Technology Development:* Channel applications for funding and support of national and international R&D programs, such as the Macro programs from the EU.
- *Spanish Foundation for Science and Technology:* Dissemination, promotion and enhancement of science, technology and innovation.
- *Government agency for scientific research:* Develop and promote research collaborations with national and foreign entities.
- *National company for Innovation:* public capital company that offers financing to Spanish SMEs through different programs and support lines.
- *General Directorate of Industry and SMEs:* It has different programs supporting innovation of SMEs at the regional level, such as the plan to support innovative business clusters.
- *Science and technology parks:* Distributed among the 17 autonomous communities, aims to strengthen the Science-Technology-Enterprise system.
- *Technology centres and similar institutions:* they are intended to improve the competitiveness of firms by generating technological knowledge, performing R&D and developing its application.
- *Spanish Technological Platforms:* Support for European technology platforms that strengthen strategic research and Science-Technology-Enterprise system.
- *Transfer offices of research results:* From within universities facilitate cooperation in R+D between researchers and companies.

The Autonomous Communities also have different programs, instruments and agents of each of the regional research and innovation systems; however, in all communities there are certain common elements.

In the Valencian community has been promoted the "Valencian plan for scientific research, technological development and innovation". There, the Valencian Institute of business competitiveness drives the support tools. "IVACE" is the organization committed to offering innovation support for SMEs. In this community can be found different kinds of organizations related to innovation:

- 11 Sectorial technological institutes.

- A university network, where the most emblematic university is the Polytechnic university of Valencia.
- 5 Scientific parks.
- A network for sectorial clusters.

SMEs in Japan

According to the Japan's Ministry of Economy, Trade and Industry (METI), SMEs are classified by business type: Manufacture (and others), Wholesale, Retail or Services, and each industry has to meet different conditions. To be considered as SMEs in the retail or services sector the company must have less than ¥50M in capital, those in the wholesale sector with less than ¥100M in capital, and those in manufacturing with less than ¥300M in capital. In addition it restricts the definition to those in retail with fewer than 50 employees, those in services or wholesale with fewer than 100 employees, and those in manufacturing with fewer than 300 employees.

Industries	Capital size (¥M)	Number of employees	of which, micro enterprises
Manufacturing and others	300 or less	300 or fewer	20 or fewer
Wholesale	100 or less	100 or fewer	5 or fewer
Retail	50 or less	50 or fewer	5 or fewer
Services	50 or less	100 or fewer	5 or fewer

Fig. 5: Classification of SMEs in Japan

Prepared by the author on the basis of data supplied by METI

In Japan, like in Spain and most of the developed countries, SMEs account for an overwhelming majority of enterprises, employment and a considerable part of value added to the economy.

	Number of enterprises		Number of employees		Value added [a.]	
	Number	Proportion	Number	Proportion	Trillion ¥	Proportion
SMEs	4,19 M	99,7%	28,27 M	66%	40,6	50,6%

Fig. 6: SMEs in Japan

Prepared by the author on the basis of data supplied by METI, Establishment and Enterprise Census (2009)
a. Manufacturing industry. METI, Census of Manufactures (2009)

SMEs composition in japan shows that they are most numerous in the retail, services and restaurant/lodging industries, but the most productive are those in the manufacturing sector. While many of the services sector's SMEs are wholly reliant on domestic demand, a large proportion of SME manufacturers are essential suppliers to Japan's large corporations.

Innovation policies for SMEs in Japan

Policies for SMEs in Japan have been recently revised according to the needs of the times and support measures have been implemented and enhanced in the last "SMEs basic act revised" of 2013 that contains the basic principles and policies for

SMEs divided into three main areas: Monetary policies, Promotion policies and Organization policies.

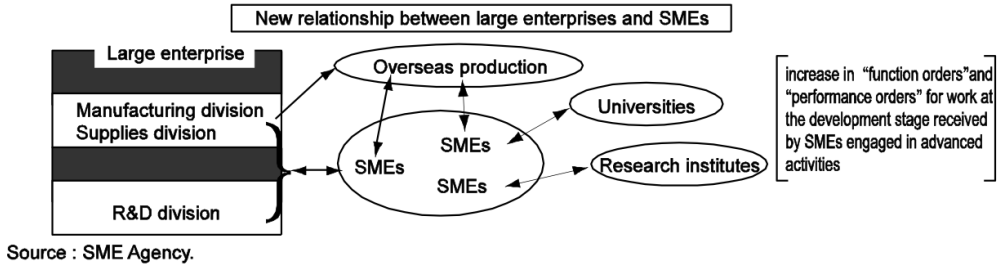


Fig. 7: New relationship between large enterprises and SMEs agency

Source: SME Agency.

The relation of Japanese SMEs with big enterprises has changed over time, in the past big companies produced everything by themselves, but nowadays they entrust some parts of the production to SMEs to the point that 60% of small companies have direct or indirect transactions with large enterprises in the manufacturing industry. As we can see in the picture above, they are an important part of the industry network.

Main SMEs policies are coordinated by the "Small and Medium Enterprise Agency" and implemented by a number of related organizations working in partnership. There are two major policies implemented by the organization:

- 1. Supporting SMEs that includes:
  - Support for financing: Government-affiliated institutions to create a system to provide SMEs with long-term funds at low rates.
  - Subcontracting trade: Clamping down on unfair acts.
  - Tax system for SMEs: Preferential tax reduction and exemption measures.
  - "Mirasapo" support portal site: Consultation needs including support formation and expert counselling.
  - Support for management: 9 SME universities in locations nationwide to support development of SME personnel.
  - Support for rehabilitation: In each prefecture to support the revitalization of SMEs
  - Support for business succession: Average manager age is 60 years, is important to ensure a smooth business succession.
  - Transfer of business: Enable employment and technologies to be maintained, supporting new business development.

- 2. Creating jobs that includes:
  - Supporting technology development.
  - Securing human resources.
  - Support for overseas business expansion.
  - New business development.
  - Revitalization of shopping districts.
  - Support for venture businesses.
  - Public agency orders.

Taking into consideration that 90% of all SMEs in Japan are micro enterprises that are vulnerable in terms of management resources and that they are highly significant in terms of their contribution to the stability of local economies and the development of Japan's economy and society, from the agency they try to focus on micro enterprises, and with that in mind they have created the "Plan for the revitalization of Japanese industry" whose major policies are:

- Promote business start-ups that utilize and mobilize local resources.
- Promote the renovation of SMEs.
- Support SMEs to enter strategic markets.

- Support for SMEs expanding business overseas.
- Revitalize SMEs through innovation.

To facilitate the R&D capacity building within SMEs as well as cluster them into regional support networks, the central government is giving the prefectural governments, and more recently municipal governments, the flexibility to use fiscal resources. With that, Japanese government tries to make innovation open and market-driven in order to stimulate local economic development as well as to promote the international competitiveness of SMEs (Lilischkis, 2011).

Innovation. Analysis of the innovative activities in Spain and Japan.[1]

Innovation in Spain

In Spain the total amount of innovative companies in the year 2013 stood at 19.730, the 13.24% of the total. The services sector was the biggest contributor to the number of innovative companies (10.270, 56% [2]), however the industry sector was the sector with the biggest percentage of innovative companies (23%[3]), and with the biggest total innovation expenses (6.90 billion euros/ 937.17 billion yen, 52.17%[4]).

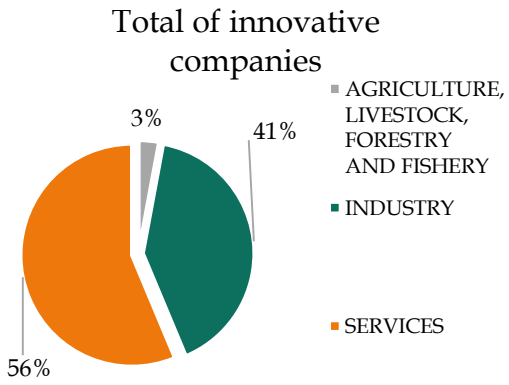


Fig. 9: Total of innovative companies (Spain)

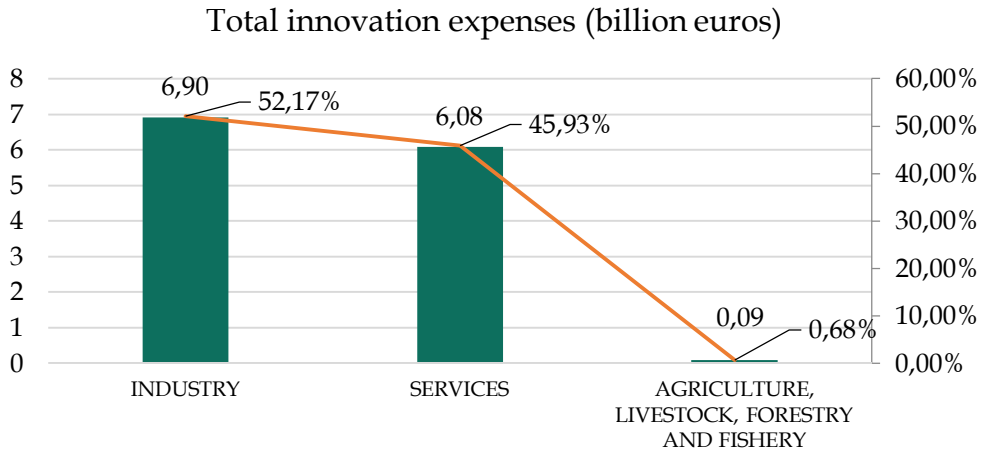


Fig. 8: Total innovation expenses (billion euros) (Spain)

1 All data obtained from the INE (Spanish National Institute of Statistics) and JSTAT (Statistics Bureau of Japan). Graphics prepared by the author on the basis of data supplied by INE and JSTAT. Year 2013.
2 % of total innovative companies.
3 % of innovative companies inside the sector.
4 % of total innovation expenses.

Among the sectors with the biggest number of innovative companies stands up the sales sector (2885 companies, 14.89%[5]), the sanitary activities and social services sector (1430 companies, 7.38%[5]) and the professional, scientific and technic activities sector, excluding R&D, (1400 companies, 7.23%[5]). However the most innovative sectors were the petroleum industries (87.5% [6]), R&D services (63.86%[6]) and pharmacy (59.43%[6]).

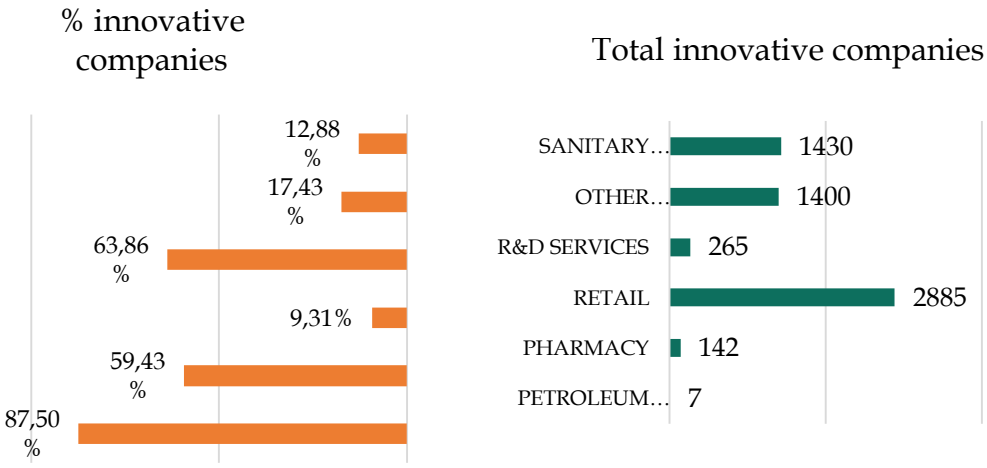


Fig. 10: innovative companies by industry (Spain)

The total innovation expenses raised to a total of 13.2 billion euros/ 1.8 trillion yen, this accounted for the 1.26% of GDP. As for the sectors with the biggest innovation expenses, in first place the automotive industry (1.78 billion euros / 245 billion yen, 13.45%[7]), nearly followed by R&D services sector (1.6 billion euros / 215 billion yen, 13.24%[7]) and pharmacy sector (1.04 billion euros / 138 billion yen, 7.88%[7]). Out of this total an average of 66.78% was spent on R&D (intern and extern) and the other 33.22% on other innovative activities.

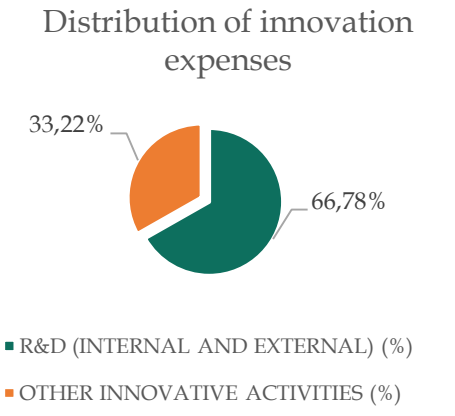


Fig. 11: Distribution of innovation expenses (Spain)

5 % of total number of innovative companies.
* Currency exchanges date June 2015. According to the web xe.com
6 % innovative companies of the sector.
7 % of total innovation expenses.

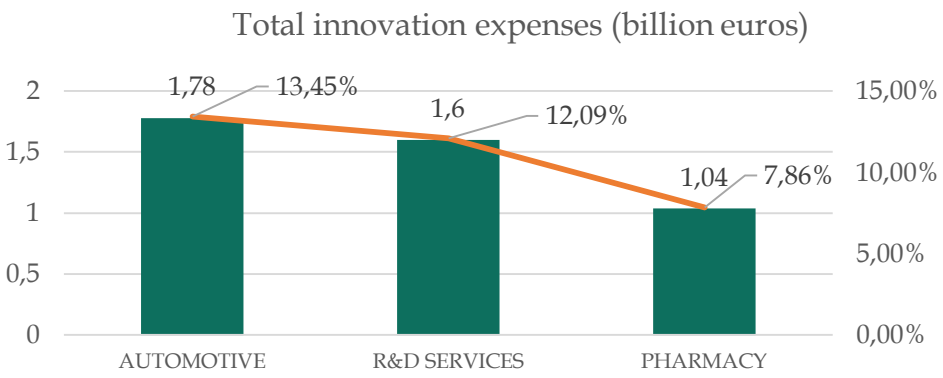


Fig. 12: Total innovation expenses (Spain)

Innovation in Japan

In Japan the total amount of innovative companies in the year 2013 stood at 12.673, 2.97% of the total. The industry sector was the biggest contributor to the number of innovative companies (10.484, 82.73%[8]), the biggest number of innovative companies (10.484, 4.11%[9]) and the biggest total innovation expenses (2.5 trillion yen, 19.7%[10]).

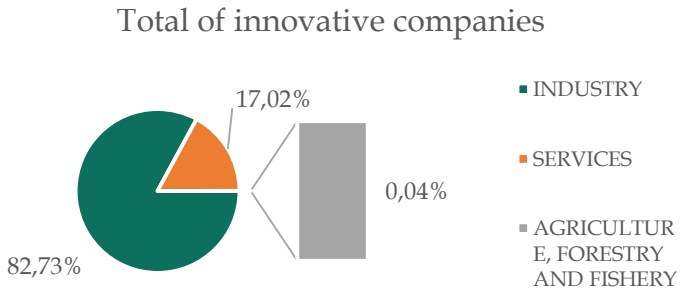


Fig. 14: Total of innovative companies (Japan)

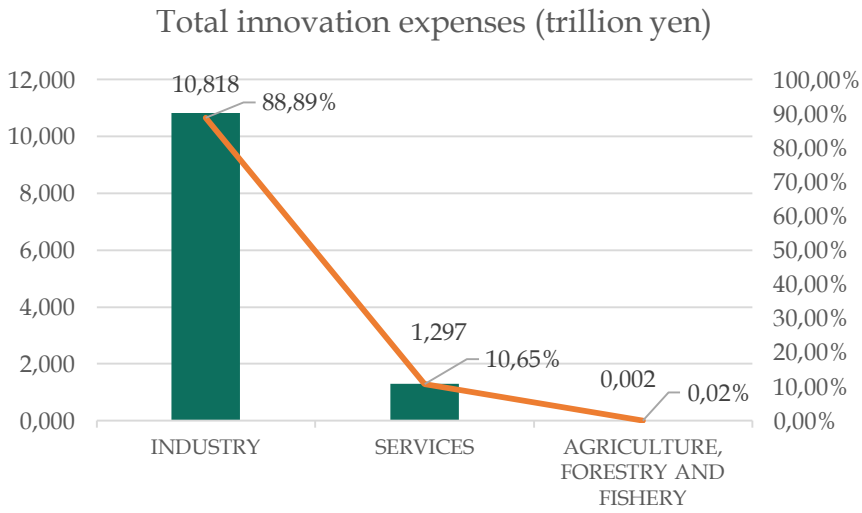


Fig. 13: Total innovation expenses (Japan)

8 % of total innovative companies.
9 % of innovative companies inside the sector.
10 % of total innovation expenses.

