Facultad de Ciencias Económicas y Empresariales

TRABAJO FIN DE GRADO

GRADO EN ADMINISTRACIÓN DE EMPRESAS INTERNACIONAL

Systematization of Innovation in Volkswagen Navarra, S.A.

Marta Alonso Tobías

DIRECTOR

Pilar Corredor Casado

Pamplona – Iruña

12 de junio de 2015

ABSTRACT

This study has been developed to compile and bring up to date the process of Systematization of Innovation in Volkswagen Navarra S.A., a mentor company in the car industry of Spain as well as at international level. As it is known, this industry is characterized by high competitiveness; VW-Navarra in particular is trying to stand out and improve through several strategies, been Innovation one of them. In this work, it can be found the contextualization of Volkswagen Navarra, S.A.; and the way this company organizes, directs, assumes, communicates and understands Innovation. How this plant located in Pamplona implements Innovation culture will also be analyzed, which is considered one of the most relevant aspects to be successful introducing Innovation in a firm. Finally, a section is devoted to the analysis and comparison of Innovation indicators in Spain, differentiating autonomous communities and cities, and types of Innovation among others.

KEY WORDS

Culture, Innovation, Process, Systematization of innovation, Volkswagen Navarra S.A.,

INDEX

1. INTRODUCTION

The car industry and in particular Volkswagen Navarra have experienced throughout history several improvements and changes in the production process, product or Polos assembled and in the way the companies are organized; all this has allowed them being more competitive and profitable, in the case of Volkswagen as a Group being nowadays the second company by sales in this industry in the world.

For all these progress to happen, during the whole life of factories for sure Innovations (something different, novel, original, creative that creates value) have been introduced; but until 2012 Volkswagen Navarra did not have a specific strategy or objective regarding Innovation and neither had a standard and regulated procedure or method to treat it. Since that year, the brand Volkswagen introduced a business strategy, Mach18.Factory, being one of its six pillars Innovation.

This report intends to explain the way Volkswagen Navarra implements this strategy, how it records Innovation, treats data related to introduced innovative measures, how does this plant encourage workers and managers to participate suggesting innovative ideas, how does it create Innovation's culture… Summing up, the way Pamplona's plant Systematizes Innovation will be analyzed, which is an organizational issue, and not that much the Innovations introduced in the firm, which relates more to technical and production aspects and that are more troubled due to confidentiality.

Actually in Volkswagen Navarra it is referred to Innovation stage as "The Way to Innovation" or "The Melting Stage" reflecting that as there have passed only 3 years since this strategy started there is still a lot of work to do until it is completely settled. Still in 2015 training is being given, culture is starting to be created. Until this year only 15 people, the components of Innovation's Team had knowledge about all this process and the way the part of Mach18.Factory regarding Innovation was being implemented in Volkswagen Navarra. That is why during the report there are several aspects that are explained as ideals or future tasks that may not be done in the future, because nowadays they are just plans or objectives changing and under development.

This study is an analysis of a specific process of a company including some regional and national indicators and has four objectives. The first one is to explain the background of Volkswagen Navarra, for this purpose a description of the company and an analysis of its relevance, history of the plant, its actual structure and an explanation of the strategic goal of the organization will be needed.

Second objective is to explain basic theory of Innovation, that is, recognized definitions, different types of Innovation, factors that slow down Innovation and aspects needed to innovate successfully.

Third goal is to explain the method specifically in Volkswagen Navarra to Systematize Innovations as well as resources used, organization, steps taken, process followed, communication strategy…

And finally, last objective is to analyze Innovation in Spain and in the Motor Vehicle industry, comparing indicators among autonomous communities and sectors. For this purpose INE (Instituto Nacional de Estadística) data base is going to be used, data collection by this Spanish organization regarding Innovation in companies is done through an annual survey.

To be able to achieve and fulfill targets of this report, it is going to follow a logical structure. Section 2 is devoted to the background of the company, section 3 explains basic concepts regarding Innovation, section 4 will tend to describe how is Innovation treated and systematized in Volkswagen Navarra, section 5 analyzes and compares Innovation's indicators in Spain and in the car industry and conclusions of the report are explained in section 6. Finally there are four annexes to complete information in other sections. Annex 1 includes world Motor Vehicle production by countries; annex 2 encompasses activities for technological Innovation by autonomous communities and cities; in annex 3 there are several tools or resources used in VW Navarra for Systemization of Innovation; and annex 4 explains through a table competences developed in the study.

2. VOLKSWAGEN NAVARRA S.A.

2.1. The Company

VW-Navarra S.A. is a production plant of cars located in Pamplona, Navarra. It belongs to the multinational Volkswagen Group, which headquarter is in Wolfsburg, Germany. VW Group is one of the leaders in the world in the car industry and of course in Europe. It is made up of 118 factories producing cars all around the world (United States, Argentina, South Africa, Portugal, Spain, England, France, Italy, Germany, Poland, Sweden, Russia, China, India, Thailand…) and selling them in 154 different countries.

The group as a whole has more than 530,000 employees and produces more than 34,500 cars a day. During 2014, 10 million vehicles were sold, which means that it covers more

than 12% of the world's market and more than 23% of the European market (excluding Russia).

Volkswagen Group comprises 12 brands each with independence and own personality: Volkswagen (cars), Audi (cars), Bentley (luxury cars), Bugatti (luxury cars), Lamborghini (luxury sports cars), Seat (cars, Spanish brand), Skoda (cars), Scania (trucks and buses), Volkswagen-Nutzfahrzeuge (commercial vehicles), Man (trucks and buses), Porsche (sports cars) and Ducati (motorbikes).

Nowadays Volkswagen Navarra only produces one car model, the Volkswagen Polo A05AG, and produces 300,000 vehicles a year approximately (3%) out of 10 million produced by the whole group; this locates this firm in the 11th position in the ranking of factories by production in the group and 5th if we only consider the production in Europe. When it is compared with Volkswagen as a brand it means a 14% of the production. The Polo model is also produced in 5 more countries South Africa, China, Malaysia, Russia and India, however the plant of Pamplona is the Leader Factory of the Polo and thus the one introducing new model in the market first.

Diagram 1: Spanish automobile industry

Source: Asociación Española de Fabricantes de Automóviles y Camiones (2012)

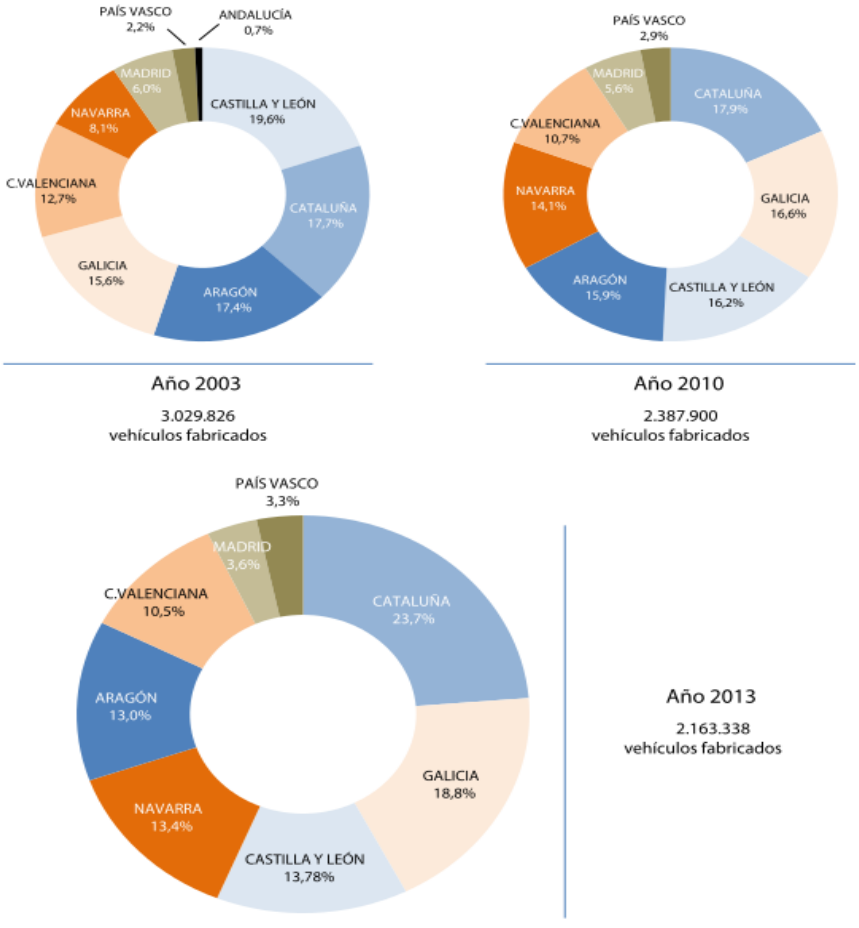
The Polo A05AG assembled in Pamplona is mainly exported, during 2013 94% have been sold in over than 74 countries, only the remaining 6% stayed in Spain. Of those exports

21% were to Germany, 13% to France, 9.5% to Italy, almost 6% to Holland, Algeria, and Turkey each, 4% to Great Britain, and 3 % to Belgium and Austria each; all of them are considered the main destinations of the exports, but there are also exports to the rest of Europe which are 14.59% of the total and 7.5% go to the rest of the world.

The amount of people working in this factory added up to 8,233 (31st of May of 2014); of those 4,400 approximately are employees of VW-Navarra and the rest are suppliers working inside the factory or in the suppliers' park.

The importance of the Spanish motor vehicle industry can be seen in diagram 1 according to ANFAC (2012); most of the production is carried out in the northern half of the country. Volkswagen Group has only two factories in the Spanish territory, the Volkswagen plan in Pamplona and another of Seat located in Martorell (Barcelona).