Among the industries with the biggest number of innovative companies stands up the manufacturing sector (1.364 companies, 10.76%[11]), the information services sector (866 companies, 6.83%[11]) and the business oriented machinery sector (835 companies, 6.59%[11]). However the most innovative sectors were the pharmacy and medicine sector (51.1%[12]), other chemical industries (44.9%[12]) and research institutes (44.6%[12]).

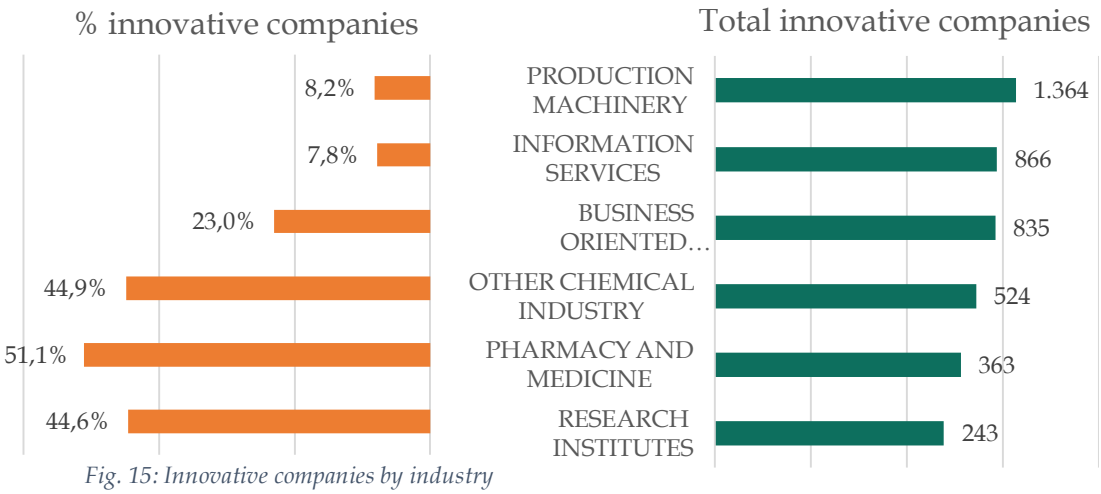


Fig. 15: Innovative companies by industry (Japan)

The total innovation expenses raised to a total of 12.69 trillion yen/ 93.6 billion euros, this accounted for 2.62% of GDP. As for the sectors with the biggest innovation expenses, first place is for the transportation equipment industry (2.41 trillion yen / 17.95 billion euros, 19.02%[13]), nearly followed by information and communication electronics equipment sector (1.67 trillion yen / 12.54 billion euros, 13.16%[13]) and pharmacy and medicine sector (1.44 trillion yen / 10.33 billion 11.32%[13]). Out of this total an average of 74.5% was spent on R&D (internal and external) and the other 25.5% on other innovative activities.

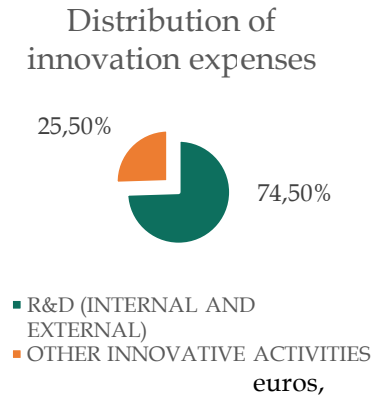


Fig. 16: Distribution of innovation expenses (Japan)

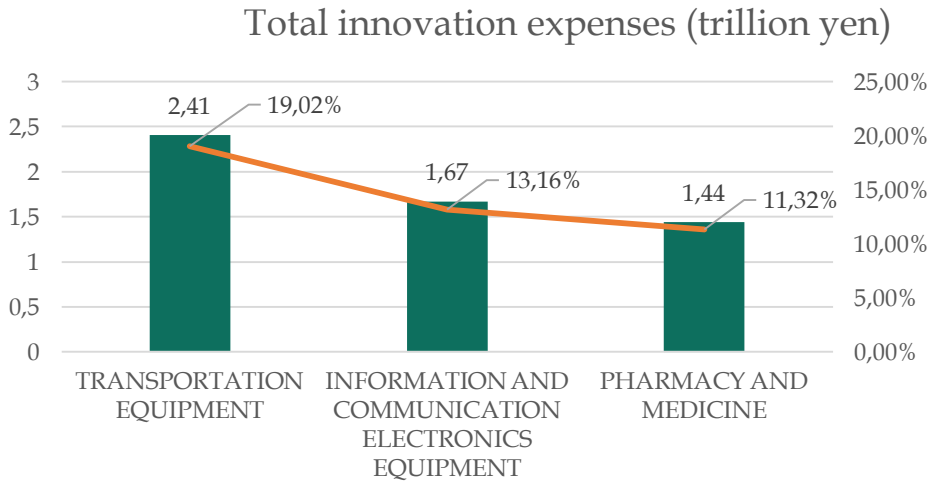


Fig. 17: Total innovation expenses (Japan)

11 % of total number of innovative companies.
12 % innovative companies of the sector.
13 % of total innovation expenses.

Innovation. Comparison between Spain and Japan

Bloomberg's innovation report

To create the Bloomberg Innovation Quotient, the countries were ranked on a scale of 0 to 100% on seven factors. The factors and weightings are detailed below.

R&D intensity (20%): Research and development as a percentage of gross domestic product.

Productivity (20%): GDP per employed person, per hour worked.

High-tech density (20%): High-tech public companies -- such as aerospace and defense, biotechnology, hardware, software, semiconductors, Internet software & services and renewable energy companies -- as a percentage of publicly listed companies.

Researcher concentration (20%): R&D researchers per one million people.

Manufacturing capability (10%): Manufacturing value-added as a percentage of GDP; products with high R&D intensity (aerospace, computers pharmaceuticals, scientific instruments and electrical machinery) as a percentage of total manufactured exports.

Tertiary efficiency (5%): Enrollment ratio in all subjects for post-secondary students; tertiary graduation ratio of students who majored in science, engineering, manufacturing and construction; annual new graduates and total tertiary-degree holders as percentages of labor force.

Patent activity (5%): Resident patent filings per million population and per $1 million R&D spent. (Bloomberg L.P.)

In general terms, according to the 2013 Bloomberg's innovation report Japan was ranked in a 6th place on the overall ranking and Spain in the 27th place.

	Spain	Japan
Overall Ranking	27th	6th
R&D intensity	27th	4th
Productivity	18th	21st
High-tech density	63rd	20th
Researcher concentration	25th	6th
Manufacturing capability	53rd	15th
Tertiary efficiency	13th	27th
Patent activity	50th	2nd

Fig. 18: Bloomberg's innovation report

While Japan was better than Spain in most of the fields, Spain was better in productivity and tertiary efficiency.

Global Innovation Index

Global Innovation Index 2013: The Local Dynamics of Innovation is the result of a collaboration between Cornell University, INSEAD, and the World Intellectual Property Organization (WIPO) as co-publishers, and their Knowledge Partners.

The Global Innovation Index 2013 (GII) relies on two sub-indices, the Innovation Input Sub-Index and the Innovation Output Sub-Index, each built around some key pillars.

Five input pillars capture elements of the national economy that enable innovative activities: (1) Institutions, (2) Human capital and research, (3) Infrastructure, (4) Market sophistication, and (5) Business sophistication. Two output pillars capture actual evidence of innovation outputs: (6) Knowledge and technology outputs and (7) Creative outputs.

Each pillar is divided into sub-pillars and each sub-pillar is composed of individual indicators (81 in total). Sub-pillar scores are calculated as the weighted average of individual indicators; pillar scores are calculated as the weighted average of sub-pillar scores. Four measures are then calculated (Cornell University):

- *The Innovation Input Sub-Index is the simple average of the first five pillar scores.*
- *The Innovation Output Sub-Index is the simple average of the last two pillar scores.*
- *The overall GII is the simple average of the Input and Output Sub-Indices.*
- *The Innovation Efficiency Ratio is the ratio of the Output Sub-Index over the Input Sub-Index.*

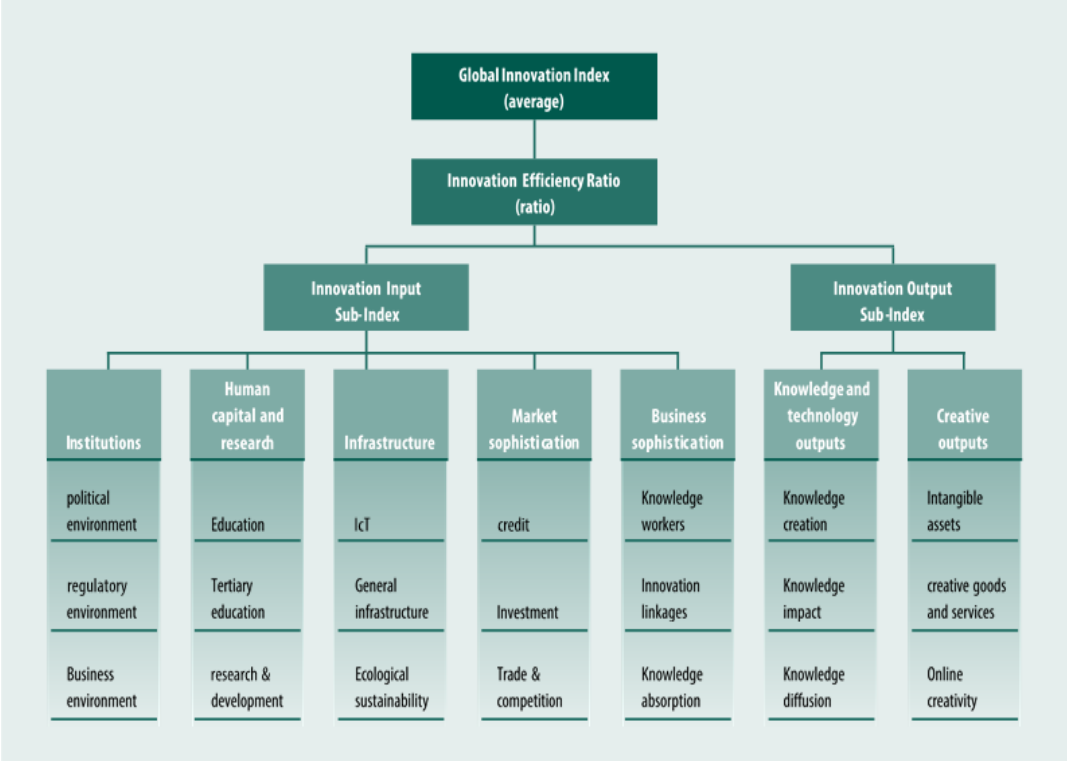


Fig. 19: Global Innovation Index

According to the Global Innovation Index, Japan is located in the 22nd place with an overall score of 52.2 points, while Spain is in the 26th place with a score of 49.4 points. Other remarkable numbers are the innovation efficiency ratio which was the same for both countries (0.7 points) and the research and development which was about 30 points higher for Japan than Spain (69.9 vs. 39.2 points for Spain), this can be explained by looking at other indexes like the number of researches in each country and the expenditure on R&D.

A	Global Innovation Index	52.2	49.4	
	Innovation Efficiency Ratio	0.7	0.7	
C	Innovation Input Sub-index	62.8	57.9	
D	Innovation Output Sub-index	41.6	41.0	
2.3	Research and development (R&D)	69.9	39.2	
2.3.1	Researchers	53.9	37.1	
2.3.2	Gross expenditure on R&D (GERD)	74.1	30.1	
2.3.3	QS university ranking average score of top 3 universities	81.7	50.5	

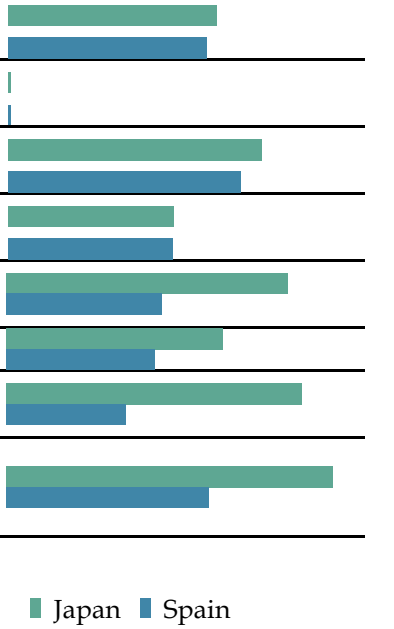


Fig. 20: Global Innovation Index, Japan and Spain

Source: www.globalinnovationindex.org

In a more comparative approach, in Spain 13.24% of the total companies were innovative companies, while in Japan the percentage drops to 2.95% were innovative companies. Although the number of innovative companies and the % of the total was higher in Spain (19.370 / 12.673) the total innovation expenses were about seven times more in Japan (12.69 / 1.8 trillion yen in Japan; 92.62 billion euros / 13.22 billion euros in Spain). That accounted in Japan for the 2.97% of GDP and for Spain the 1.26%.

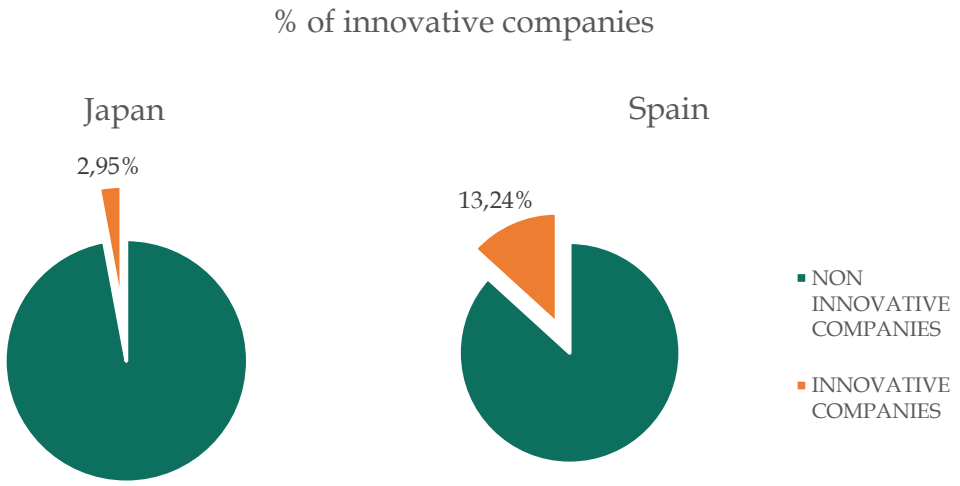


Fig. 21: % of innovative companies Japan and Spain

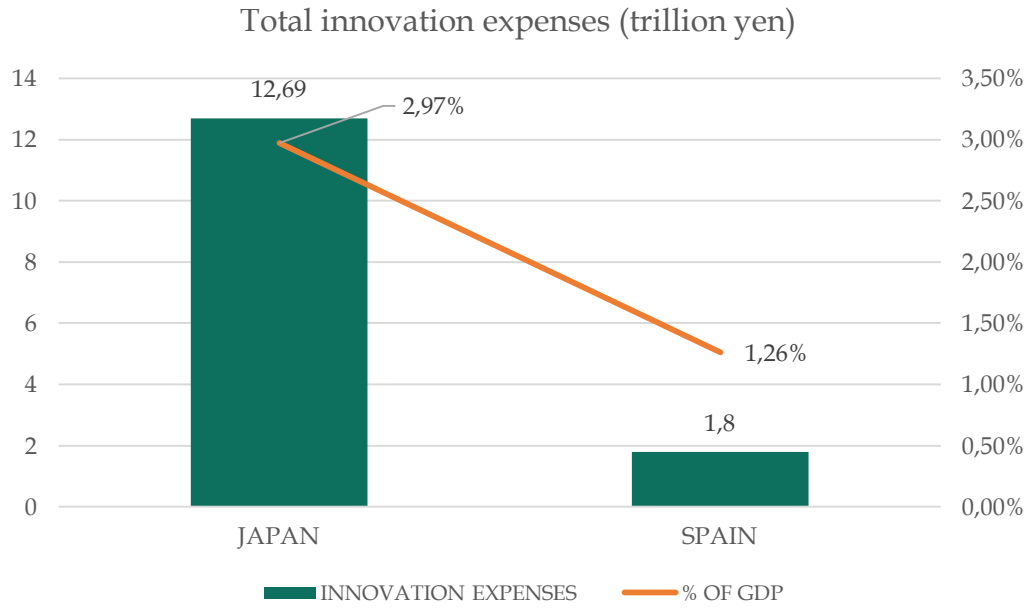


Fig. 22: Total innovation expenses Japan and Spain

In Spain the sector with the biggest number of innovative companies was the services sector, however the most innovative sector and the one with the biggest expenses in innovation was the industry sector.