Diagram 2: Vehicle production by Autonomous Communities



Source: Asociación Española de Fabricantes de Automóviles y Camiones (2012)

The production of vehicles in Spain, that can be seen in diagram 2, has decreased during the last decade according to ANFAC (2012) from around 3,000,000 vehicles produced in 2003 to slightly more than 2,000,000 in 2013. Navarre has increased its share since 2003, in 2013 there were produced in Navarra, or what is the same in Volkswagen Navarra, as it is the only producer of vehicles in this community, 13.4% of total vehicles produced in Spain, being the 4th region in car production.

In Annex 1 Table 2, the world motor vehicle production by country and type (commercial vehicles and cars) is shown. According to International Organization of Motor Vehicle Manufacturers (2015) Spain was the second largest producer of cars in the EU (1,898,342 cars) in 2014 after Germany that produces 5,604,026 cars; but the same year it was the largest producer of the EU of commercial vehicles (504,636 vehicles). Regarding total production it is the ninth producer of motor vehicles (cars and commercial vehicles) and the fifth if percentage change of production (2013-2014) is taken into account (11%).

2.2. History

2.2.1. AUTHI 1965-1975

In 1965 was set up the plant located in Pamplona, AUTHI ("Automóviles de Turismo Hispano Ingleses"). On September was finished the first car, Morris 1100. In October 1967 second model was introduced, the MG1100, also Sports Sedan, Spain's first sports car, very successful and increased production above expectations. In 1969 two versions of Mini were launched and half of AUTHI was acquired by the British partner British Leyland. 1971 two new models were introduced in the plant, Austin 1300 and Mini GT (replacing previous Mini C produced), one year later the Austin Victoria was presented.

In 1973, British Leyland bought 48.3% of the shares that were still under Spanish control. During the following months the automobile sector was in crisis in Great Britain, this made British Leyland to focus on other projects, consequently negotiations with General Motors started. In 1974, the situation was unsustainable, AUTHI filed for bankruptcy. After two months of uncertainty it was bought by SEAT for 1.1 billion Pesetas.

In general, during this decade the total production was 131,744 cars, of those 17.4% were exports and the total surface used in Pamplona's plant was 441,636 square meters.

2.2.2. Seat 1976-1983

Seat was very relevant at that time; it was the first in production and one of the five car producers in Spain. At the beginning of 1976 the first car of the 124D model was rolled off

in Pamplona, this first year reached the production of 200 vehicles per day. For the Lancia assembly in 1979 (first to be made out of Italy) the plant was enlarged, from 1978 on the railway crosses through it. The drawback of less technological advanced line of Pamplona plant compared to the ones in Italy was not a barrier to make it successfully.

The new Seat Panda was launched in 1980 reaching a production of 120 Pandas per day. This car model was the hope of the brand to fix its financial troubles, given that it was a vehicle that matched better the economic possibilities and needs of Spaniards at that time than others. In 1981, Seat agreed with Fiat to eliminate all the technological and financial bounds with Seat giving up its shares to National Institute of Industry.

In 1982 another important agreement was signed between the National Institute of Industry and Volkswagen that was considering producing 90,000 Polo-Derby in Pamplona. The advantages that made the plant located in Navarre the optimal one were its adaptability and flexibility, and there were not needed important changes to produce the target that they had in mind (90,000 Polo-Derby and 30,000 Santana which will be 65% produced in this plant); flexibility still remains being one of the main advantages of this plant with respect to others. Aligned with this strategy, in 1983, the government of Navarre financed Volkswagen with 746 million Pesetas. It took an investment of 10 billion Pesetas to have everything ready for the assembly of the new Polo, leaving the Panda out of stage.

During the era of Seat total production reached 284,225 vehicles, of which 30.6% were exported and for all that a surface of 789,521 square meters was used. In general terms we could say that all the data were double than in previous years with AUTHI.

2.2.3. Volkswagen 1984-Today

At the beginning of 1984 the Polo started to be assembled in Pamplona in its two versions: Comfort and Luxury Comfort. The plant counted on the presence of much more robots and technology than ever before, but it still was a Seat factory making cars that were 100% Volkswagen regarding quality (the firm won the World Quality Award two years later). By the end of 1985 the production reached 100,000 vehicles. In 1986 Volkswagen bought Seat's shares accumulating 75% of them.

In 1989 with already 2,518 employees the production reached 638 cars per day. The same year announcements of the future production of the Polo Coupé in Pamplona and of the new model to be launched in four years were released. The system of production used nowadays was implemented for the first time in May of the same year, Just in Time, but

that year it was only introduced for sequenced delivery of car seats. Next year Volkswagen acquired the 23.8% that the INI had.

The 24th of June of 1992 the 1,000,000 Polo rolled off the line; the company became the leader in productivity. By the end of that year Polos were only produced in Pamplona, being this plant able to produce 1,158 cars per day. But this numbers didn't last very long, next year production fell to 760 vehicles each day. Before Christmas of 1993 a new company was founded with the objective of managing Pamplona's factory, Fábrica Navarra de Automóviles, S.A.

In May 1994 the Polo A02 stopped being produced and in less than one month Polo A03 was being assembled. Volkswagen finally acquired 100% of the shares of the company founded previous year. Same year the plant was the first of the group receiving a Company Registry Certificate, which meant that its Quality Assurance System met the requirements of ISO 9002 Standards. On December 1994 it finally was called Volkswagen Navarra, S.A. The car 2,000,000 was rolled off the line on September 1995. Next year the production rate reached 1,200 vehicles per day and total production of 251,805. In 1997 VW-Navarra was awarded with the Environmental Certification, this time being the first factory of cars in Spain meeting the requirements of ISO 14001 Standard. In 1998 annual production record was achieved, 311,136 Polos that year. In 1999 new model Polo A03GP was launched and next year Polo number 3,000,000 was assembled in Pamplona.

The fateful 11th of September of 2001 was presented in Frankfurt the new Polo A04 that was being assembled in Pamplona for the first time. Next years the production decreased sharply given the decrease of demand from European customers. However, given the already mentioned flexibility (managers - labor unions) of this plant, no worker was fired. The Polo 4,000,000 was released on 2004. In 2005 new model, Polo A04GP was launched, after a year of work with its prototype. In 2008 the Cross Polo was uniquely produced in the plant located in Navarre. It took from 2008 to 2009 to carry out all the phases that imply the trials and prototypes of the production of the new Polo A05. In October, VW Navarra gets involved with the campaign of the European Union, European Road Safety Charter, thought to decrease the mortality caused by traffic accidents. Same month the new model received 5 stars (maximum grade) in EuroNCAP (the most important award or indicator regarding safety).

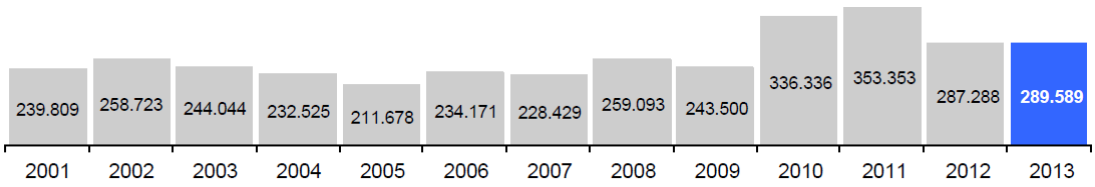
At the end of the year Polo got some new recognitions, BlueMotion model of the Polo won the Green Steering Wheel and at European level it was chosen Car of the Year 2010, ISO/TR 14062 standard, Best world car of the year in the New York Auto Show, Best Ecological Car 2010 for the model BlueMotion and 2009 Occupational Safety Cup.

Volkswagen Navarra is a very committed factory with training to the entire workforce, and in order to be able to teach its staff Volkswagen Academy Navarra was built in the plant, nowadays here take part some courses regarding Innovation as well.

In 2011 the TTS/KTL (German initials describing the industrial unit where it is done the process to prepare the bodywork before it is painted) industrial unit was built and a new record of production was reached, 353,353 Polos were assembled in Pamplona. The levels of production obtained last years just reflects that the global crisis has not affected the production of Polo as it can be seen in Graph 1 below, during the worst years of the crisis the production instead of decreasing or remain still, increased.

A new strategy is started in June 2011, Think Blue Factory, in relation with the worry of the company about environment, trying to reduce CO2 emissions, waste of water, light… In 2013 Volkswagen made its debut in the World Rally Championship achieving second position in the Mountain category. Nowadays and since February 2014 the Polo A05GP is being produced in the plant located in Navarre and several changes are taking place in the factory (enlargement of several industrial units, restructuring of the existing line…), for it to be ready for the launch of the next Polo model in coming years.

Graph 1: Development of production in VW-Navarra S.A 2001-2013



Source: Internal documentation of Volkswagen Navarra S.A.

During the Volkswagen's era total production reached 6,224,984 vehicles of which almost 90% have been exported. To be able to produce such amounts the surface used added up to 1,630,199 square meters. Compared with previous periods of time this is by far the most productive of all of them, but also the one which has lasted longer.

2.3. Structure

Volkswagen Navarra is divided in 7 main management areas:

- General Management: is at the same time divided into two areas Industrial Planning which is in charge of the production system (work methods and times) and Production Planning responsible for ensuring the best productive process.
- Production Management: this area encompasses production workshops (Presses, Sheet Metal, Painting, Motor assembly, Vehicle assembly and Final Revision)
- Technical Product Area Management: this area is focused on the product which in this case is the Polo, at the same time it is formed by several departments: Schablonenbau (optimization and creation of tools, templates…), Analysis Centre, Technical Office, Leading Factory and VW 250 GP)
- Logistics Management: which is responsible of the availability of right materials and supplies at the precise moment of time, this is very closely related with JIT and sequencing; it is also involved in the release of final product. The departments forming Logistics are: Planning and Logistic Optimization, Logistical Purchase of Production Materials, Programming and Control of Production/Distribution, Procurement and Transport and Materials Management.
- Quality Management: as the name of this area suggests it is dedicated to guarantee the quality of the product along the whole process of the assembly of the car, for this there exist a subdivision formed by: Auditing and Test Centre, Planning and Quality Analysis, Assembly line Quality, Measurements, and Purchased Material Quality and Laboratory.
- Human Resources Management: also formed by several divisions that are: External Relations and Communication, Human Resources Development and Strategy, Personnel Service, Environment, Safety, Prevention of Accidents Service and Medical Service
- Financial Management: this area is divided in three departments; Administration, Controlling and Financial Planning, and IT (Information Technology).

  The financial manager is the patron of Innovation and that is why this subject is considered to be part of the area of Finance, even though Innovation is an aspect involving personnel of the whole factory; moreover, to reflect this reality, the Innovation Team, that is the engine of Innovation in VW-Navarra, is composed by a member of each area. This variety of points of view allows the team to be open minded in the sense that any innovative idea is analyzed by other areas trying to

improve it and find applications for other fields. Innovation is part of a bigger project called Mach 18 that will be explained in the next section of this report.

2.4. Innovation and Mach18.Factory Strategy

Mach18.Factory can be defined as Volkswagen's objectives translated in organized and structured steps to be implemented in all the factories of the Group. This new strategy of the Production and Logistics Management areas of Volkswagen was launched in 2012. It aims to achieve very ambitious and clear objectives for 2018. The final goal of the Group is to consolidate as the most successful producer of series at global level, both ecologically and economically. To be able to fulfill it, uniform standards are being used, as well as systematic implementation processes as in the case of Innovation, structured ideas and global transference of knowledge. It is thought as a global strategy for all the factories to take advantage of the big size of the company as a whole.

However, there exist some barriers or obstacles that should be beaten to develop this strategy: the Group has very complex firms given the diversity of new models and versions of the products, the clients in this market are extremely demanding and tough, really high competition is found in the sector, the Group itself has changing and exigent expectations, still the financial crisis and decrease of sales are present in the industry, and finally all has to be done keeping an eye on costs. But Volkswagen has to carry out Mach18.Factory taking care of the environment, for this there is also another strategy, Think Blue.Factory, which basically consists of reducing 25% the impact on the environment, based on verifiable indicators.

Mach18.Factory is based on 6 pillars each with a concrete objective; a picture representing the strategy is shown in diagram 3:

- Productivity: focuses on the reduction of 20% of the costs that are involved in the manufacture of the car.

- Quality: which aim is to decrease to the half breakdowns of sold vehicles.

- Launch: concentrates in reducing to 8 weeks the launch period.

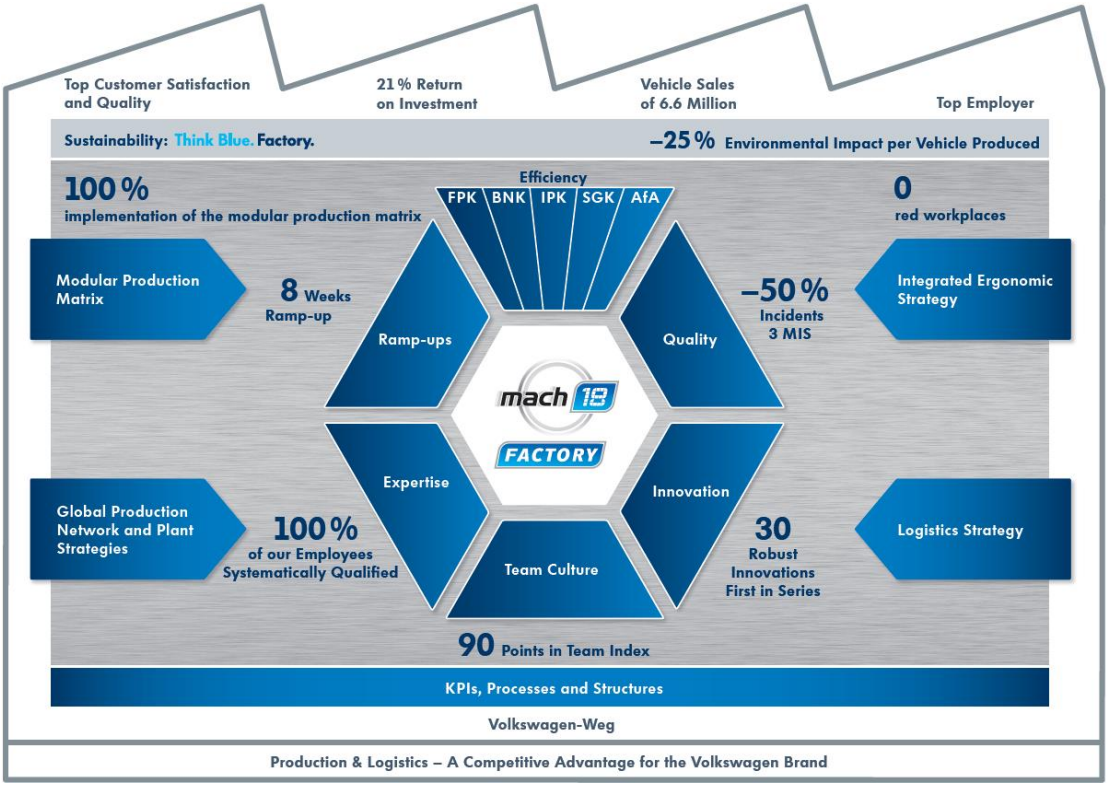
- Professional competence: having 100% of labor force qualified in a systematic way, referring to a personalized plan for every employee and adapted to each one needs.

- Team culture: which goal is to achieve 90 points in the measure for team culture and collaboration.

- Innovation: deals with the implementation of at least 30 innovative measures in each factory, which implies a minimum of 5 each year.

Innovation, the core aspect of this report, is gaining importance for firms because it is the way they have to adapt to changing environment and not to be left behind in competitiveness, assuring long term survival and profitability of companies.

Diagram 3: Mach18.Factory Strategy Volkswagen



Source: Internal documentation of Volkswagen

3. INNOVATION: THEORY

3.1. Definitions

Before going into detail about how Innovation is applied in Volkswagen Navarra and what does it imply to make it systematic, some key concepts should be introduced and clarified. In some cases there is more than one way to understand Innovation. VW-Navarra has also a particular way to understand it; this will be the most relevant for this report.

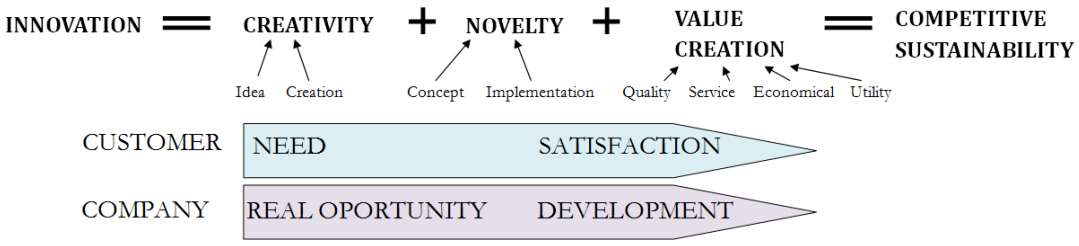
One of the most recognized and accepted report is the Oslo Manual, a basic guideline regarding Innovation published jointly by the Organization for Economic Co-operation and Development and the Statistical Office of the European Communities where we can find Innovation, OECD and EURSOTAT (2005), defined as: "*the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new*

organizational method in business practices, workplace organization or external relation". This definition is quite broad and includes all types of innovation that can be found and that will be explained in the following section.

Others instead of trying to focus on the forms that Innovation can take prefer centering in what it implies. Alfonso Cornellá (2007) (chairman and founder of Infonomía, an innovators' net) understands Innovation as "*a function from ideas to value: Innovation = f (Value)*". Consisting of finding ideas both inside and outside the firm that can create value in and out of the company, transforming creativity into solutions that benefit at least some of the parts implied. This other vision of the subject will complement the first definition and gets closer to what Volkswagen understands by Innovation.

However, this last view is still not complete. The meaning of this word for the Group Volkswagen is the way it defines Innovation and it will be a reference for the actions and efforts that the company puts in this topic. For the Group, Innovation is an act of effective generation of value basic for the competitive sustainability of the firm; it is based in the creative search of original ideas that allow the simultaneous achievement of concrete satisfaction of the needs in the market (customers) and the fulfillment of real business opportunities (company). Or simply, as Félix Oliva, the manager and representative of the Innovation's department of the whole brand, explained in an interview for the magazine *Apunto*, Volkswagen Navarra, S.A. (2011 d): "we consider an Innovation when it obeys to four criteria; that is something new, better than what it existed before, feasible and probably most important economically profitable". All this concepts are organized and depicted in diagram 4.

Diagram 4: Innovation definition and function for Volkswagen



Source: Own elaboration

But as it was already mentioned the main concern of this report is not to explain and analyze what Innovations are introduced in Volkswagen Navarra, but the way it makes Innovation systematic. Systematize is to organize, classify, arrange in or according to a

system, make systematic or reduce to a system; understanding by systematic: working or done step by step, methodical, characterized by the use of order and planning. So VW-Navarra's objective is to create a specific, detailed and standard process, with some rules, norms and tools to manage Innovation; it also implies Innovation's culture creation, Innovation's recognition and many other aspects that will be described throughout this report.

3.2. Types of Innovation

There exist four types of Innovation following OECD and EURSOTAT (2005) definition of Innovation that are: product, process, marketing and organizational innovations.