On the other hand, in Japan the sector with the biggest number of innovative companies, the most innovative and the one with the biggest expenses in innovation was the industry sector.

For both countries the industry with the highest innovation expenses was the automotive industry. But one more time, the total expenditure in Japan was much more high than in Spain (2.41 trillion yen / 17.95 billion euros; 0.245 trillion yen / 1.78 billion euros).

As for the distribution of the innovation expenses we can see that tonaverage the innovation expenses were distributed similarly both in Spain and Japan with a little bit more expenditure in R&D in Japan than in Spain.

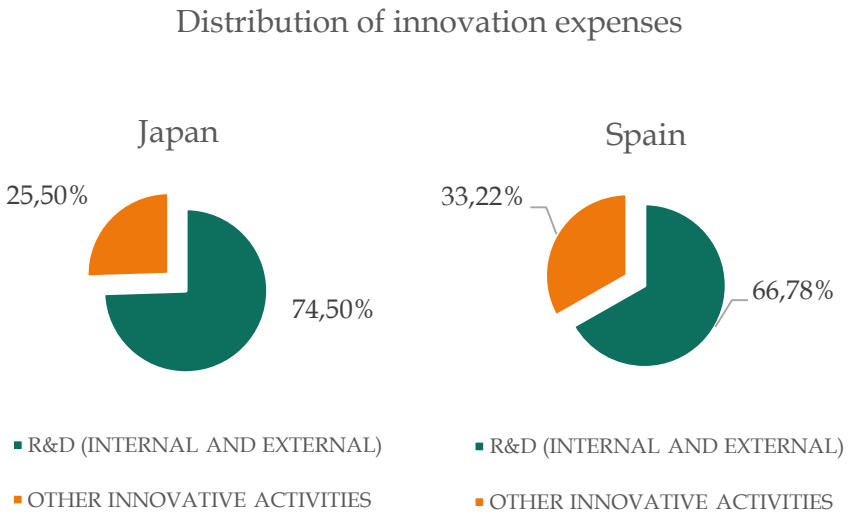


Fig. 23: Distribution of innovation expenses Japan and Spain

Auto industry

Auto industry is one of the most important sectors of the global economy as it largely contributes to global production, job creation and technological development. It is estimated that in 2015 production level will be around 88,6 million cars (IHS Automotive), an increase of 2,4% compared to 2014, and for 2017 it is expected to exceed 100 million vehicles. This industry avant-garde technology has positioned it as one of the most important in terms of innovation.

Auto industry production is not distributed evenly around the world. There are four main markets: China (being the largest market since 2009), United States, Europe and Japan. As wee can see in the pie chart, these four areas concentrate 75% of global sales.

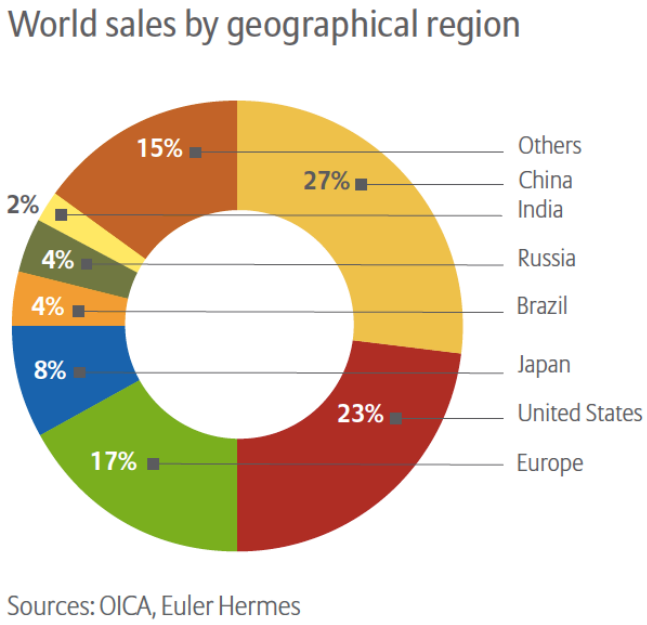


Fig. 24: World sales by geographical region

The automotive industry and its components is formed by those economic activities aimed at making cars; thus we consider all those companies that assemble motor vehicles and those that manufacture parts and components (Salazar León, 2012):

- Manufacture of parts and components. Activity dedicated to the manufacture of all kinds of parts, accessories and components that will form part of the equipment module or directly from the vehicles.
- Manufacture and assembly of modules and equipment. Obtainment of modules and equipment for the assembly of automobiles are included in this group.
- Vehicle assembly. This activity groups vehicle assemblers.

These activities are linked to each other, each one being necessary to obtain the final product. Within the auto parts industry, component manufacturers are involved in the vast majority of vital vehicle functions: ignition, injection, braking, lighting, air conditioning, comfort and safety.

The supply chain consists of an orderly layered hierarchical structure depending on the relationship with the automaker:

- **Tier 1:** Modules already assembled (air conditioning systems, engine parts, steering systems, logistics systems, electronic parts) that go directly to the assembly line of the assembler. They specialize in complex systems.
- **Tier 2 and lower:** hundreds of small businesses divided into two major categories: manufacturers of components and sub-assemblies.

In almost all cases, a component manufacturer is an indirect supplier of automobile assemblers their direct customers are other providers of higher levels of the supply chain hierarchy. All component manufactures are the responsible of the design and testing of their products.

The last level of the hierarchy is constituted by thousands of distributors, also known as auto dealers, whose function is to sell automobiles to consumers.

Increasingly, vehicle manufacturers are outsourcing more activities and selecting its partners more carefully, so collaborators can be classified depending on what they specialize in (Mortimore & Barrón, 2005):

- Integrated suppliers: They offer a broad spectrum of services. A typical product is the integrated instrument panel. Success depends on their experience, integration and solid knowledge of the vehicle as unit.
- System suppliers: They offer expertise in planning and designing total systems (consisting of multiple components), to give greater joint functionality. Characteristic products are for example brake systems. Success depends on their ability to develop functional integration of total systems.
- Component suppliers: Supplier of critical components with strong engineering background. Among the products they supply are included: auxiliary engines, crankshafts and compressors. Success depends on their operational efficiency and their capacity to reduce costs.
- Suppliers of standardized products: Traditional Businesses. Among the products they manufacture are included: standardized parts, metal fittings and connections. Product maturity gives little opportunity for differentiation. Success depends on operational efficiency, economies of scale and their ability to reduce costs.

Trends

To assemble the 30000 parts that form an automobile it is crucial that automakers and parts manufacturers join efforts. Especially considering that the purchases of parts and materials comprise approximately 70% of the total costs incurred by automakers (Japan Credit Rating Agency, 2012), so cost reduction capacity of al actors is essential. Factors like environmental/safety regulations, standardization, electronic components and the unevenness of global markets are playing an important role in cost containment.

Although global production plunged after the collapse of Lehman Brothers, it has been trending back up to pre 2009 rates of around +4% sales per year thanks to demand in emerging economies.

Besides of that there is a big unevenness in global markets. Demand in developed regions is mature and the automotive industry relies heavily on economic trends and replacement demand. Concerning the U.S. market experts tend to be optimistic but the outlook in Europe is much weaker as the region is slowly emerging from a six-year sales slump. Regions like Russia and South America have a direr situation with a decline of sales of 25% and 15% in 2014 respectively.

On the other hand, in the market of emerging countries such as China and India, with the development of motorization, demand is increasing and diving medium-term global demand. In the case of China, worlds largest vehicle market, demand growth has slowed, even though investments made by OEMs (original equipment manufacturers) continue to ramp up. Indian market's performance has been inconsistent (Hirsh, Singh, Kakkar, & Wilk, 2015).

But, what is driving change in the auto industry? There are some major trends and future perspectives that are leading the changes in the structure and relationship between automakers and component manufacturers:

- Shifts in consumer demand: There is an increasing awareness of product differentiation. Consumers have less and less brand loyalty and are more aware of price and quality.
- Expanded regulatory requirements: Fuel economy and safety-related features are the two main areas where governments are putting a special emphasis in making regulations. That leads to a cost pressure that falls largely on OEMs and consequently also on part manufacturers.
- Increasing availability of data and information: Information about vehicle usage and driver behaviour is proliferating as sensors and telematics systems become more common, but there is an uncertainty about how to use it. Meanwhile, customers are awash in easily accessible information and are gaining bargaining power.
- Cost of electronics and software: The electronic content inside a car has shifted from 20% a decade ago to 35% nowadays. Also 90% of innovations are made in this field.
- Pressure on suppliers to engineer and produce parts globally: OEMs follow the demand of emerging markets. Activities such as simultaneous worldwide launch of key models are on the rise.
- Increased dependency on the Chinese car market development: Given that demand in developed countries is mature, china has gained significant importance. Especially because Chinese have a strong preference for premium models, typically yielding above average margins for OEMs.

Considering the above trends, there are some risks and consequences for this industry that OEMs and auto parts manufacturers have to consider for the next years.

Given that the customers are shifting his preferences and demands, OEMs have to adapt and confront the pressure by both consumer preference for more segmented vehicles and the need to reduce costs. So vehicle manufacturers are offering a larger number of models and at the same time reducing the number of vehicle architectures on which they are built, drastically improving product commonality (Hirsh, Singh, Kakkar, & Wilk, 2015).

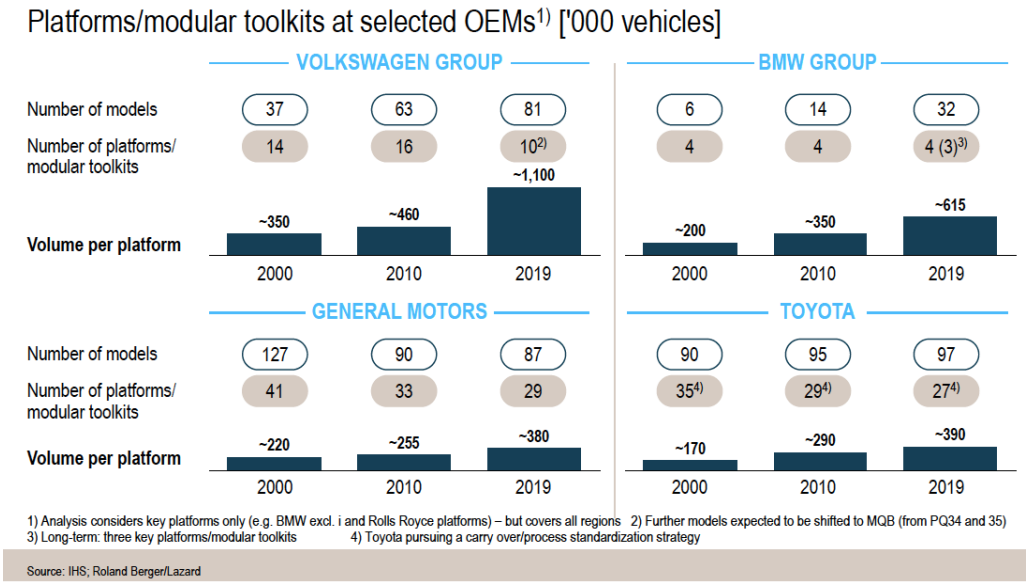


Fig. 25: Volume in '000 cars

Source: (Roland Berger strategy consultants & Lazard, 2013)

That standardization has two other consequences, first leads to a consolidation of suppliers as a growth strategy that will result in a smaller number of large global players; second, commonality combined with activities on the rise such as worldwide launch of key models lead to a risk of massive recalls.

To address the new and expanded regulatory requirements OEMs and consequently auto parts manufacturers have to prioritize R&D to focus on that projects that offer the best value and differentiation to face regulations in the most cost-effective way.

Now that customers can collect a great deal of information quickly they want a seamless car-buying experience, they are gradually replacing on-site sales for on-line sales since there is no pressure. Car dealers already earn little from new-car sales and in the future if this trend continues a lack of a robust dealership network will be a competitive disadvantage for any automaker.

Electronics and software is an area acquiring more and more importance inside car industry, so OEMs should collaborate with suppliers and experts outside the traditional auto industry to improve performance and differentiation.

Globalization is one of the factors that is having a greater impact on the industry in many ways. Follow the demand requires suppliers to follow OEMs to emerging markets. Also requirements for doing business are changing, an increasing investment and global R&D is need and a growing management and coordination complexity, without necessarily realizing a substantial additional profit (Roland Berger strategy consultants & Lazard, 2013). Vehicle manufacturers also require from suppliers large-scale component projects and given the long lifecycles and high volumes "not being part of the game" is not an option, and that is resulting in strengthened OEM negotiation position (Roland Berger strategy consultants & Lazard, 2013). Therefore component manufacturers should focus their efforts on their core products to be among the top two or three supplies of their category. In the figure below we can see that the domain with a higher growth is Powertrain. So it is important to pay attention to future trends and market behaviour to establish a solid company strategy.

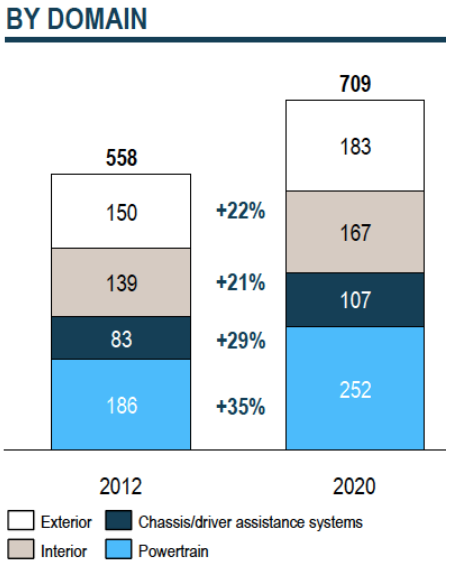


Fig. 26: Future car market trends by domain

Source: (Roland Berger strategy consultants & Lazard, 2013)

On the other hand simultaneous worldwide launch provides the full benefit of the "new car" effect but gives few time for lesson learning and market adaptation.

Boosting demand in China has lead to a dependency on the Chinese car market development given that on average 15% of sales of major OEMs are in the Asian

country. Also, the fact that vehicle manufacturers want to be close to demand makes that many OEMs' factories are being outsourced to China, consequently, as said, with component manufacturers following. Global business expansion requires substantial funding and capital expenditure and R&D, but at the same time forms a high barrier to market entry.