Product Innovation, as the name suggests, refers to the introduction of a new or improved good or service with respect to the product previously produced, this novelty can come through a change in materials, software, components, functional characteristic, uses or technical aspects. This kind of Innovation can be observed in VW-Navarra for example when a new material is used for the first time in the vehicle production which makes the car safer of lighter or when new chemical composition of paint is used for a better finish avoiding re-works afterwards. However, most of the innovations of this type are done in Germany in the central, where the Polo is designed.

When the production process or delivery systems are improved, it is considered to have implemented a Process Innovation, which can be achieved changing techniques, software or equipment used. The most significant example that can be found in Pamplona's factory is the change in the factory of the old production and organization system to JIT (Just In Time), very closely related to the Logistics Department. This new system allows increasing productivity and reducing costs due to excessive storage capacity; this way factories work when they have orders and not depending on capacity. There have been introduced several smaller Innovations of this kind in the factory such as improved tools that change for the better labor conditions, time needed to assemble each car, decreasing the ratio costs/car, decreasing the probability of mistake by the operator or even improving the final quality of the product. Definitely this type of Innovation is the most relevant one for the factory.

However, when there is a change of the marketing method, which means changing the marketing strategy previously used by the company including changes in design, package, placement, promotion, target segment or pricing, it will be called Marketing Innovation. Always when this form of Innovation takes place the companies are aiming to reach customer or to fit better their needs. Most visible example of this in Volkswagen, more

specifically with the Polo occurred when the company realized that with the old version of the vehicle; their main customers where women because of the car's design. The brand wanted to change this situation; for that new advertisements and small changes in the car's designed were performed (as the only objective of variations in the car were the change its appearance and not improving the car's functionality, it can be considered Marketing Innovation and not Product Innovation). This change of marketing strategy was finally successful allowing the firm to reach not only female but also male customers.

And finally when there is an introduction of new business practices, or there is a change or improvement in the workplace organization (that imply increase of labor productivity and satisfaction or reduction of costs) or in the external relations (making easier to share knowledge with external organizations, for examples universities), an Organizational Innovation will be taking place. One example of this will be the recent increasing interest of the company to train to the workforce, reflected in the Volkswagen Academy built some years ago. There is training for the different jobs, also language and skills courses that are very important and recognized by the firm. The way Volkswagen is carrying out its main objectives through Mach18.Factory Strategy can also be considered an Organizational Innovation. Implementing this kind of strategies the company is able to transform goals into realities under a much controlled framework and following standards, in conclusion in a more systemized way. And another advantage is that it is not only carried out in VW-Navarra, but in all the factories of the Group, making easier to measure and compare indicators and results with other firms, which at the same time allows each factory to learn from others and improve.

However, it is also important to clarify what cannot be considered as Innovation. It is not Innovation when a firm stops doing something (a product, a process, a marketing strategy…), even if only giving up something it improves productivity, reduces costs or brings any progress. When new equipment is bought to enlarge the already existing one can neither be considered Innovation, increasing capacity or assets already used is just an increase of capacity but not an Innovation as it does not imply creativity, novelty and value creation all together. Because of the same reason the changes produced by different prices of factors of production are not Innovation. Seasonality or cycles that may produce changes in products, such as in clothes industries, are not Innovation. This last change is most probable appreciated in the car industry in general or in Volkswagen in three different ways. First, the cycle of whole life of the product, facing higher sales when a new model is

released and decreasing more or less one or two years before the following model is launched. Second type is the one caused by government grants (such as Plan PIVE last years in Spain) that encourages cars sales. Last kind of cycle that can be observed in this industry is the one produced yearly, even though it may seem not to happen with cars, there is a time of the year when sales are higher, and it is not due to households consume. The month before Eastern rental car companies renew their fleets and this is translated in higher sales; moreover given the Polo's characteristics it is highly demanded by these companies, in the case of Spain especially in the Canary Islands. Nevertheless, these changes don't fulfill Innovation's definition and should not consider as one.

3.3. Barriers to Innovation

The process from the consideration of Innovation until it is finally set up is very complex. There are several barriers to Innovation that hold up and hinder this process, sometimes even stopping it. These barriers can be classified in two big groups: general barriers, which can be applied to any project; and specific barriers referring to automotive industry and to VW-Navarra in particular.

Included in the first group we can find resistance to change, fear to fail, lack of time, absence of cooperation among areas, shortage of incentives, priorities to other aspects or strategies, scarcity of resources and low support from upper-level managers.

Relating to more specific on car industry there are other barriers that of course affect to Volkswagen Navarra directly as well: not obtaining immediate profitability, absence of a structure to manage Innovation, operating system culture that limits to do tasks without questioning them, lack of internal and external communication, cooperation and coordination (internal most pronounced among departments than inside them and external between VW-Navarra and the Group or the Committee, absence of interaction and communication with other factories and other actors in the business environment), understanding research and development as an expense and not as an investment, and last but not leas lack of training and culture of Innovation. In the case of Volkswagen Navarra the most common ones could be not obtaining immediate profitability or understanding R&D as an expense; and lack of training and culture of Innovation that is trying to be solved nowadays through training programs, motivation plans, awards and events.

3.4. Success, Key factors

To reach systematization of Innovation successfully, previous barriers have to be overtaken, and it would be easier if there is support and cooperation among internal

departments of the factory and the company as a whole. In the case of Volkswagen Navarra there exist three internal paths to achieve it.

First, it is trying to develop a system that can allow participation of every component of the factory in the process of creation of ideas. Nowadays ideas from the employees are conducted through "Sistema de Sugerencias" (Sugestions' System), an office belonging to the department of General Management that studies all the suggestions made by the employees, when they detect through a Innovation's Checklist (Table 4 in annex 3) that it can be considered Innovation, the suggestion is sent to the Innovation's Team. Now the company is developing an internal system (in the intranet, or through smartphone apps), as the one for suggestions, exclusively dedicated to Innovation, where all the components of the factory will be able to upload their innovative ideas that later will be studied by the Team of Innovation to confirm if they meet Innovation's requirements (Checklist).

Second is creation of a structure that allows managing information. It should be kind of a committee, represented by all the areas of the company. At the factory level this would be represented by the Team of Innovation of Volkswagen Navarra, formed by people of all the areas that are the ones in charge of making decisions about Innovation, its implementation and every event related to this aspect. More concretely there are 14 people from different departments plus the patron of leader of the project, they are trained and receive basic notions of Innovation, and they are also responsible of transmitting to the rest of the workforce Innovation's culture. There exists also the same kind of aggrupation at the Group level which tries to set basic and general goals and make global choices about Innovation, such as the budget for each factory.

Finally, execution and implementation of innovative ideas that fulfill the Checklist, here is basic to have the support of the upper-levels of managers. Before final inclusion in the factory of the ideas, most of the times the development of prototypes and trials is needed, this is a high intensive time and effort consuming action.

Those three main lines of action cannot be taken separately, for a complete Innovation's implementation three of them have to be performed. Then to maintain an Innovation strategy in a factory successfully, a part from this basic steps a good measurement system has to be developed or adopted to be sure that everything is done in the right way and the measures taken are in the right direction. This step is still missing in VW Navarra.

A good communication plan and strategy of steps taken also helps to be successful regarding Innovation. Moreover, there are also some external actors, whose cooperation is very useful to implement Innovation successfully. These actors are: the Group Volkswagen (sharing Innovations introduced in other factories, there is already a software to connect all the plants of the group where they can upload their measures and share them), universities (several projects have been developed with University of Navarra, for example, ideas market to apply in VW-Navarra concepts under study in universities), public institutions (being aware of what actions are financed by governments or existing fiscal benefits, that are quite high when talking about Innovation is crucial and can save lots of costs), customers (having feedback of their experiences with the product may lead to ideas to solve problems or to improve), other companies in the same industry (sharing some information with competitors might be sometimes useful)and suppliers (knowing the way suppliers work or their offers instead of being fixed to a single product or way of delivery could bring many progress to the production process).

4. INNOVATION IMPLEMENTATION IN VOLKSWAGEN NAVARRA

4.1. Organization

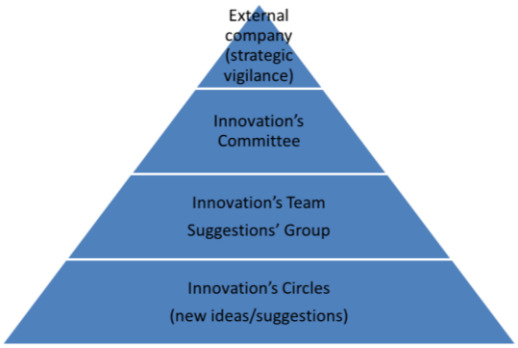
There are several actors needed to carry out Innovation's systematization. According to people involved in Innovation in Volkswagen Navarra, they could be grouped and organized as in diagram 5.

Bottom up, it is found in first place Innovation's Circles, it consists of small groups of workers that organize themselves freely because they are interested in Innovation and they generate Innovative ideas or suggestions and send them to the Innovation's Team, to the coordinator of Innovation of their department or to the Suggestions' Group. This is not exactly like that nowadays; the whole workforce are able to do this, but ideally groups of workers that are more creative, already identified, should meet to try to solve challenges.