China's market share and demand is expected to rise further in the next years and specially premium OEMs benefit from Chinese particular focus on high-end models and fully-featured models that yield significantly higher margins for OEMs (Roland Berger strategy consultants & Lazard, 2013).

Another problem that component manufacturers have to face every year is the increasing OEMs pressure to reduce prices, mainly, as mentioned before, due to the rising energy costs, regulations and the cost of electronics and software, all this, at the same time satisfying customer needs. Although it depends on the market, adding and increase in raw materials to the price of automobiles is problematic, so profit margins are compressed in other costs.

In a market where automakers are increasingly globalised key factors in the competitiveness for auto parts manufacturers include, in particular, global supply capacity, cost-competitiveness, and the ability to develop new technologies. For a parts manufacturer affiliated with a specific automaker, its position within the group is critical. On the other hand, for an independent manufacturer, its core competence in acquiring orders and its continuity are important. For both, the ability to develop proposals and planning capacities for cost reductions and new technologies are important for receiving stable orders (Japan Credit Rating Agency, 2012).

Automotive Industry.[1] Analysis of the sector in Spain and Japan.[2]

Automotive Industry in Spain

In Spain the automotive industry accounted in the year 2013 for a total amount of 52.14 billion euros/ 7.09 trillion yen, the 5% of the GDP. The total number of vehicles produced was 2.652.061 and the 86.9% of them were exported, representing the 16.8%of the total value of Spain's exports. The sector employed 131.837 people (0.58% of the total Spain's workforce).

Below we can see the location of the automobile and auto parts manufacturers inside Spain. Being Catalunya the region with the highest concentration.

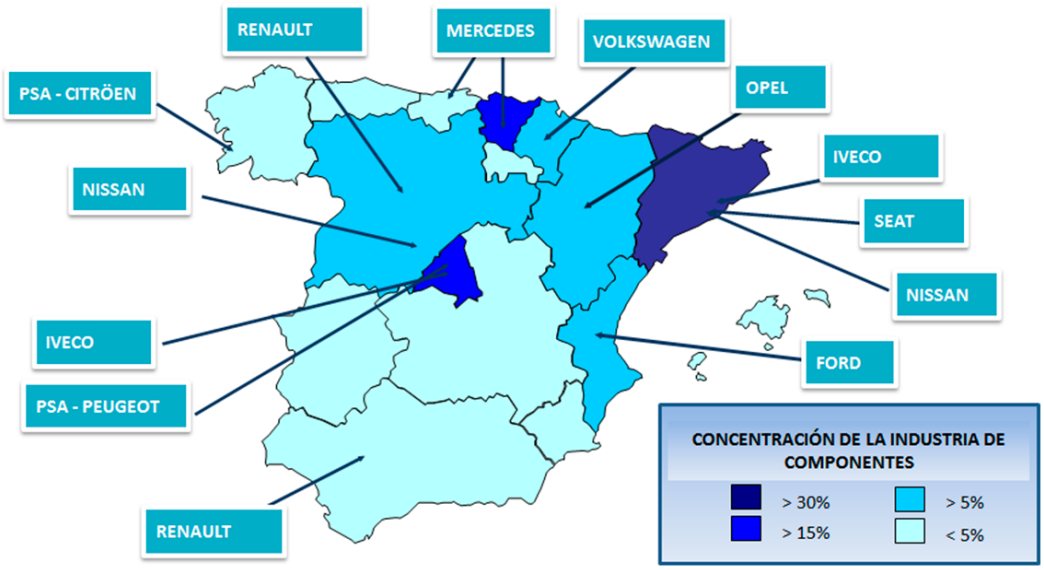


Fig. 27: Location of automobile and auto parts manufacturers

Source: Sernauto 2014

1 Automobile production and auto parts industry.

2 All data obtained from the INE (Spanish National Institute of Statistics), Sernauto (Spanish association for component and equipment for automobile manufacturers), Anfac (Spanish Automobile Manufacturers Association), JSTAT (Statistics Bureau of Japan) and JAMA (Japanese Automobile Manufacturers Association). Graphics prepared by the author on the basis of data supplied by INE, SERNAUTO, JAMA and ISTAT. Year 2013.

* Currency exchanges date June 2015. According to the web xe.com

Auto parts Industry in Spain

In Spain the auto parts industry accounted in the year 2013 a total amount of 17.2 billion euros/ 2.34 trillion yen, the 32.98% of the automobile industry and the 1.64% of the GDP. The 60% of the total production was exported (82% if counting the pre-installed components on exported vehicles), representing the 7% of the total value of Spain's exports. The sector employed 73.979 people (56.11% of the Automobile Industry's workforce and 0.33% of the total Spain's workforce).

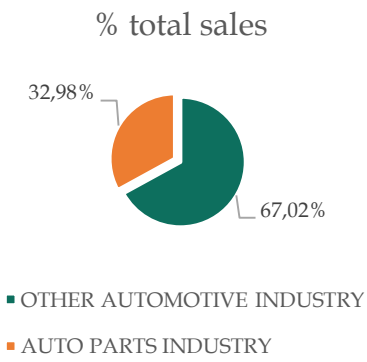


Fig. 30: % total sales (Spain)

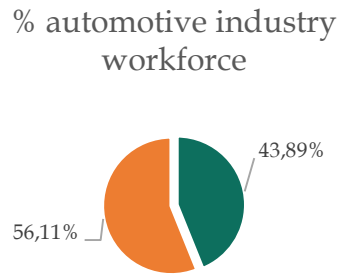


Fig. 29: % automotive industry workforce (Spain)

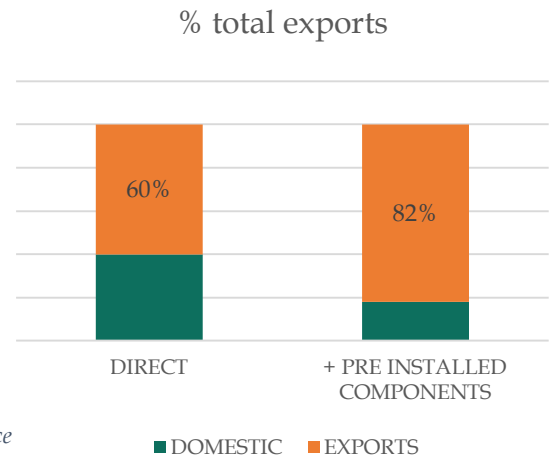


Fig. 28: % total exports (Spain)

According to the data provided by SERNAUTO the auto parts industry expects to have 30.000 new employees (+40%) and generate a 25% more sales (21.5 billion euros/ 2.91 trillion yen), in general terms the automotive industry expects growing a +33.5% between 2013 and 2020, producing more than 3 million automobiles. Also expects an increase of a +76% in R&D expenses (600 million euros/ 81.35 billion yen) and a total value increase of exports of 2.4 billion euros/ 325.38 billion yen (+14%).

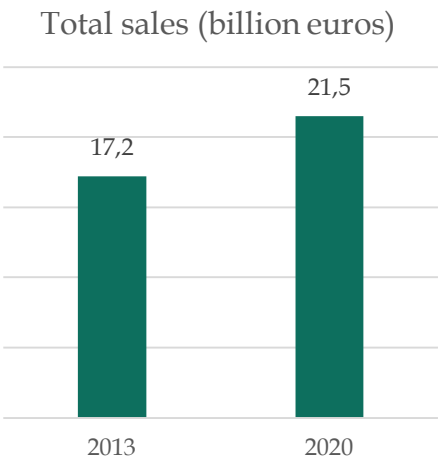


Fig. 32: Total sales (billion euros) (Spain)

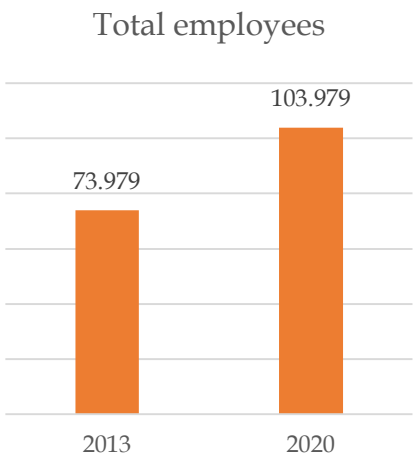


Fig. 31: Total employees (Spain)

Automotive Industry in Japan

In Japan the automotive industry accounted in the year 2013 a total amount of 59.69 trillion yen/ 438.56 billion euros, the 12.32% of the GDP. The total number of vehicles produced was 9.464.767 and the 49.39% of them were exported, representing the 20.4% of the total value of Japan's exports. The sector employed 785.000 people (1.24% of the total Japan's workforce).
Below we can see a map with the locations of the Auto manufacturing plants in Japan, being Aichi the most active prefecture.

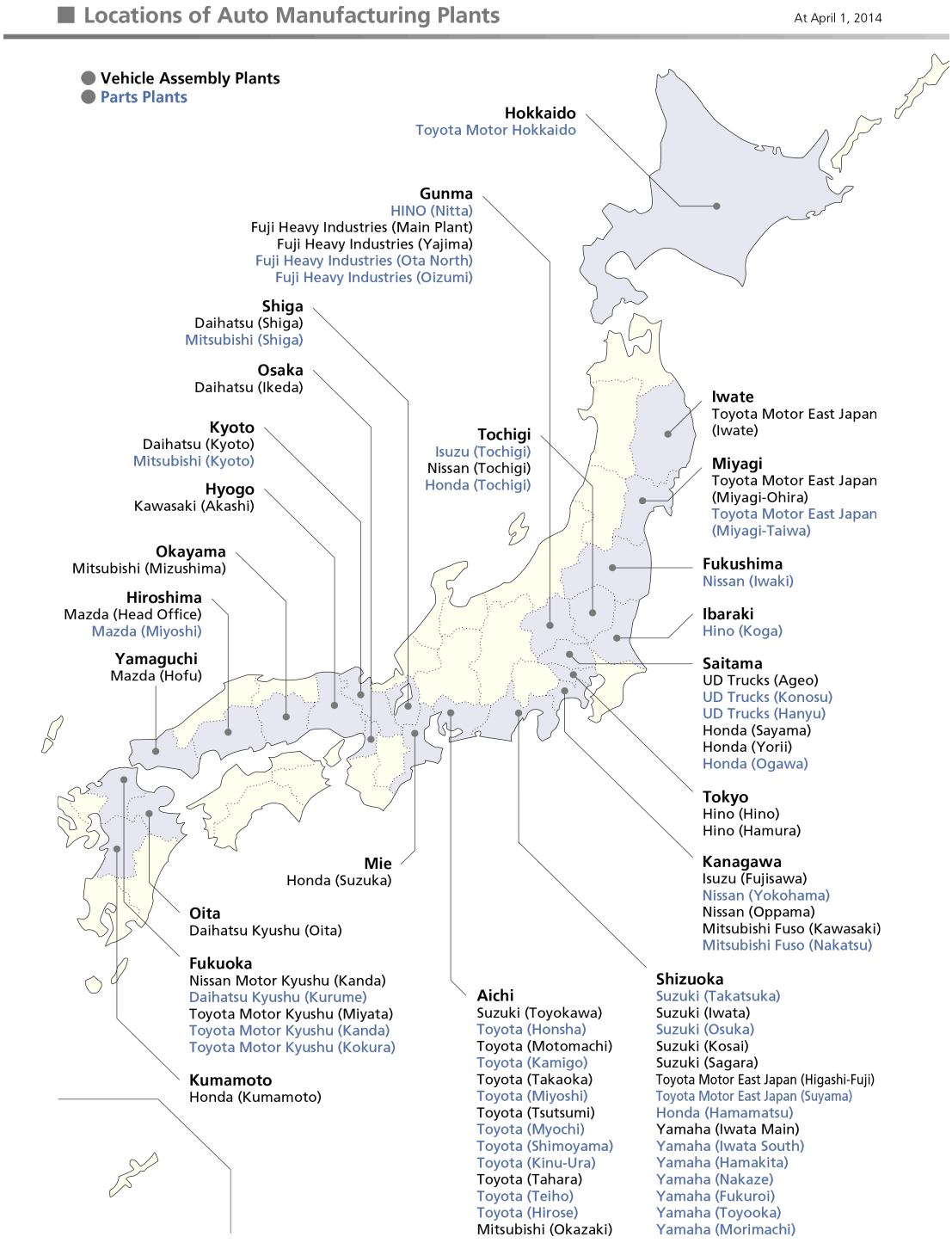


Fig. 33: Location of Auto manufacturing plants in Japan

Source: JAMA 2014

Auto parts Industry in Japan

In Japan the auto parts industry accounted in the year 2013 a total amount of 30.1 trillion yen/ 221.2 billion euros, the 50.43% of the automobile industry and the 6.21% of the GDP. The 11.52% of the total production was exported (32.11% if counting the pre-installed components on exported vehicles), representing the 8% of the total value of Japan's exports. The sector employed 620.000 people (78.98% of the Automobile Industry's workforce and 0.98% of the total Japan's workforce).

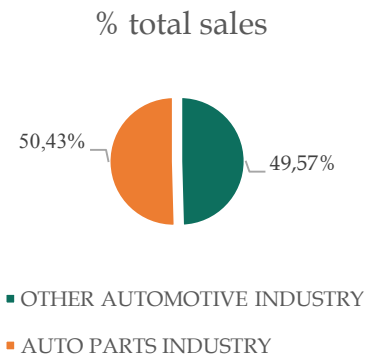


Fig. 36: % total sales (Japan)

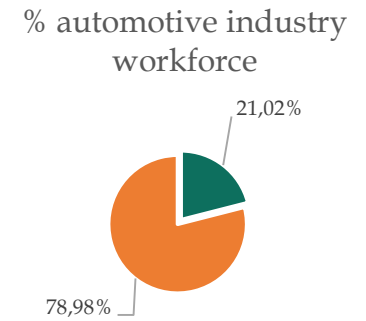


Fig. 35: % automotive industry workforce (Japan)

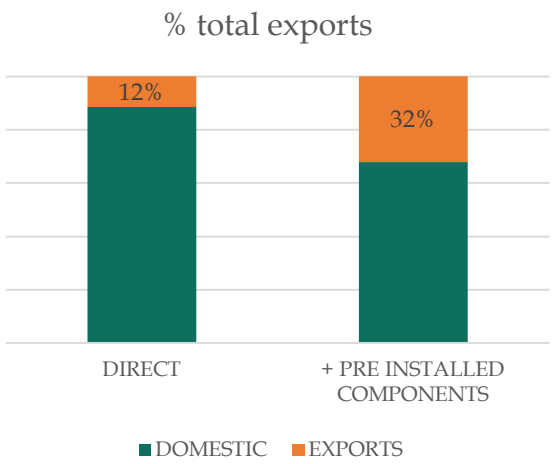


Fig. 34: % total exports (Japan)

According to the data provided by JAMA in general terms the automotive industry expects growing a +33.5% between 2013 and 2020, producing more than 3 million automobiles. Also expects an increase of a +76% in R&D expenses (600 million euros) and a total value increase of exports of 2.4 billion euros (+14%).

Comparison between Spain and Japan

Japan has been always a leading country in the automotive industry, it produces three times more vehicles than Spain, three times more revenues and employs three times more national workforce. But the percentage of the total exports value in both countries is similar (20.4% for Japan and 16.8% for Spain). But Spain exports the 86.9% of the total production and Japan the 49.39% that makes Spain's auto industry mainly with export activity.

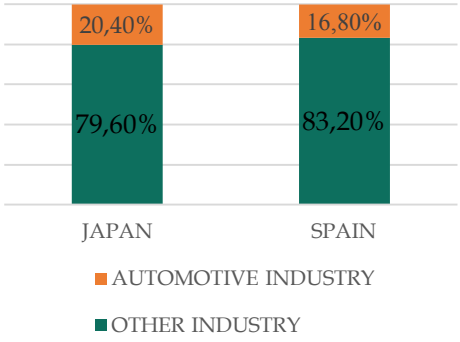


Fig. 38: % total exports value. Japan and Spain

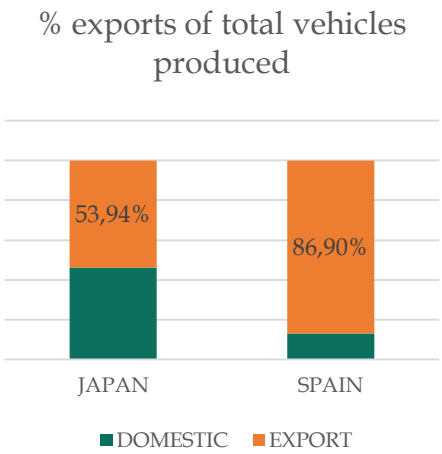


Fig. 37: % exports of total vehicles produced. Japan and Spain

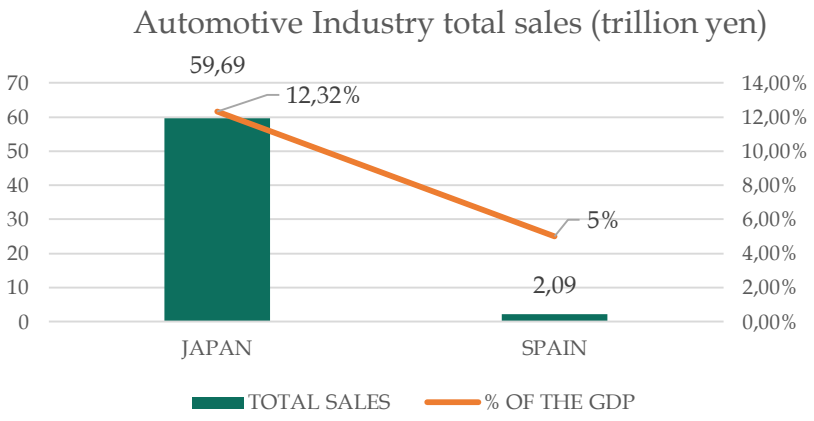


Fig. 40: Automotive Industry total sales. Japan and Spain

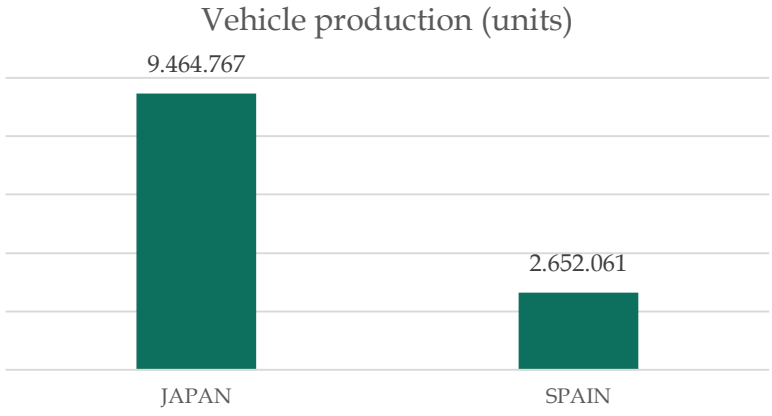


Fig. 39: Vehicle production. Japan and Spain

Auto parts industry, has 4x more weight in the Japanese economy than in the Spanish. But the Spanish industry exports 5x more of the total production.

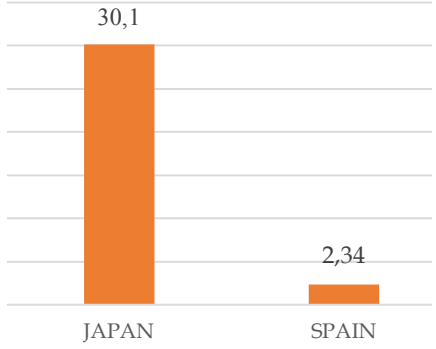


Fig. 40: Total sales. Japan and Spain

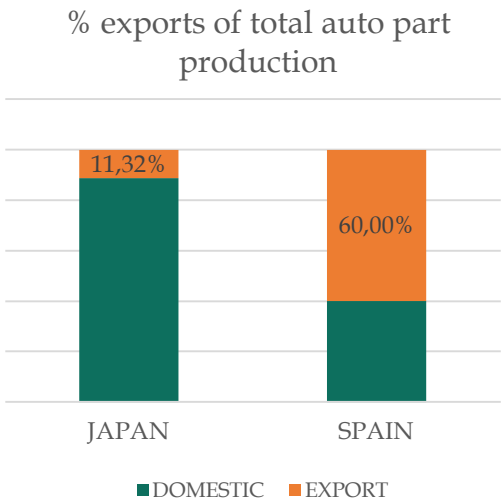


Fig. 41: % exports of total auto part production. Japan and Spain

The weight of the total exports value in percentage of nation total exports value is very similar (8% for Japan / 7% for Spain). The ratio sales / employees is slightly higher in Japan (48.55 million yen / employee) than in Spain (31.63 million yen/employee).

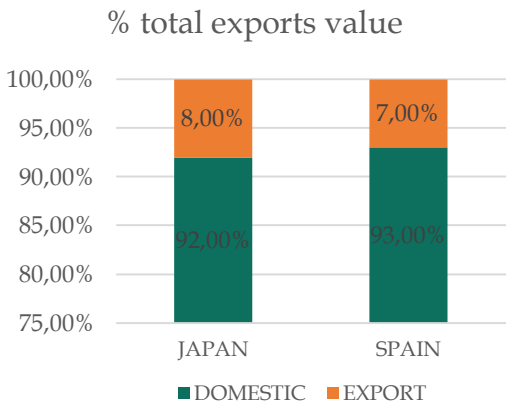


Fig. 42: % total exports value. Japan and Spain

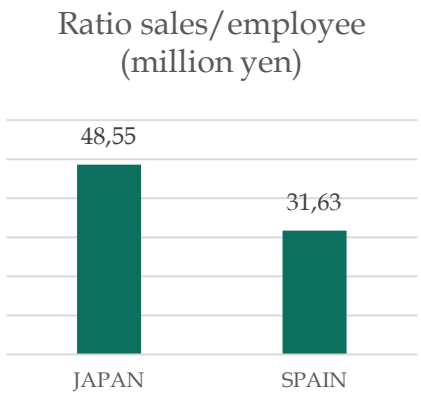


Fig. 43: Ratio sales/employee. Japan and Spain

Case studies

Three case studies were studied to have a better understanding of the way Japanese SMEs of the auto parts industry work. The three companies selected have a great growth prospect inside their industry, so they were selected as models of behaviour to complement the survey.

1) AVEX Inc.

http://www.avex-inc.co.jp

2) KTX Co.

http://www.ktx.co.jp

3) Iida Industry

http://www.orotex.co.jp

Interview Questions

To gather more information apart from the one obtained from the questionnaire, an interview was arranged with a member of each company, here is a copy of the questions that were made.

1) How can innovation be promoted in Japanese SMEs? *(Government support, connexion with universities, conferences and workshops to inform about innovation…)*

2) What value does innovation provide to your company? *(Cooperation, knowledge, more flexible and open to changes, better position in the market…)*

3) Which is the degree of innovation integration in your company's strategy?

4) How do you think innovation influences your company? *(Changes in strategy, changes in the culture…)*

5) What factors influence innovation climate in Japan? *(Lack of qualified workforce, government support, international competition…)*

6) What do you consider that are the strengths and weaknesses of your company to innovate?

7) Do you think support by Japanese government is enough?

8) Do you think international competition is a serious constraint for innovation or it encourages it?

9) Do you belong to any innovation community?

10) Which is your most important partner for innovation?

---

11) What do you think is the future of the auto parts industry?

12) Which is the key to compete in the auto parts sector?

13) What are the requirements of a company to become a reliable supplier in the automobile sector? *(Quality, flexibility, technology…)*

14) What is the mission of the company for the next years?

15) What are the future challenges for the auto parts manufacturers of Aichi?

AVEX

Kato Ironworks started in 1949 as a small company manufacturing precision parts. But it was not until 1953 with the development of business that the group was organized as a corporate organization under the name of "Kato Seiki Ltd.". In order to clarify their corporate vision for the new century, in 1992 corporation identity was introduced and the name changed to "AVEX". Capital was increased for the fourth time in 1993 to 10 million yen, reinforcing their corporate structure.
Nowadays AVEX is a strong company with 5,5 billion yen annual sales and 380 employees.

With Takenori Kato as company's president and representative director their basic management principles are: "As a company which nurtures the "spirit of manufacturing" carefully and supports employees with high quality and new technology, we create a strong corporate environment filled with vitality corresponding to the changing times."

Their main customers are other auto parts companies, being Aisin AW their main customer. Other customers are: Borg Warner Morse TEC KYB Corp., Aisin Seiki, Kawasaki Heavy Industries or Daihatsu Motor Co. Nowadays the company has 3 branches in Japan

After studying the company the following SWOT analysis can be drawn:

SWOT

Strengths

- Good customer base: Their main customers are other important car parts manufacturers in a higher position of the hierarchy like: Aisin AW, Borg Warner Morse TEC KYB Corp., Aisin Seiki, Kawasaki Heavy Industries or Daihatsu Motor Co.
- Fast order processing: There are trying to limit their order processing time to 10 days. Which is a good mark for the industry.
- Long-term order planning (1-2 years): During the interview they explained that they have a planning horizon for their orders of 1-2 years. Which allows a good planning.
- Good knowledge transfer system: In the interview they explained that old employees transfer the knowledge to the young ones creating a knowledge transfer system based in experience. Also they have different boards where they can see the changes made, troubles or standards of the company that are revised every morning in a meeting.
- Good employee training program: New employees are trained beginning with simple and trivial tasks, and then more complex tasks are assigned. Also when a machine has to be repaired all employees must be present during the process. Also many of the machines they use for the simple tasks are 2nd hand machines that they rebuild to fit their needs, with that they save costs and also they train employees given that they learn how to build and repair the machines.
- Strong company culture: They have a clear and well-defined culture as they showed during the visit through their mission, vision, objectives and treatment of employees.
- Cooperation and learning from customers: Their customers are also their main partners when innovating.
- Improvement focus: According to their corporate philosophy they are focusing on a constant company improvement. Also shown in their "Challenge to 1/2"
- Quality products above competitors: Given that they master in high-accuracy cutting/grinding parts they try to master quality and accuracy raising the accuracy unit to 1 micrometer. They stated that they are proud of their quality control.
- Strong quality policy: Quality group plays a main role in checking and correcting systematically and assuring that company standards are meet.

Weaknesses

- Cost above competitors: In the interview they recognized that given the size of the company and the high quality standards their cost is above competitors.
- Late adaptation to modular system supply: The trend in the auto parts market is to start supplying modules instead of parts and AVEX is having a late adaptation to this trend given that they still supply small pieces and parts.
- Lack of information to develop new technologies: According to their own words they have a lack of information when it comes to develop new technologies given that they are mainly based in experience.
- Strict procedures: They consider that defects occur whenever employees change work procedures or treatments at their own discretion. So one of their guidelines is to remember the basics and always follow the rules, which may lead to strict procedures
- High dependence on automobile industry: Almost all their market share and products are centered on the automobile industry.
- Poor differentiation: Their products have no differentiation in terms of features.
- Slow adaptation to new technologies: Given their strict procedures and they lack of information they have a slow adaptation to market trends and innovation.

Opportunities

- Opportunities to collaborate with universities to develop new technologies: Aichi companies have different ways to collaborate with universities to undertake joint projects. Like the ones NITECH develops with the different companies.

- Strong national market: A high percentage of the Japanese cars are manufactured inside the country, also national companies make most of the pieces and components that also applies to other industries.
- Potential uses of their products in other markets: High precision components can be easily spread to other industrial markets.

Threats

- China and Vietnam are strong competitors in high precision: As they said during the interview, those 2 countries are serious competitors for their main product.
- Pressure to reduce costs from customers: Each year customers push small companies to reduce prices given that they have to face higher costs and are also forced to reduce prices.
- Uncertain future car demand: As seen in the automobile industry section, car demand is difficult to predict.
- Larger competitors traditionally get majority market share: In the automobile industry usually bigger companies get a bigger market share because they can compete with lower prices thus smaller companies with standard products are hindered by the lack of customers.

Considering the SWOT analysis we can conclude that the company is in a good position to compete with quality in the auto parts market but needs to keep updated with new technologies and trends among the automobile industry.

As shown by their corporate slogan: "Professional team which masters high accuracy cutting/grinding processing of small parts" the company focuses on quality when it comes to manufacture their products.

Recommendations

The strengths of the company are clear, they have a good customer base and they are strong inside the auto parts industry thanks to their quality products. Also they have a clear strategy and an improvement focus necessary qualities to overcome their competitors.

As for the opportunities it is necessary to concentrate on them to fight the company's weaknesses.

Starting with the opportunities to collaborate with universities to develop new technologies, it would be a great chance to overcome the lack of information to develop new technologies and the poor differentiation. So as a recommendation looking for new partners or collaborate more regularly to find new innovations or keep track of new technologies, would help to differentiate products and help to adapt faster to the new technologies and create a lower dependence on old employees and machinery.

This, combined with their knowledge transfer system and matching their cooperation and learning from customers will lead the company to have good opportunities to innovate and achieve their ½ challenge where accuracy cost and lead time should be halved.

Second opportunity to look at is the potential uses of their products in other markets combined with the strong national market can help them to find new business opportunities and fight their dependence in the automobile industry. So the recommendation here is to find new business opportunities since precision elements can be easily introduced into other industries.

They have a long-term order planning among their strengths so it is a good opportunity to organize production and start an action plan to introduce the company in new markets.

Given that they have a strong company culture that also creates strict procedures, which may reduce innovative ideas among employees. Also they

knowledge transfer is based in old employee to new employee which may lead to a deadlock regarding technology. That can be solved finding ideas from the outside or promoting innovation inside the companies using, for example, the different events held during the year or the employee-training program.

To protect the company against threats it is important to reinforce the strengths and get advantage of opportunities as described above.

In the case of the strong competition from China and Vietnam it is important to differentiate the company's products through innovation. That can be accomplished collaborating and learning from customers or universities and start to climb positions in the customer's list of providers for example providing modular systems instead of individual components.

To fight the cost reduction pressure it is important to create scale economies with the AVEX branches they already have and differentiate the product from the competitors by promoting innovation, to be an essential provider for customers.

Given that like in most of the industries larger competitors traditionally get the majority of the market it is important to keep up with the innovations and make unique products to be essential as much as possible for the customers.

It is true that the future car demand is uncertain, but the company has a strength to overcome this, given that they have 1-2 year planning horizon and a good customer base they can have a clear horizon for the next year and they can plan production and action plan together with the market forecasting.

In conclusion recommendations can be resumed into three lines of work:

- Find more partners to collaborate: Finding new partners to collaborate and carry out research and development will help the company to overcome the lack of information to develop new technologies and the dependence in old machinery. Mixed with the employee training program and the cooperation with the customers will help the company to keep the track of the developments of the market and be updated with the latest technology to take advantage over competitors.
- Find new business opportunities: Since car demand is uncertain it is not good to rely completely in the automobile industry. So it would be interesting to introduce their precision products into other markets finding new business opportunities.
- Promote innovation: promote innovation inside or look for new ideas from the outside, combined with the good knowledge transfer system will help to differentiate products and services and accomplish the ½ challenges.

KTX

Established in 1965 and named Konan Tokushu, the company started different businesses through time to what it is today, a company that masters from moulding to leather wrapping. Under the direction of Taichi Noda the sales of the company exceed 300 million yen after 50 years of history. Nowadays the company has its headquarters in Konan city in Aichi prefecture and two more branches in Japan; moreover it also counts with four affiliated companies located in Korea, Thailand, United Sates and China.
From the beginning the company has dedicated to research on electroforming since "Electroforming" is their mission.

The following SWOT can be drawn from the analysis of the company:

SWOT

Strengths

- Easy communication inside the company: Since it is a small company easy communication is one of their strengths.

- Partnership with other companies of the sector to improve quality and technology: As they said in the interview, they collaborate with other companies of the same industry to improve their products and services.
- R&D facility: In the visit to the company we saw that they have their own R&D facility inside the company.
- No dependence of one unique industry: They explained that their products are sold to different industries so they are not dependent of one unique sector.
- Focus on field of expertise: Their company has been focused always in electroforming and they are always trying to improve it.
- Overseas offices: They have different overseas offices to be closer to international demand.