In the second level there are two groups, both are multidisciplinary work teams. The main task related to Innovation of the Suggestions' Group is to distinguish and select which of all the Suggestions that they receive are not Suggestions and have to be sent to the Innovation Team. Then this Team analyzes and decides if an idea deserves to be implemented depending on factors such as profitability, novelty, originality and value creation, included in the Checklist shown in Annex 3, table 4. They also have to prepare all the information about Innovation that should be shared with the Group to meet Mach18.Factory Strategy. This team is formed by people trained in Innovation aspects and

one of them is also a member of the Committee. In the Innovation's Team there is also a coordinator who should be devoted only to Innovation, he is in charge of prioritize ideas and projects, participate in the resources allocation, report to managers and monitor the status of Innovation. He should also unify and standardize Innovation's documentation and support every Innovation project. This figure doesn't exist yet in VW-Navarra because there is still no one dedicated 100% to Innovation and developing all those tasks but it will be created in the following months because the Team has decided that this is one of the main goals in the short run.

Diagram 5: Innovation's Pyramid



Source: Own elaboration

Next group involved is the Innovation's Committee that has to drive Innovation in Volkswagen Navarra. This is formed by the responsible person chosen by the managers of every area. A part from those members, the patron of Innovation in the factory and the coordinator of Innovation form also this Committee that meets monthly. Main tasks of this group are: drive Innovation in the factory, prioritize ideas and projects, sponsor projects, select a company to strategically watch Innovation, transmit to the Group Volkswagen the results, monitor the status of Innovation, create an "Innovation's Environment" defining an implementation strategy, promote ideas' exchange and define a reward system.

Finally an external company has to strategically monitor Innovation in Volkswagen Navarra and spreads in the factory news and tendencies in the world about Innovation attending the guidelines emitted by the Committee.

Even though it is not in the structure of the organization of Innovation in VW-Navarra, another figure should be mentioned. The "Drehscheibe", belonging to the Group Volkswagen in Wolfsburg, who nourishes the factories in the Group with innovative ideas,

monitors the improvement of Innovation in the brand and is permanently in touch with the patron of Innovation in the factory located in Pamplona.

4.2. Resources

We can consider resources all the means that allow reaching an objective; and in the case of Volkswagen Navarra the goal is to systematize Innovation.

Finance is one of the principal resources as it is in most of the cases, without money innovative measures cannot be developed; a budget has to be approved by the Innovation's Committee, which would be after divided among different areas or measures by the Innovation's patron and the coordinator. Another way of financing internally a project is by the Return on Investment (ROI) or auto financed. There are other projects that can be financed externally because some ideas can be subsidized by the government, more often when they carry friendly environmental consequences; and when patents can be registered generating revenues.

Understanding that definition of resources we can consider as one of them Open Innovation, which consists of cooperation with external agents such as universities, suppliers or smaller companies to share information and develop new innovative projects; creating synergies and different points of view.

Having a physical place called "Innovation's House" will be favorable. It should be a multidisciplinary building that should allow or be prepared for ideas creation and projects development. Different areas may form it some rooms related to creativity should be dedicated for ideas creation and team work; other rooms could be built for relax, concentration and isolation; and finally an area should be constructed for quick decisions taking. Such a building already exists in CEIN (European Center of Enterprises and Innovation of Navarra) and is seen as an example for a similar concept in Volkswagen Navarra. Nowadays the Team of Innovation has achieved to dedicate a space in the HHRR building which is called the Room of Innovation and the composition and structure of it is still under study.

In workshops and offices or even near the coffee machines, some "corners" should be devoted to Innovation; some tables are planned to be placed in that Innovation's corners for quick meetings and sharing of ideas. They should be places that could also be used for communication and marketing about Innovation in Volkswagen Navarra and could be especially useful for the Innovation's Circles previously described. These places are easier

to implement than the Innovation's House and may be a great source of ideas generation as people working in the same area can share with each other detected problems in line for example and all can propose different innovative solutions.

In the following months it is expected to have already designed and prepared the "Book of Challenges" that includes the main concerns or problems of the factory as a whole ordered by size and prioritized. Through this tool the Team of Innovation wants to be able to show to external agents (universities, other companies, suppliers…) and also to internal agents the problems that should be solved or improved and in this way everybody could contribute with innovative ideas. It might be beneficial and will complete this document the inclusion of failure experiences related to those concerns not to repeat bad experiences and to learn from them.

Other very important documents that can also be considered resources are the Checklists already mentioned in other sections and especially in next one, and shown in annex 3 table 4. There exist two, one to detect if an idea can be considered Innovation and another one to decide if an Innovation is a project, or which is the same if it is big enough and encompasses several areas in the factory. Both consist of a list of questions that should be answered for every idea.

The resources that are used for channeling, managing, developing and storing all the data and innovative ideas (successful and failures) are all the software. The main tool is massnahmen@web (some outputs of this tool are shown in Annex 3 Diagrams 8 and 9), a centralized system for all the factories of the Group containing all the ideas and projects that are shared with the rest of the firms. This is very useful as an Innovation can be applied or implemented in lots of factories and this way it benefits the whole company; it does also show information about Innovation measures in a standard way (A3 Sheet shown in Annex 3, diagram 9) as well as a stair with the measures to be applied during every year of Mach18.Factory Strategy. Other software that will be soon implemented is an app for smartphones which allows the entire workforce introducing their ideas being for the Innovation's Team much easier to collect information; it is an innovative measure itself.

4.3. Process

One of the basic aspects needed to be able to systematize something and in this case Innovation is the process, the ideal one but a bit general is the Innovation's Cycle; this is a cycle of 5 steps regarding ideas management. First step is ideas' creation, it encompasses from the generation of the idea till the collection in it different forms. After that comes

ideas' selection which is filtering and prioritization of those ideas, as a result enumerated list of ideas should be obtained. Ideas' introduction is done next, implies collection and execution of needed tasks to implement the innovative idea, this is one of the most time consuming steps in the cycle, some measures take several years to be completely implemented in the factory. Fourth step in this cycle is sustainability the main goal of this part is to guarantee that Innovations are secured and maintained in the organization. Finally, to close the cycle diffusion is needed, internal and external spreading of successes and failures, this last step will be better explained in the section referring to communication.

The cycle of Innovation's management previously described is a bit general; Volkswagen Navarra has developed its own diagram showing the steps followed by the factory to design the process to manage innovative ideas. Diagram 6 combines processes already existing in the factory (yellow rectangles) with non-existing processes (red rectangle).

However, the process will be divergent depending on the way taken to start it. Challenges Book represents the first step; opportunities identification which is the main goal of the book, where challenges detected by the factory managers are collected, prioritized and categorized; after they publication, responsible of every area (that are the only ones receiving the Newsletter explained in the section 4.4.3. Marketing, communication and events) interested on the challenge can communicate them to their team and they will propose innovative solutions for it. In this case the Innovations' Team is the one receiving all those ideas and is the one in charged to detect with the Checklist if it is an Innovation or not.

Other way to start the process is through Suggestions' Office; an office belonging to the department of General Management that studies all the suggestions made by the employees, this first part of the process will be related with two first rectangles at the same time. The employee after detecting a problem or opportunity ideates an innovative solution for it and transmits it to the Office. Then the Suggestions' Office is responsible of evaluating every suggestion with the Innovation Checklist to detect if it has to be sent to the Innovations' Team, which will have to use the same list again to confirm if it is actually an Innovation. Even though it might seem redundant, there are still many suggestions send by the Suggestions' Office to the Innovations' Team, that don't fulfill the requirements included on the Innovation Checklist, after this, if the idea finally does not pass the

Innovation's Checklist, the process, at least as a possible Innovation is finished; it might follow to be treated as a suggestion.

Scouting and Open Innovation are also other channels that can start the process shown in the diagram. Both cases consist of looking outside (suppliers, universities, other factories in the group, news, new technologies…) to identify tools, mechanisms, materials… that can be applied in VW-Navarra factory and that are innovative, either the implement itself or its application. Here the Innovations' Team should evaluate it with the Checklist to decide if it can be considered information or not.

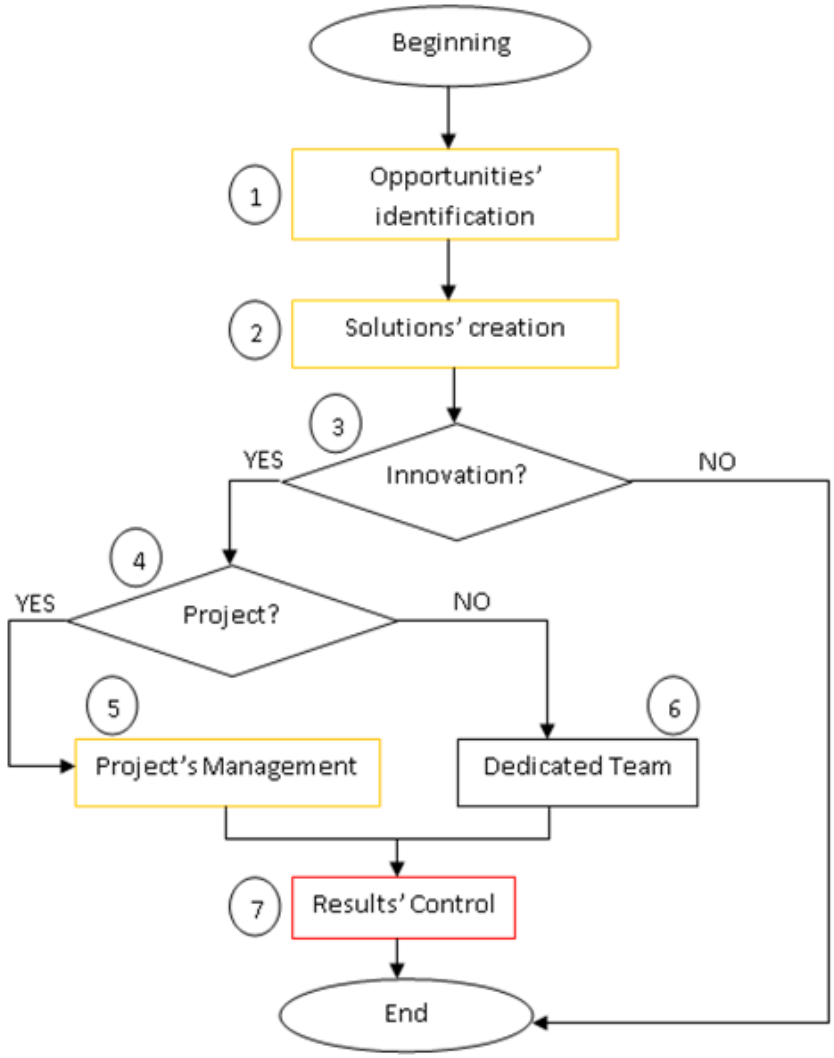
If the idea or innovative solution doesn't complete the Innovation Checklist the process ends at that point, in the case of Suggestion the process regarding Innovation also ends but the suggestion is sent back to the Suggestions office. But when the Innovation's Team detects through an Innovation's Checklist that it can be considered Innovation (YES in the Innovation rhombus), the idea is analyzed through the Project's Checklist to consider the option of it being a project depending on the size and the departments involved. If it can be considered a project the idea is directed to the Projects' House, the office in charge of implementing, developing and supervising the projects in Volkswagen Navarra. However if it is not considered a project the Innovation's Team and responsible of each idea would be the ones who should manage and control the innovative idea or measure.

Every Innovation detected is documented, for each measure a A3 Sheet is crated, shown in diagram 9 annex 3, it is an standard (for the whole Group Volkswagen) way of organizing every relevant information about the measure (timing, objectives, benefits, area, state, images …), the information in each Sheet is updated and checked weekly and introduced in massnahmen@web the software used to share information with the rest of the factories. Through this tool the Group controls the state of every measure monthly and marks each factory depending on the quality of the information contained and on the fulfilment of the established timing for each measure.

After all these steps have been taken a results' control is needed to assure the measure's Innovation, ROI, knowledge…and to guarantee that it is maintained in the organization.

Moreover, as the Innovation's Team is analyzing nowadays a very important step missing in this flowchart, communication of results. It is already practiced by the factory but it hasn't got still the importance that it deserves, nor expected results.

Diagram 6: Process for Management of Innovation.



Source: Internal documentation of Volkswagen Navarra, S.A.

The explanation of the process would not be complete if the relevance of the Checklists is not highlighted. It is not enough understanding the meaning of Innovation for the factory; a list to detect which ideas become Innovation (Innovation's Checklist) is a key tool, that at the same time contains the basic elements of the Innovation's definition and specially focus on effective value creation; the main criteria checked are: creativity applied to the creation of solutions, novelty, applications novelty for the factory, contribution to value generation, creation of different competitive advantages, capability to totally shift old technology used, and possibility of funding obtaining and of patenting the idea. There exists a similar tool to identify projects after an idea is considered Innovation; in this case it is based on the dimension, multidisciplinary nature and cross-directionality. The judgments used are the

following: actions that require knowledge and participation of different areas, activities to realize in a period of time higher than 6 months involving expenses and/or investment higher than 0.5 million euros and eligible actions for subsidies and/or patents.

4.4. Culture and communication

All the following points are considered very important for the factory. For a successful implementation and systemization of Innovation, it is indispensable that the whole workforce understands Innovation as Volkswagen Navarra does and that culture is created, only in this way the objectives of Mach18 will be achieved. It also is pretended that workers are educated in the Innovation culture; until now the goal was Continuous Improvement which is a production system or method based on improvement but without a change in path including higher speed in production and efficiency; to a view of Innovation as was defined in the section 3.1. For this reason training, motivation, events and marketing are considered inputs that create culture and when it is crated there will be some outputs that are innovative ideas that should be shared and communicated.

4.4.1. Training

Volkswagen Navarra is using training as the first step to create Innovation's culture. The knowledge of techniques of Innovation, group dynamics or similar activities will help to detect innovative ideas and suggestions.

There already exist training courses. They will allow workers to know and understand Innovation and how is it systematized in the plant. The factory has decided that the courses should be taught form upper layers to lower layers.

Innovation Team is the first taking this course, this team received more theoretical courses regarding this topic several years ago to start the path of Innovation, but nowadays the course is more focused on the culture and systematization, and not that much on the theory. During the spring of this year the managers of VW-Navarra are taking a similar training and this way are getting closer to Innovation, here also participate the members of the Innovation Team, to encourage participation and to show the improvements and achievements of the Team during last years.

Next step coming in the following months or next year will be offering the training to lower layers of the workforce, when this is finished it is expected that there will be a high level of awareness of Innovation, and workers will have learned to think in a different way coming up with new ideas or suggestion that would become Innovations in some cases.

4.4.2. Motivation

Labor motivation is indispensable for the step of ideas creation, it is very important that workers are motivated in order for them to get involved with the factory and their initiatives. Factors valued by the labor force have to be recognized for them to participate.

When the worker starts sharing innovative ideas a circle starts. He will value the development and learning that his position produces which will make him become with new ideas. For this motivation and recognition is needed, VW-Navarra is developing the Innovation's Award, that would reward the effort of the workers who have shared the best innovative ideas; this will be similar to the prize given to suggestions, that consists of an amount of money from 30€ to 6,000€ or a Polo depending on the importance of the suggestion for the factory and the production process. In the case of the Innovation's Awards the prize itself has not still been defined or quantified.

4.4.3. Marketing, Communication and Events

Innovating, making progresses and training the labor force is not enough; if every advance or improvement is not communicated they will not have the expected impact on culture. This is why Innovation has to be properly sold, meaning that marketing, reports and new have to be made for everybody to be aware of the effort and measures taken in this field.

As in the strategy ThinkBlue.Factory, Innovation has to be identified with a color or logo; this will help reinforcing the culture. Presently the color is yellow-orange and a light bulb containing Volkswagen's logo is used as the Innovation emblem; shown in Annex 3, diagram 7. Both the color and the logo should be used in the Corners of Innovation in the "Innovation's Room as well as it is in the documents emitted by the Team and the Committee of Innovation. There also exists a slogan for Innovation in Volkswagen Navarra that summarizes the tasks of the factory with respect to Innovation: *"Inspire, Explore, Innovate!"*

Communication of progress to disseminate the culture is made both internally and externally. Internal channels already existing:

-Polo Zoom: internal weekly magazine where some times are published Innovation articles.

-A-Punto: articles in a triannual magazine with a very high spreading that is distributed through all the labor force

-Intranet: internal web page used to introduce some news about Innovation, here can also be found an Innovation forum that might be enlarged to external agents in the coming months.

- Liga Polo: the team of Innovation is also thinking about introducing in this monthly meeting Innovation as a topic to be explained, this might be implemented during this year.

- Newsletter: until this year used to communicate to managers only, last technologies introduced in the factory and events related to the Innovation's Team; given the low rate of interest observed in its addressees some changes are being introduced. From now on it will contain challenges from the Book of Challenges so every interested manager can communicate them to their teams in order to propose innovative ideas to solve them; it is also containing Innovative technologies or ideas observed in other companies with the same purpose. All these means that it will become bilateral tool of communication and will stop being a unilateral tool.

- Innovation's Tour or Route: as communication to the employees in the line is the most difficult one, this year it is being created a tour highlighting every Innovation implemented in the factory with graphic posters containing all the information about each measure; this way workers will know and understand why changes of tools or methods take place and the advantages that they generate. This tour is also going to be used in other events such as visits of responsible of other factories of the Group. To make it more visual it is also being designed a layout of the factory including the points where this measures are located, actually they won't be points but bulbs, if they are switched on (yellow) it means that the measure is completely installed in the line and working, the ones switched off (grey) show that even if the measure is implemented it is not working properly and it will be finished in the following months.

The external channels that could be used to spread Innovation's Culture are:

-External publications (Newspapers, magazines…): as well as revenues or production news about the factory, the Innovation progress of Volkswagen Navarra should be published in this type of media.

-External communication to Germany: very relevant news about Innovation in Volkswagen Navarra should be published in German newspapers and magazines, such as Autogramm and GroupNews.

The tool used mainly to communicate with other firms in the Group is Massnahmen@web: is software which is used to communicate to the Group Volkswagen the advances in Innovation and the measures implemented or under development. The main information used of this software is the A3 sheet (Annex 3, Diagram 9) and the Innovative Measures Stairs (Annex 3, Diagram 8). This is not only a tool to evaluate each factory as explained in the process, another very important use of this software is that is an information input because the measures made by other factories in the Group are also visible for VW-Navarra, so it can study the viability of their introduction in the factory.

With respect to events, it was already mentioned the Innovation's awards still under definition, similar ideas would be creating the Day of Innovation in Volkswagen Navarra, meetings even with external agents to capture ideas and Innovation Competition. Actually only the Awards and the meetings with external actors (universities, CEIN…) are under development.

5. ANALYSIS OF INNOVATION IN SPAIN

This section tries to complement previous work and every aspect explained of Innovation in Volkswagen Navarra, and is devoted to the analysis of data available in INE "Instituto Nacional de Estadística" (Spanish Statistical Institute). This is a public, autonomous and administrative organism, belonging to the Economy and Rivalry Ministry of Spain, which is in charge of realization of statistical studies of huge significance (demographic and economic census, national accounts, demographic and social statistics and indicators …).

5.1. Database and Methodology

For the purpose of the study, Innovation data in INE for the survey of 2013 will be analyzed, this year has been chosen because it is the latest available and precisely in 2012 was the year in which Volkswagen Navarra started with its reporting and systematizing of Innovation and the survey of 2013 includes information for some data for the period 2011-2013. A comparison among Autonomous communities and cities will also be realized. Special attention will be paid to industrial sector, more specifically in the activity of motor vehicles and to companies settled in Navarra; which are Volkswagen Navarra industry and location. For the extraction of all these data, INE uses a survey, INE (2015 e), annually done in the whole Spanish territory. Some basic definitions and methodology of this survey and data have to be explained before the numerical analysis is carried out.