Weaknesses

- Lack of technical knowledge outside the field of expertise: During interview they recognized to have a lack of technical knowledge outside their usual working field.
- Lack of technical employees: They also recognized in the interview that they have a lack of employees with technical knowledge to improve.
- Missing expertise in some areas: Some areas of the company have a missing expertise mainly to the lack of technical employees.

Opportunities

- Opportunities to start supplying modules: Auto part manufacturers are starting to supply modules instead of parts, and KTX has capacity to follow this trend and be more valuable to their customers.
- Government support in different ways: In the interview they explained that they receive support from the government and that there are more open opportunities to collaborate.
- Specific niches not covered by competitors: In their area of expertise there is opportunities to cover specific niches that are not covered by competitors, especially outside Japan. For example, as they state in their web they are a pioneer company in electroforming.
- Opportunities to collaborate with universities: Aichi companies have different ways to collaborate with universities to undertake joint projects. Like the ones NITECH develops with the different companies.

Threats

- Pressure to reduce costs: Each year customers push small companies to reduce prices given that they have to face higher costs and are also forced to reduce prices.
- Changing customer tastes: Automobile industry constantly needs adjusting to changing demand and thus prices change.
- Lack of research developing time: One of the biggest problems in almost all sectors is the lack of research developing time. Customers want improvements but they don't want to waste time in trial and error. Companies explained that if the product doesn't work during the first showing trial, they don't want it.
- Cost of technology investment: Technology is becoming more and more complex each year, that causes that investment time and cost increases with time.

KTX Corporation has been always a pioneer in the field of electroforming, first with their Porous electroforming in 1982, and then with Mesh Electroforming and Perforated Electroforming, followed for the Super Porous Electroforming technology in 1998 and the Dual Axis Rotational Molding System in 2000. Nowadays the vision for their employees is to create innovative ideas and keep with continuous improvements to introduce their technologies to the world.

Recommendations

One of KTX's biggest strengths are the overseas offices that allow them to be close to the demand. On the other hand, the biggest threat of the company is the lack of technical expertise outside their expertise field.

Opportunities can be matched with strength to reinforce each other.

Given that there are specific niches not covered by competitors in their field of action it is important that they continue with their research work and cooperating with companies and universities to prevent to fall in a technological deadlock.

Participating in government supported conferences or workshops can also help to improve their technological knowledge in other fields.

Given that they have company offices overseas, they can easily meet the international demand, and it would be a good opportunity to supply modules to the customers and use it as an advantage over competitors.

The main weaknesses are related with lack of knowledge so main solutions for this problem are collaboration with universities and research centres or look for new qualified workforce outside the company.

Also costs for technology investments but can be funded by Governmental grants.

Also customers in auto parts industry are very demanding with times, tastes and costs so it is essential for the companies to be flexible and keep costs as low as possible but with the highest quality. In the case of companies as KTX that work with prototypes and a try and error basis there is a strong lack of time of research and developing time so it is very important for companies to collaborate and create a network to improve the possibilities of success and reduce time by combining knowledge.

So in conclusion the company needs to focus on:

- Broaden their knowledge horizons by hiring new qualified workforce, finding new collaborators or assisting to events related to innovation.
- Take advantage of their international position to create scale economies to reduce costs, and widen customer share by start supplying modules.

IIDA INDUSTRY

IIDA industry was founded in 1954 manufacturing lunch boxes, more than 50 years later is a first tier manufacturer in the auto parts industry, having as customers the main automakers of the world like Toyota, Nissan or Mazda. With 229 employees and net sales exceeding 6 billion yen, the company's main products are insulators for cars to provide a "comfortable driving".

The company has different branches around the world, being the Japanese the one that supports the others located around the world: Thailand, USA, China (2), India and Mexico. Their main products are insulators (80%), but they also produce office and construction items, always related to insulators, gel, rubber or resin.

We can summarize the company's analysis in the following SWOT:

SWOT

Strengths

- Sense of improvement: Their company and employees are orientated always to innovation and improvement.
- Culture orientated to innovation: Their company philosophy and culture are orientated to innovate.

- Trial and error culture: Their innovations are pursued with the trial and error method to solve problems, characterized by repeated, varied attempts which are continued until success.
- Good vertical network: One of their good points is that they showed a good vertical integration with customers and providers in terms of collaboration.
- Good customer base: Main car producers are part of their customer base.
- Customers are partners to innovate: Their main partner when innovating are customers according to what they said during the interview.
- Product Quality: They always manufacture their products with the maximum quality according to the demands of the industry.
- Flexibility and adaptation: One of the main requirements of automobile industry is to be flexible, and during the interview they stated that if one of their clients has an urgent need they give it maximum priority and adapt their production lines.
- Control whole production process: They don't outsource production so they can control the whole production process.
- Exclusive products: Their products are innovative so they are exclusive of their company.
- International branches: They have different branches around the world to be closer to international demand.
- Young workforce: During the visit they explained that they like to recruit young workforce so they can have fresh ideas inside the company and it can become more innovative.

Weaknesses

- Wide range of products: In their catalogue they have a wide range of products in areas so different as: automobile, construction, office or daily life and it can lead to problems in flexibility and production control.
- Lack of info about the market: They recognized during the interview to have a lack of info about the market and that they would like to have more knowledge.
- Long time to develop new products: They also stated that developing new products takes a long time given the small size and the resources of the company.
- Difficulty to transfer know-how: Given that the company located in Japan is the one that support the rest of branches and that spreads the knowhow of the company they could have some difficulties to control the branches around the world and to share company culture.

Opportunities

- Get knowledge from the outside: Getting knowledge outside the company will help them to gather information of the market.
- Opportunities to get partners for innovation: Apart from customers they can also get other partners to innovate like government, other companies from the same sector or universities.
- Field to improve: Given that they specialize in different areas and sectors, there is a big field to improve.
- Possibility to expand to other markets: Their innovative products are demanded by main automakers so that can lead to a bigger expansion to international markets if they follow the demand to other countries with more branches.

Threats

- Not enough government support: In the interview they said that government doesn't provide enough support to innovate.
- Development of new technology is slow: Also new technologies are becoming more complex and that leads to slow developments.
- Demanding clients: In the automotive industry clients are changing tastes and are becoming more and more demanding with features as we saw in the automotive industry trends section.
- Continuously need to adapt to technology changes: As automotive clients are more demanding automakers need to adapt to needs and therefore adapt and create

new technologies, thus auto parts manufacturers, and specially first tiers need to follow this trend.

Iida Corporation manufactures a wide range of products apart from the automobile insulators. In addition to the automobile department they also have an Architecture department, Construction machine/railroad department and a General department for life related products.

Many of their products are exclusive, no other company manufactures them, that combined with an innovative culture has lead the company to a first tier position and to partner with the main automakers around the world to develop innovative products.

Recommendations

The main strength of the company are their innovative and exclusive products that they develop in association with their customers. That has leaded them to a vertical network of innovation to create quality products and to have a innovation-oriented mission and culture. Moreover their wide range of products can have twofold effect, on one hand this makes them not dependent on only one industry and gives them room for improvement, on the other hand a wide range of products can make company procedures and production difficult to adapt and less flexible. Flexibility is one of the main points to compete in this industry, so the company must ensure a good organization.

To overcome weaknesses and threats it is important to take advantage of the opportunities that market offers.

As said, to have a wide range of products can lead to problems in organization, and especially if the sales share inside of the company is not relevant it would be advisable to cut some of the products with the lower share of sales so the company can focus more on their leading products to keep them updated with the market trends, specially if the company has not a big size.

The company has a good knowledge of the technology related to his field of expertise, mainly thanks to the collaboration with the customers, but on the other hand lacks on information about the market itself, so it would be recommendable to collaborate with universities or to take a look at the international competition. Competition from other countries should not always be seen as a problem, in the case of Iida industry they said that they are not afraid of competitors instead they should learn from them and apply their innovative culture and try and error system to develop new products and improve the existing ones.

As widely known by the auto parts manufacturers, customers are very demanding, development of new technologies is a slow process but part manufacturers need continuously to adapt to technology changes and market demand; so as said before it is vital to survive to find a good innovation network. Also, with a culture orientated to improvement and a continuous approach in R&D, is a good base to improve success and reduce time in developing new products.

Another good point of the company is that they control the whole product process, with a 4-step process: R&D, Design & Analysis, Evaluation and Production, that gives them total control over production but also hinders the know-how transfer, especially to the offices overseas given that the office in japan supports the overseas offices, so it can lead to organization problems.

In conclusion the company is in a good position to compete as it has a young workforce, an innovation-orientated culture and a good customer base that are at the same time innovation partners that help the company keep track of the industry's innovations and to create exclusive products. But also has to take care of possible organizational problems that affect the flexibility and the know-how transfer.

In conclusion company should:

- Cut some irrelevant products to avoid future product organization problems.
- Get market information through new collaborations or learning from competitors.
- Have a good organizational and know-how transfer planning to avoid having problems with flexibility and demand.

Field research

Aichi prefecture

Aichi prefecture is a prefecture of Japan located in the Chūbu region. The region of Aichi is also known as the Tōkai region. The capital is Nagoya. It has an area of 5,153.81 km2 and a population of 7,408,640 inhabitants (2011). Nagoya is known for its industry, being automotive industry one of the most relevant given that in the prefecture major industries are headquartered (Wikipedia, Aichi prefecture).

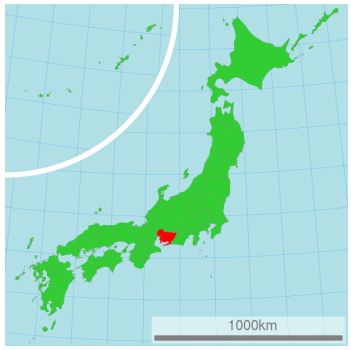


Fig. 44: Location of the Aichi prefecture

Source: Wikipedia

Province of Valencia

Valencia is a province of Spain, in the central part of the Valencian Community. The capital is Valencia. It has an area of 10,763 km2 and a population of 2,566,474 inhabitants (2013) Today, tourism is a major source of income, but Valencia plains are also known for their olive, mulberry, ilex, algaroba, orange, and palm trees and is a major fruit exporter (Wikipedia, Province of Valencia).

Fig. 45: Location of the Province of Valencia

Source: Wikipedia

Survey Results[3]

After gathering the results with the online questionnaire a total of 15 companies answered in the case of the Aichi prefecture, and 18 in the case of Valencia. Even though the results cannot be generalized to al companies they can be taken as an approximation and a starting point for the study of innovation in both areas.

The obtained results are presented below:

Starting with what the company considers that are their key factors to compete. In the case of Valencia there are 3 factors considered as a strong factors: Quality 25%, Price 21% and Customer service 21%. For Aichi companies, Technological innovation with 32% is the main factor, followed by Price 18% and Quality 17%.

[3] All graphs were prepared by the author with the data gathered from the online questionnaire made specifically for this research.

From this and with the data obtained in the interviews we can say that companies agree that Quality, followed by Price are the 2 essential factors for a company to compete in the automotive sector.

It is also worth noting that customer service is more important for Valencian companies (21%). Also it is important that for companies in Valencia Technological innovation is not important with only 6% of companies considering it as a key factor.

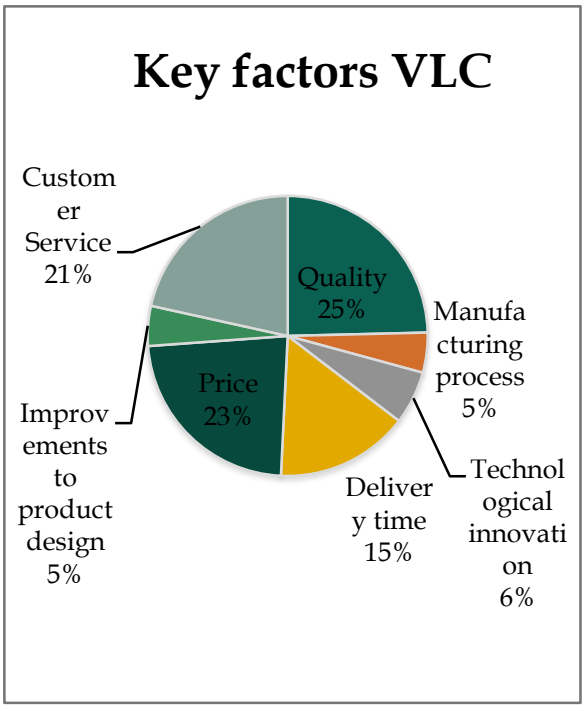


Fig. 47: Key factors VLC

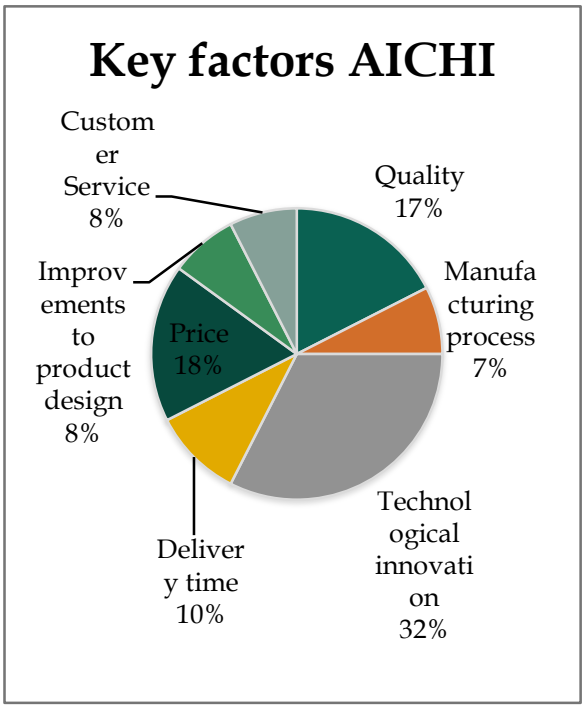


Fig. 46a: Key factors AICHI

Next thing to analyze are patents and intellectual property rights, also a widely used indicator for innovation. In the case of Valencia only 33% of the companies made at least 1 patent, while in Aichi, this percentage raises to 60% of the companies.

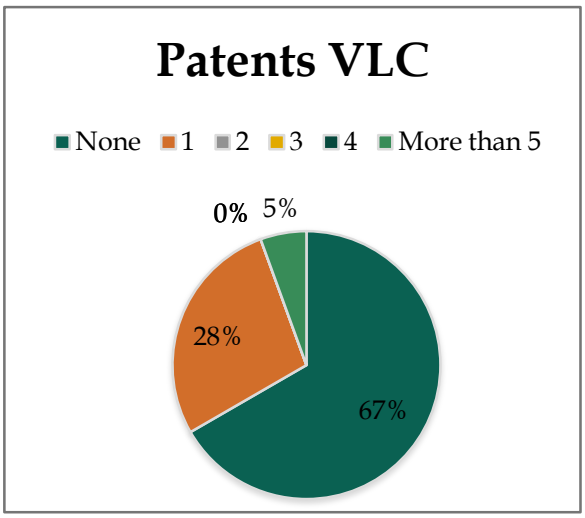


Fig. 49: Patents VLC

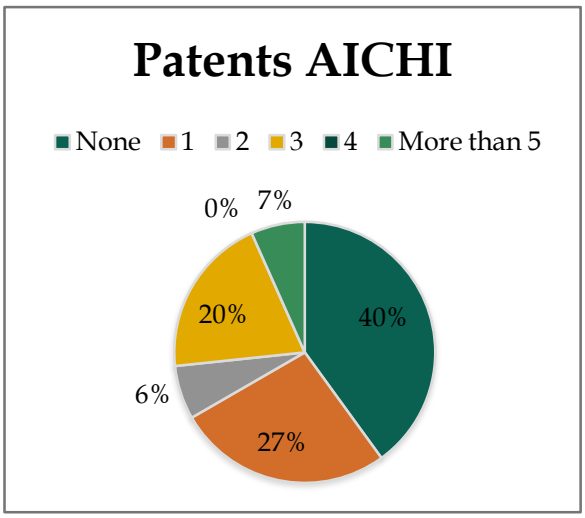


Fig. 48a: Patents AICHI

Next thing to check is the kind of innovations made in each region, whether product innovation, process innovation or organizational innovation. In the graphs below we can see that all types of innovation have similar representation in both areas. But for each type of innovation they are developed in different areas:

- Product innovation: for Valencia the predominant innovation was services, meanwhile in Aichi it was Goods.