The main objective of the this inquiry is to provide information about the innovation process' structure and show the relations between that process and the technological strategy followed by companies, the factors that influence in their capacity to innovate and the economic performance of the firms. The variables under study are the expense dedicated to Innovative activities by type of activities and size of the firms, results of Innovation and economic impact. It is realized since 1994 being available since 1996, since 2005 it is done every year. The respondents are Spanish firms belonging to agricultural, industrial, building and services sectors with at least 10 employees. They are divided at the same time in 33 types of activities of the firms being the most important for this report the category of motor vehicles. The sample size of the one realized for Innovation of 2013 was according to INE (2015 f) 40,092 companies chosen randomly.

Here are included definitions that have to be clearly distinguished and understood to be able to interpret data. These definitions are included in the General Methodology 2013, INE (2015 f) and are also based on The Oslo Manual published by the OCDE.

- Technological Innovation: include products (goods and services), processes technologically new and significant technological improvements of the processes. They will only be considered when they are already introduced in the market, for the case of Product Innovation, or when they are used in the process of production, for the case of Process Innovation. Both types are defined by the INE in the same way as OCDE, already in section 3.2.
- Non-Technological Innovation: include Marketing Innovation (changes in 4Ps: Product's design and package, Price's strategies, Promotion and Placement) and Organizational Innovation as described also in section 3.2.
- Activities for Technological Innovation: set of activities that lead to development or introduction of Technological Innovations. Encompassing following activities: scientific research and technological development (internal R+D); acquisition of R+D (external R+D); acquisition of machinery, equipment and hardware or software; acquisition of other external knowledge; training; introduction of Innovations in the market; design, other preparations for production and/or distribution. More detailed definitions for each of these seven activities can be found in INE (2015 f) pages 13-15.

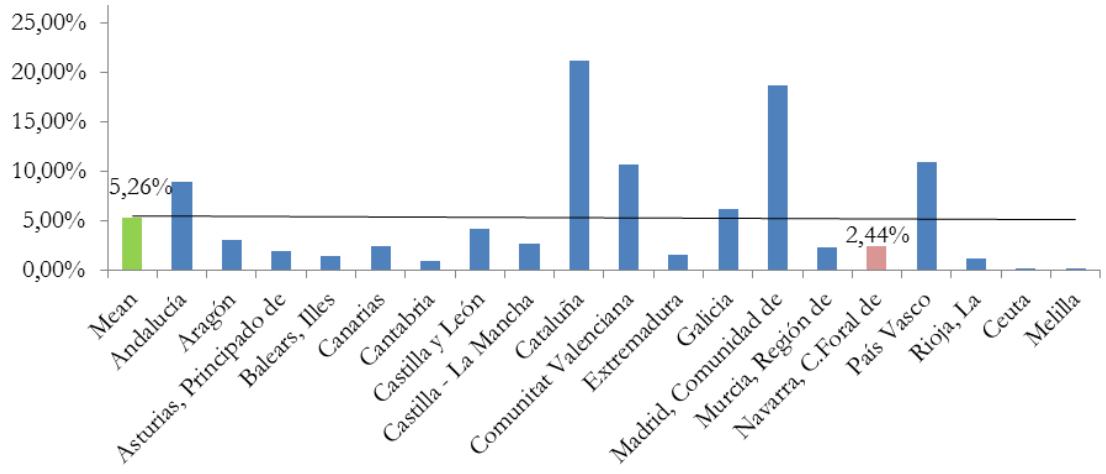
- Innovation's Intensity = (Expenses in Innovative Activities / Revenue) * 100
  Is the percentage of revenues that are devoted to innovative activities as expenses.

Due to Volkswagen Navarra's business activity and importance of types of Innovation, and to availability of data in INE (2015 a) special focus is going to be made on Technological Innovation (and Process Innovation within it), this information is published for periods of 3 years; and Activities for Technological Innovation, which is shown for each year separately.

5.2. Activities for Technological Innovation

This section compares and analyzes different indicators of activities for Technological Innovation. First of all, a comparison among autonomous communities and cities will be realized for the number of companies developing this activities that have been already described in section 5.1., also expenses in this activities will be studied and finally intensity of Innovation; for the data distributed by autonomous communities and cities more detailed information can be found in Annex 2 Table 3. Afterwards these data will be explained for the sector of Motor Vehicle industry for Spain in general.

Graph 2: Percentage of Companies with Innovative Activities by Communities and Cities (2013)



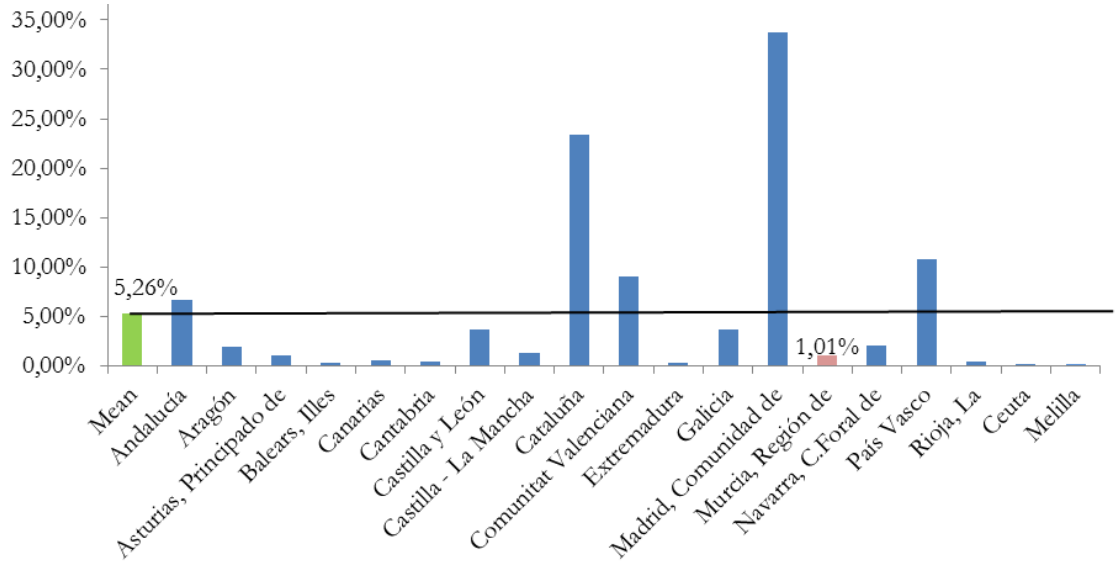
Source: Own elaboration with data from INE (2015 a)

Regarding the number of companies realizing Innovative Activities only Cataluña, Madrid, Basque Country, Valencia, Andalucía and Galicia are above the average from higher amount of companies to lower. The total number of companies with Innovative Activities in Spain is 16,119. Navarra is having very few companies with Innovative Activities, only 2.44 % or 394 of all the companies in this community realize them. This comparison and

data for the rest of the autonomous communities and cities that are also below the mean (5.26 % or 848 companies) can be found in Graph 2 and in Annex 2 (Table 3).

Of the companies that according to the number of companies realizing Innovative Activities were above the mean, all of them except Galicia are also above the mean regarding expenses in Innovative Activities as it can be seen in Graph 3 and Annex 2 (Table 3). The expenses in Innovative Activities of Navarre in this case are even smaller, only 1.44 % or 274,248 in 1000 € of all the expenses in Spain of this type, that are 696,489 in 1000 €. The rest of the regions are again below the mean, which is completely logical given that in these communities and cities there is the lower amount of companies realizing these activities.

Graph 3: Distribution of Expenses in Innovative Activities by Autonomous Communities and Cities (2013)



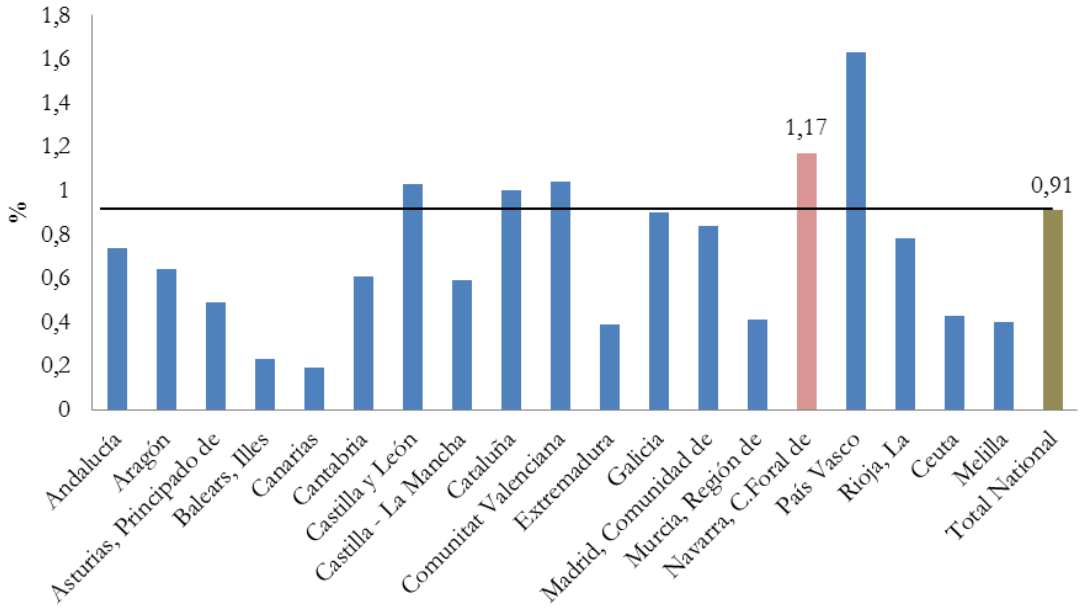
Source: Own elaboration with data from INE (2015 a)

Last comparison among autonomous communities and cities focus in Intensity in Innovation, or which is the same expenses in Innovative Activities as a percentage of revenues of all the companies. This percentage adds up for all the companies (primary, secondary and tertiary sectors) to 0.91 % for Spain as it can be seen in Graph 4 and Annex 2 (Table 3); above this percentage are Basque Country, Navarre (1.17%), Valencia, Castilla-Leon and Cataluña; the rest of the communities and cities have an Intensity in Innovation lower that the one of Spain. This indicator can be considered more relevant than expenses of the companies because Intensity in Innovation highlights better the effort made by firms

in relation to their revenues. In the case of Navarre total expenses of this community were very small but as it has been explained in relation to revenues of all the companies, it is the second community making a higher economical effort to realize Innovative Activities.