- Process innovation: in Valencia the predominant innovation was Support activities, meanwhile in Aichi it was Method of manufacture or production.
- Organizational innovation: in Valencia main innovation was work organization, in the case of Aichi it was organizing workplaces.

So we can see that although types of innovation are similar they were related to different aspects of the company.

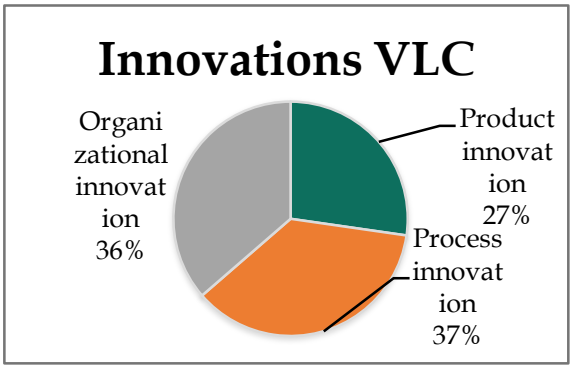


Fig. 51: Innovations VLC

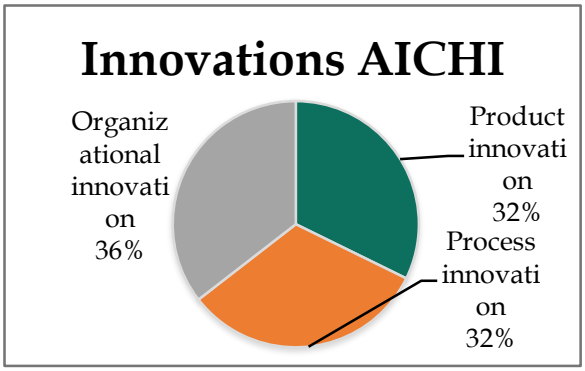


Fig. 50a: Innovations AICHI

Another difference we can find is in the number of innovative companies. In Aichi, all companies interviewed made at least one innovation in the last 3 years, while in Valencia this number reduces to 89%.

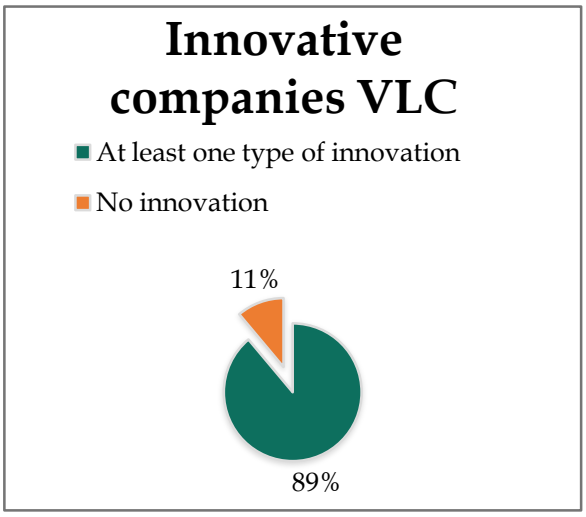


Fig. 53: Innovative companies VLC

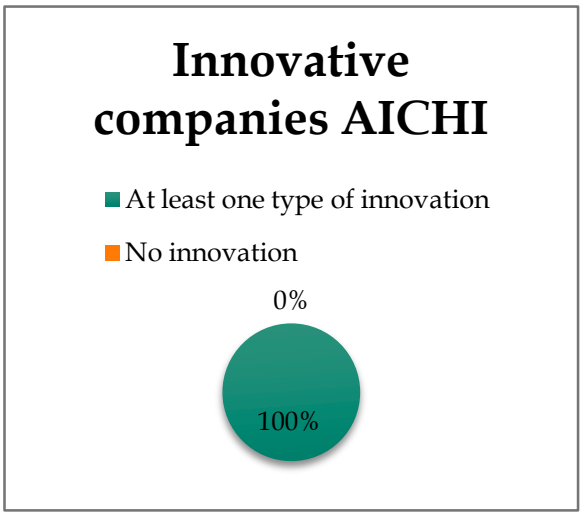


Fig. 52a: Innovative companies AICHI

But one important point when analysing innovations is the degree of innovativeness. So next graphs refer to if the innovation made by te companies was new for the market or only for the company itself.

In the left piechart we can see that in Valencia 12% of innovations where new to the market while that number rises to 35% in the case of Aichi, so we can conclude that the companies in Aichi are oriented to offer innovative products to the markets trying to take advantage of competitors with exclusive products, as we have seen above, one of the key factors for Aichi companies is technological innovation. That can be also extracted looking to the number of patents, where we saw that 60% of Aichi companies patented something.

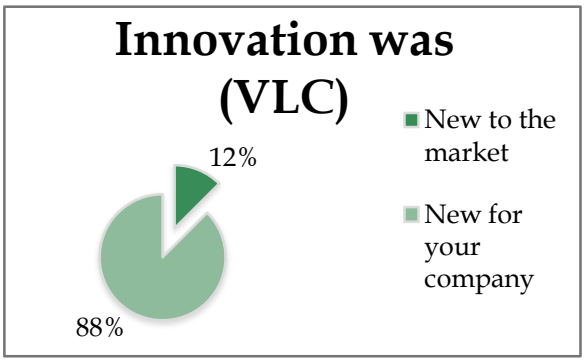


Fig. 55: Innovation was (VLC)

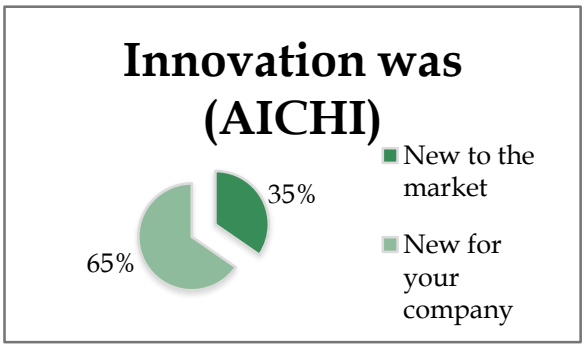


Fig. 54a: Innovation was (AICHI)

The following question is about collaboration. Collaboration is one of the most important things when innovating nowadays given that it is not possible to develop in-house all the knowledge to exectue innovation, so it is essential for companies to look for the right partner. In the graphs below we can see the percentage of companies that cooperated when innovating and who were the collaboration partners in both areas.

In the case of VLC only 25% of the companies cooperated with someone when developing innovations, and those partners were in 25% of cases Suppliers followed by other companies of the group 19% and private sector clients 19%. So for Valencia companies most important partner is Suppliers.

If we take a look to Aicihi's graphs we can see that the number of companies who colaborated incresases to 67%, so we can clearly see that Aichi companies tend to collaborate more, and their partners are consultants, laboratories or private R&D institutes, followed by public and private clients. In the SMEs policies in Japan we saw that the Government is working hard to promote collaboration with different measures and promoting regional clusters.

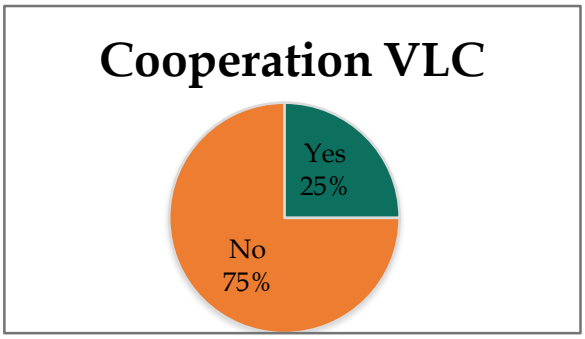


Fig. 57: Cooperation VLC

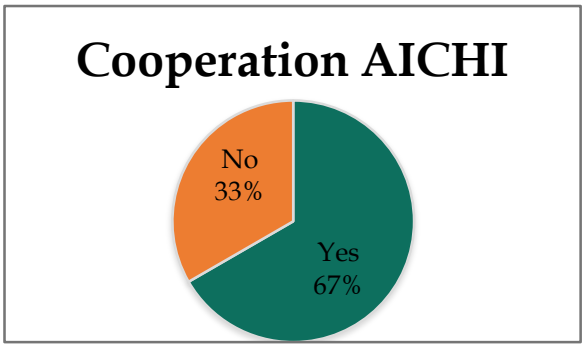


Fig. 56a: Cooperation AICHI

Fig. 58: Cooperation partners VLC

Fig. 59: Cooperation partners AICHI

In the questionnaire companies were also asked about their aims when innovating. The 9 main aims were divided into 4 categories depending on their weight: not applicable, low impact, intermediate impact or high impact.

If we focus on aims that got the higher values for "high impact", for the companies in Valencia we can see that the main aims for companies are quality, decrease costs and improve the ablity to develop new products and the range of goods and sevices. For Aichi's companies, as seen on case studies, main aim is to enter new markets and increasing the share in the current market.

So we can observe that for Aichi companies the main trend is to open to new markets and try to get a bigger market share, given that there are hundreds of small companies fighting to get a portion of the auto parts market it is becoming very difficult for SMEs to get clients, and that leaded to a price/quality war.

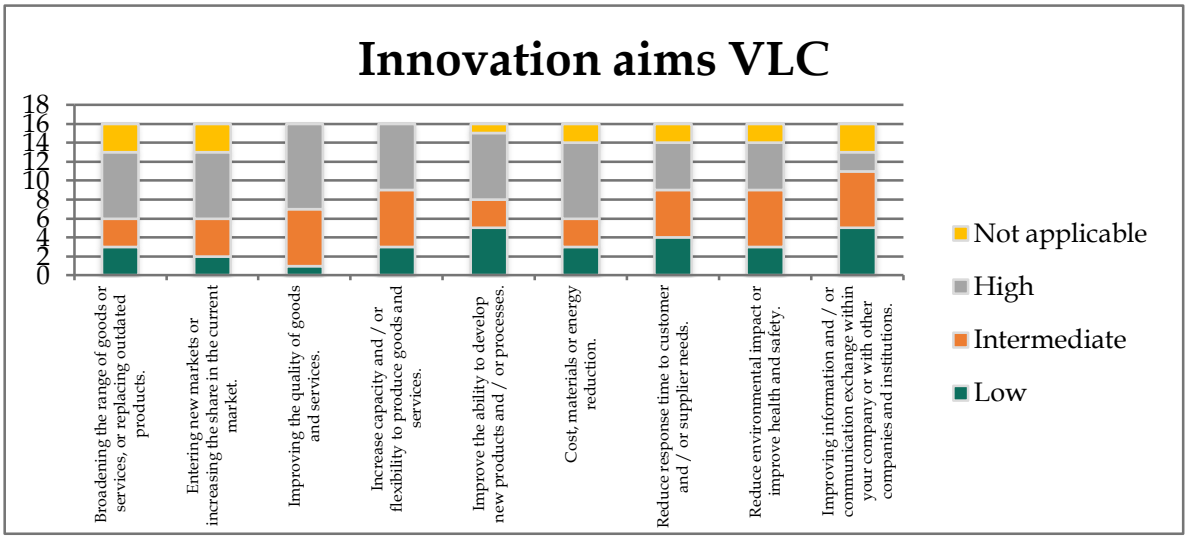


Fig. 60: Innovation aims VLC

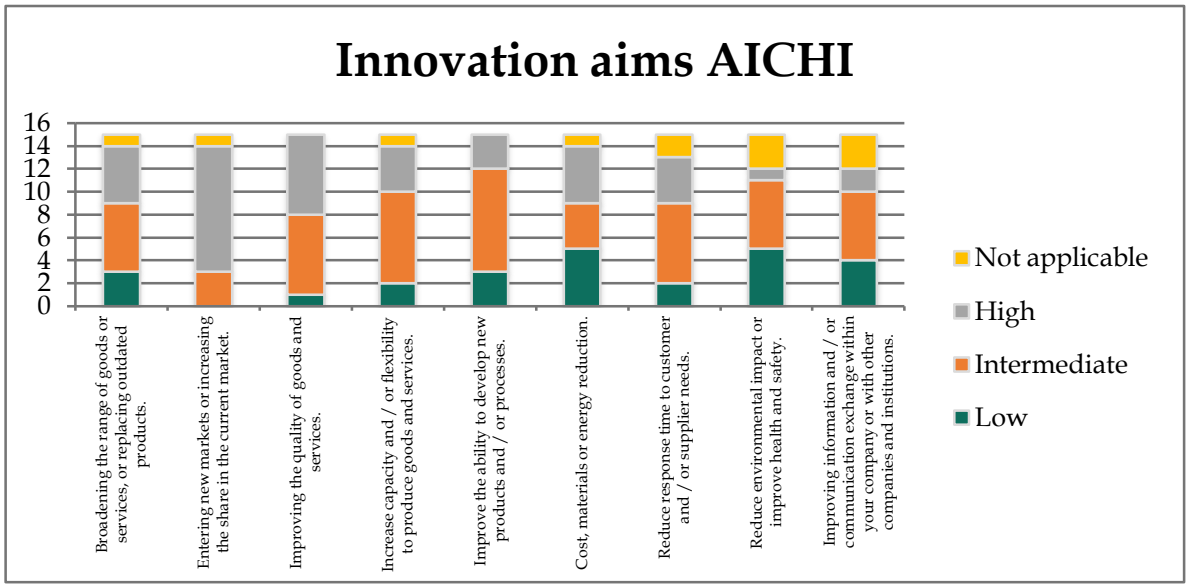


Fig. 61: Innovation aims AICHI

To see the integration level of innovaiton inside the companiy's strategy and culture, the question about if the company considers innovation as a key factor for succes was asked. The possible answer ranged between "the concept of innovation is unknown" to "the company develops innovation in its strategy".

In the graphs below we can see that in Valencia 53% of the companies already have innovation in its strategy and develop it, a 24% even think of it as a key area for success. For the Aichi companies 60% of them know innovation but don't apply it. So here we can see a clear difference between both areas, Valencia companies have innovation more integrated in their strategy so they are starting to focus in developing new products or improving their own, as we have also seen in the aims, to cope with competition, specially competitors from Europe as it is their main competition. For Aichi companies innovation is an important point, since all of them innovated, but they are mostly centered in further developing their already innovated products and also many of them are more focused to offer their already developed innovations to new markets or new customers. One of the companies said in one of the interviews that their strategy is not driven by innovation because they can not rely in innovation success compeltely, so instead they are looking for new markets and trying to reduce costs to compete with the emerging markets.

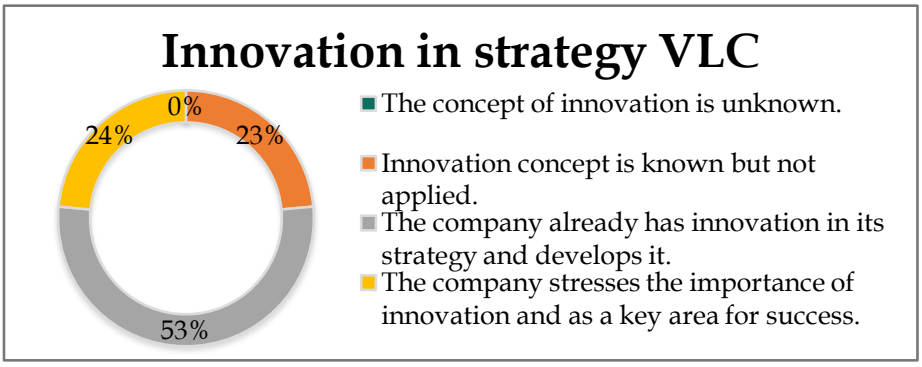


Fig. 62: Innovation in strategy VLC

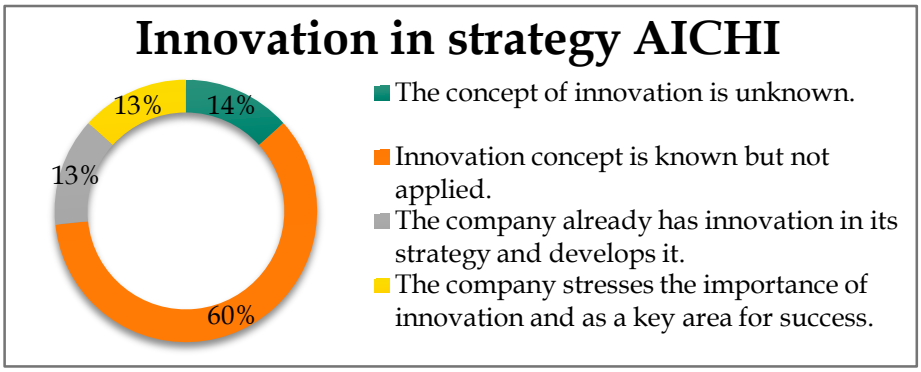


Fig. 63: Innovation in strategy AICHI

Finally, we will take a look at the barriers of the companies when innovating, Companies were offered different closed options in the questionnaire and they should choose one or more factors that they perceive as barrers or disincentives to innovate in their company.

Looking at the graphs below wee can see that main barriers for Valencia are related with money: lack of funds, lack of external financing and high innovative costs. On the other hand, as we have seen in the case studies, for Aichi companies 2 of the main barriers are related to information and knowledge: lack of qualified personnel and lack of technological information.

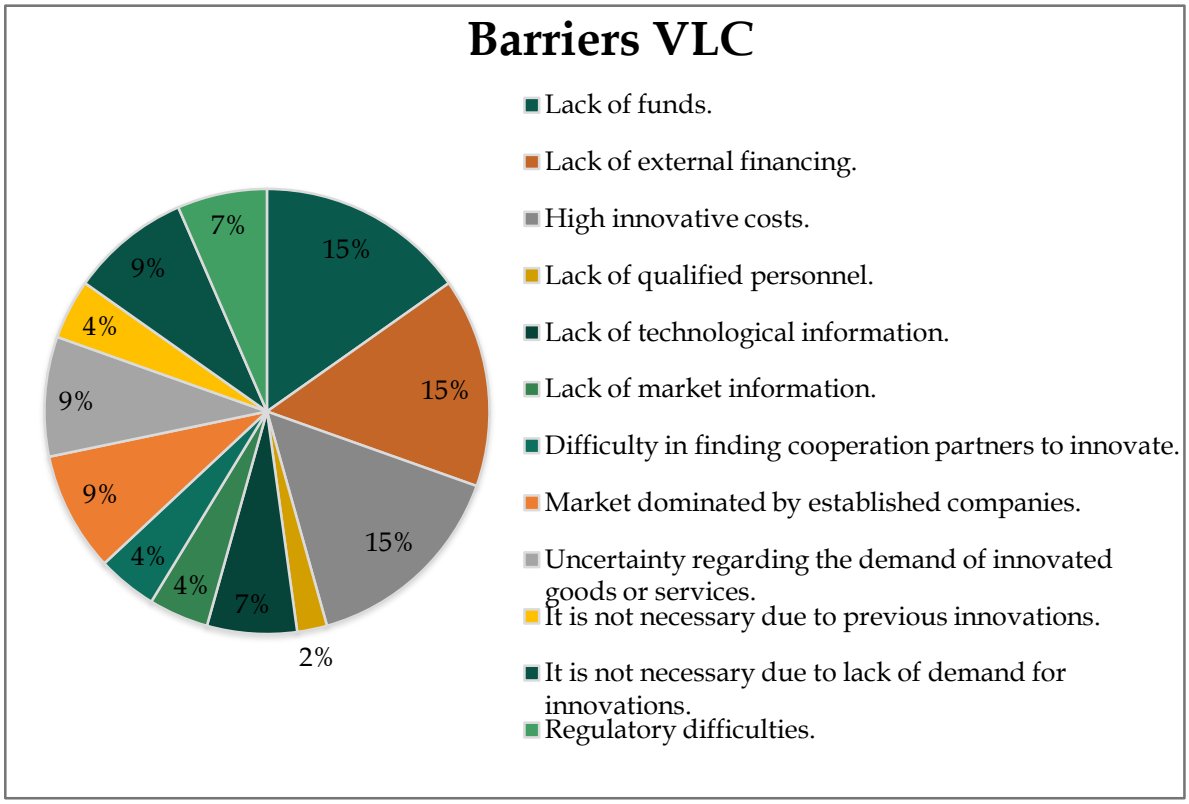


Fig. 64: Barriers VLC

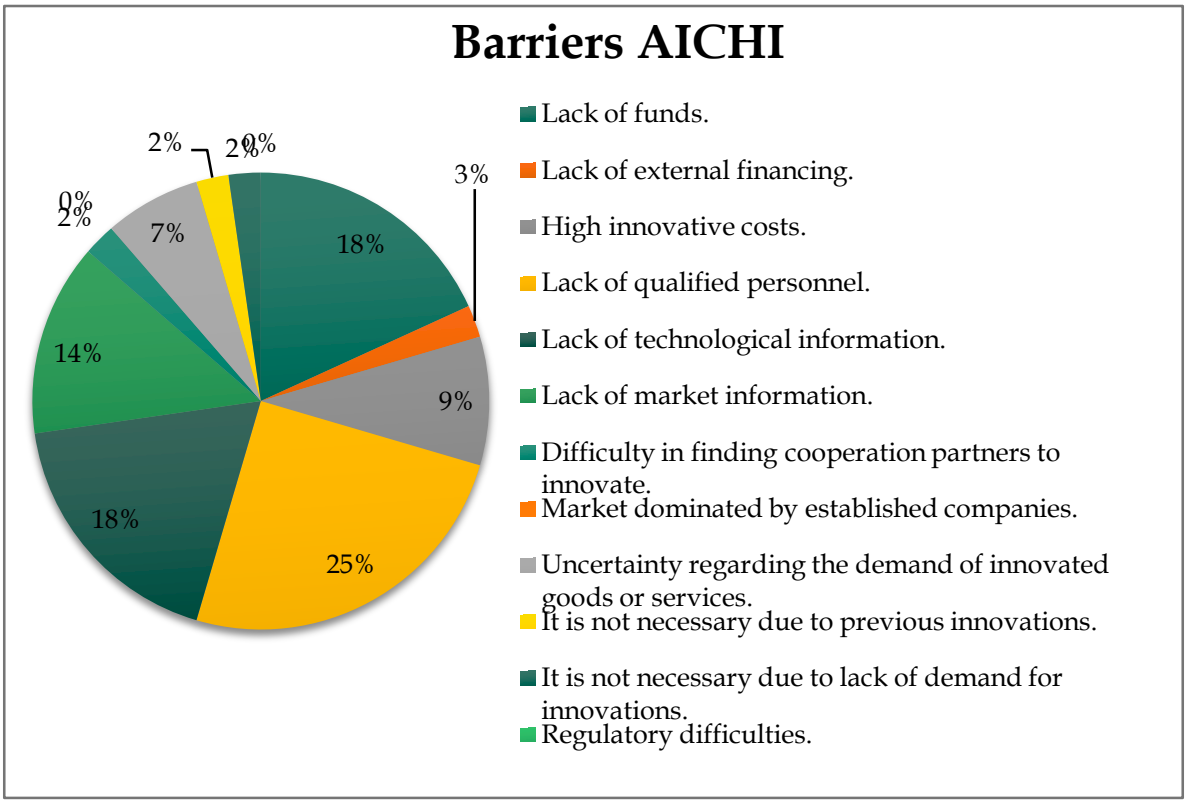


Fig. 65: Barriers AICHI

Conclusions of survey

After looking ath the results of the survey and examining the rest of the data gahtered during the research the following conlcusions can be drawn. For each conclusion is explained from which section is the information extracted to reach the conclusion.

- Japan and especially Aichi prefecture is a leader in many aspects for automobile industry. Also this industry is a referent in terms of innovation. So historically Aichi counts **with leading position to innovate and can be used as a benchmark for Valencia.**

Innovation. Analysis of the innovative activities in Sapain and Japan.	• Here we saw that altough percentage of innovative companies is lower in Japan, innovation expenses are much more higher implying that each company has higher innovation expenditure. And Transportation equipment industry is the one with the higher innovation expenses with 19,02% therefore is the most active industry when innovating in Japan. • Also in both Bloomberg's and Global innovation indexes, Japan is in a higher position in the ranking.
Auto Industry	• Japan is the second country in terms of sales with the 17%
Automotive Industry. Analysis of the sector in Spain and Japan	• Automotive industry is the biggest industry in Japan in terms of GDP 12,32% and Aichi is the most active prefecture given that is home of the head offices of Toyota which is the world automaker leader for the last 3 years.
Field Research	• Here we can see that all the companies surveyed in Aichi prefecture made at least one type of innovation.

- Aichi companies are **seeking internationalisation and new markets** to introduce their innovations and products. In the case of Valencia, companies are **starting** to develop and to take in account innovations to have a better competitive position.

Innovation policies for SMEs in Japan	• In Japan, main policies implemented in the new "SMEs basic act" are aimed at helping companies to enter new markets.
Innovation. Analysis of the innovative activities in Spain and Japan	• In Valencia, services sector has the biggest % of innovative companies, but on the other hand is industry the sector with the biggest expenses in Innovation, that implies that companies that innovate inside the industry sector spend more when innovating. And specifically, is the Automotive sector the one with the highest expenses.

Automotive Industry. Analysis of the sector in Spain and Japan	•Spanish auto parts industry is mainly exporter 82% while in Japan this sector only exports 32% that shows that Japanese national market is very strong and that creates a war between small companies to compete for the market share.
Interviews	•Interviewed companies in Aichi when asked about future plans internalization and/or entering new markets was one of the main expectatives to continue growth.
Field research	•In the case of Aichi we can see that main aim by far to innovate is to enter new markets. •For Valencia we can see that now lags behind Aichi in terms of innovation and auto industry had a late development given that Ford was established in Valencia in 1976, but if wee look in the aims two of the main aims are to increase the ability to develop new products and the range of goods and services. Furthermore 53% of the companies mentioned having innovation in its strategy, that proves that they consider innovation a key point to compete.

- An improvement point for Valencia is **cooperation,** Japanese government made a strong effort to create policies to boost collaboration, so spanish government should also incentivate these measures for company-company relations and regional clusters. Creating a network to innovate is essential to innovate and broaden the knowledge and expertise of companies. In the case of Aichi, **the lack of information** of the companies could be settled with more **Government support** boosting cooperation with Universities and public research centres and also providing access to fairs and different events to share information related to the industries. This lack of technical knowledge could also be related with the fact that the average age for managers in Japanese SMEs is 60 years.

SMEs	•In the case of Aichi Government is promoting in the new plan various policies to boost cooperation and expansion, but does not attach importance to information. •For Valencia a few agents in the innovation system promote cooperation between companies, universitieies and research centres, but there is a lack for company-company cooperation and regional clusters support.
Interviews	•Some of the companies interviewed felt that Government is not enough and that information in not spread evenly. Also all companies recognized having some kind of lack of information as a weakness.
Field Research	•For Aichi companies, 2 of the main barriers are related to information and knowledge. •On the other hand, Valencian companies' cooperation level is only 25% while in Aichi is 67%. That shows that Valencian companies need to make an effort in collaboration to reach Aichi levels.

- The existing **economical crisis** in Spain is producing **a lack of financing** that is restraining innovation given that companies perceive it as a cost and resource consuming process that requires lots of financing to cope with it. So it is imperative for the **Government** to not decrease and even increase grants and financial support for the national companies and also to promote innovation as a key factor to survive in the market.

Auto Industry	• When Lehman Brothers collapsed global production plunged and Europe is now slowly emerging from a six-year sales slump.
Field Research	• Main barriers for Valencian companies are related with money and 18% of companies think that there is uncertainty or lack of demand for innovation.

- **Quality and low costs are imperative** in both markets due to new regulations about safety and environment imposed to automakers, globalization efforts and changes in customer demand

Auto Industry	• There are a few trends that led us to conclude that Quality and low Costs are 2 key factos for the automobile market: • Customers are more aware of price and quality and have a great deal of information available. • There is more regulatory preassure to enhance security and ecological features, which leads to higher costs for automakers. • Electronic costs are becoming higher and higher as they become more complex.
Interviews	• When companies where asked about the key factors to compete in the auto parts industry all companies agreed that Quality is the most important attribute followed by Costs.
Field Research	• Cost reduction and Quality improvement are in both, Aichi and Valencia's important aims when innovating. • Price and Quality appear in both, Aichi and Valencia, as key factors.

References

Anzola, S. (1993). *Administración de pequeñas empresas.* México: Mc Graw Hill.

Bloomberg L.P. (n.d.). *Bloomberg's innovation report*. Retrieved from www.bloomberg.com

Cornell University. (n.d.). *The Global innovation Index*. Retrieved from http://www.globalinnovationindex.org

EOI escuela de negocios. (2001). *Diagnóstico de las capacidades de Innovación de la PYMEs de Andalucía y su incidencia en el empleo.*

Eurico Neves. (2013). *Innovation Capcity of SMEs.*

Euroepan Commission. (2005). *Oslo Manual.* Eurostat.

European Commission. (1995). *Green Paper on Innovation.* European Commission.

European Commission. (2003). *The new SME definition. User guide and model declaration.* Enterpriese and Industry Publications.

Furman, J. a. (2002). The determinants of national innovative capacity. *Research Policy , 31*, 899-933.

Hirsh, E., Singh, A., Kakkar, A., & Wilk, R. (2015). *2015 Auto Industry Trends*. Retrieved from Strategy&: http://www.strategyand.pwc.com/perspectives/2015-auto-trends

Japan Credit Rating Agency. (2012). *Automakers and Auto parts manufacturers.*

Lilischkis, S. (2011). *Policies in support of high-growth innovative SMEs.* INNO-Grips.

Lundvall, B. (1992). National systems of innovation. Towards a theory of innovation and interactive learning.

Mortimore, M., & Barrón, F. (2005). *Informe sobre la industria automotriz mexicana. Serie Desarrollo Productivo.* Publicación de las Naciones Unidas, CEPAL.

Organization for economic co-operation and development. (1997). *National Innovation Systems.* OECD, Paris.

Palmisano, S. (2006). *Ponencia en el programa de promoción y desarrollo de innovación en la PYME .* PROinnonva. IBM The Global Ceo StudY.

Ramís, J. (2005). *Curso sobre gestión en la innovación.* ESADE.

Rodríguez, J. (1996). *Cómo administrar pequeñas y medianas empresas* (4th ed.). México: Edita Interantional.

Roland Berger strategy consultants & Lazard. (2013). *Global automotive supplier study 2013, Driving on thin ice.*

Salazar León, A. (2012). *Estudio de la innovación tecnológica en el proceso de diseño y desarrollo de producto: aplicación a las PyMEs de la industria auxiliar del automóvil, caso comparativo Estado de México y Cataluña.* Universitat Poltècnica de Catalunya, Barcelona.

Vaibmu. (2012, November 27). *Interactive vs Linear Innovation*. Retrieved from Extremefactories: http://www.extremefactories.eu/interactive-vs-linear-innovation/

Valverde, M. (1998). *De la innovación al empleo. Informar sobre innovación.* Fundación COTEC, Madrid.

Wikipedia. (n.d.). *Aichi prefecture*. Retrieved from Wikipedia: https://en.wikipedia.org/wiki/Aichi_Prefecture

Wikipedia. (n.d.). *Province of Valencia*. Retrieved from Wikipedia: https://en.wikipedia.org/wiki/Province_of_Valencia

Zevallos, E. (2000). *Pequeña y mediana empresa. Repensando conceptos. Libre empresa.* COPARMEX.