Now analyzing the Motor Vehicle industry for the whole country, as it is shown in Table 1, here were a total of 274 companies with Activities for Innovation in Spain in this industry, or 38% of total amount of companies. There were in 2013 three times more small companies (with less than 250 employees) realizing Activities for Innovation than big companies (with 250 employees or more).

Graph 4: Intensity in Innovation: Of all the companies (%) (2013)



Source: Own elaboration with data from INE (2015 a)

However, even though 205 out of 274 are small companies, they only represent 33% of all the companies in the industry, while 78% of big companies in this industry realize Activities for Innovation.

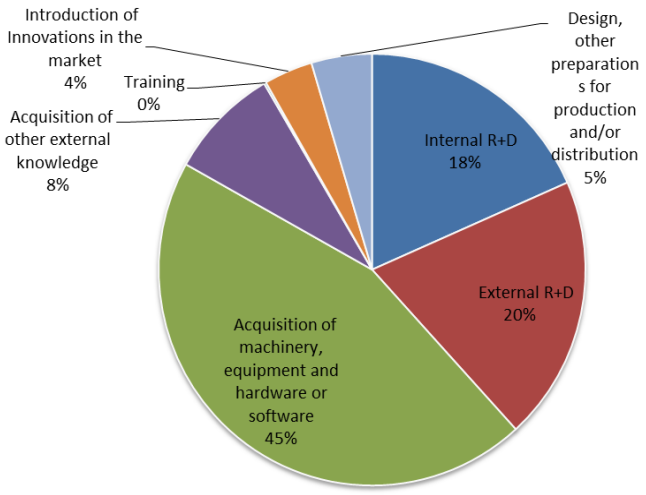
In general firms realize more frequently internal and external Research and Development, and acquisition of machinery, equipment and hardware or software; but acquisition of other external knowledge and design, other preparations for production and/or distribution (more related to non-technological Innovation) are practiced less often by companies in this industry; there are more companies when summing up by activities that the total (274) because companies realize usually more than one of those activities.

Table 1: Companies with Activities for Innovation in the Motor Vehicle industry (2013)

	<250 Empl.	> or = 250 Empl.	Total
Total	**205**	**69**	**274**
Internal R+D	131	60	**191**
External R+D	79	43	**122**
Acquisition of machinery, equipment and hardware or software	70	27	**97**
Acquisition of other external knowledge	2	3	**5**
Training	46	19	**65**
Introduction of Innovations in the market	34	23	**58**
Design, other preparations for production and/or distribution	18	8	**26**
% of Companies with Innovative Activities in 2013/ Total amount of companies	**33%**	**78%**	**38%**

Source: Own elaboration with data from INE (2015a)

Graph 5: Distribution of Expenses for Activities for Innovation in the Motor Vehicle industry (%) 2013.



Source: Own elaboration with data from INE (2015 a)

Obviously, as it is shown in Graph 5, expenses in every type of activity are related to amount of companies realizing each. Being the activities to which more expenses are devoted internal and external R+D and acquisition of machinery, equipment and hardware

or software. According to INE (2015 a) in 2013 the Intensity in Innovation of the Motor Vehicle industry was 3.38% a very high percentage if compared with the Industrial or Secondary sector in general, 1.32 % of revenues are expenses for Activities for Innovation, which is the sector with higher Intensity in Innovation. This indicates that the Industry in general and even more the Motor Vehicle industry spends a lot of money in this aspect, as it was mentioned at the beginning of this report Innovation is crucial for companies especially in car industry, with a very high competence, that is one of the reasons why it is taken as a very relevant aspect in Volkswagen Navarra.

5.3. Technological Innovation

Regarding data for Technological Innovation a period of three years, from 2011 to 2013 will be analyzed as it takes longer to introduce Innovations than to make activities to innovate.

In Spain there were 19,370 companies realizing Technological Innovation in total for that period and the distribution among companies is practically identical than in Graphs 2 and 3 according to INE (2015 a); but as it has already been explained Technological Innovation can be divided into two types: Product Innovation and Process Innovation. Last kind is the most important and common for Volkswagen Navarra, and apparently, for much more companies because in every autonomous community and city the number of companies realizing Process Innovations (14,833 in the whole country) is higher than the number of companies realizing Product Innovations (9,925 in Spain) , and it is even lower the number of companies realizing both types of Innovations in all the cases and also for the whole territory, where there were only 5,387 realizing both.

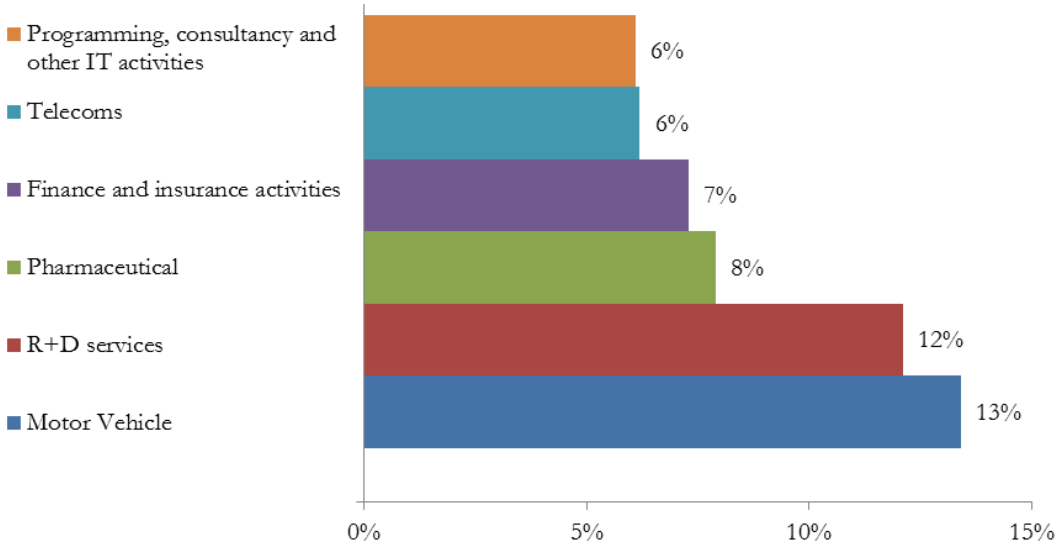
For the data related to distribution of expenses in Technological Innovations in particular, it is much more interesting to compare activities or industries because as it can be seen in Graph 6, of the total amount of expenses devoted to this type of Innovation in Spain, 13.4% of them belong to Motor Vehicle industry, being it the first activity acording to this distribution. Once more this reflects the high competitivness that exists, trying all the companies in this business to make the higher amount of cars in the shortest time possible, and obviously to achieve that a lot of money has to be spend in innovation in the process to improve it.

According to INE (2015 a), for the period 2011-2013, regarding sources of information to innovate, a higher amount of companies in the Motor Vehicle industry reported that internal sources (inside the company) and market sources (suppliers and customers

especially, and also competitors consultants) were of huge relevance. Institutional sources (universities, technological centers and research public institutions) and other sources such as conferences, exhibitions, scientific magazines and publications were of high relevance for very few companies in this industry.

Related to section 3.3. Barriers to Innovation, and according to INE (2015 a) for the same period, most companies in Motor Vehicle industry consider of high importance as barriers to Innovation cost factors, for example internal and external funding, high costs or investment; next barriers by the number of companies considering relevant are those related to the market such as uncertainty with respect to demand of innovative goods and/or services, and dominated market by other firms; in third position are knowledge factors as qualified workforce, information about technologies, information about markets and difficulties to find partners to innovate; finally the factors that less amount of companies consider relevant as barriers to Innovate that due to previous Innovations is not needed to continue innovating or that it is not necessary due to lack of demand for Innovations. Volkswagen Navarra barriers are more related to cost and knowledge factors.

Graph 6: Distribution of Expenses in Technological Innovation by Industries (2011-2013)



Source: Own elaboration with data from INE (2015 d)

6. CONCLUSIONS

Companies have to be continuously improving in order to survive, and moreover in highly competitive sectors or in economically difficult periods as it happens to Volkswagen Navarra. This factory, which produces Polos and which is a very relevant pillar for

Navarra's economy, has been using the method or system of continuous improvement for decades but when processes and resources are completely optimized, it is time to Innovate.

As the American economist and professor of Harvard, Theodore Levitt, once said "*Ideas are useless unless used*". For sure, in Volkswagen Navarra there have been thousands of Innovation or innovative ideas throughout history but in order for them to be useful it is needed to organize the process by which they are treated and implemented, to systematize them. This factory started doing it in 2012; today there is still a long way to go. This report has encompassed both steps already done, and future objectives and plans regarding Innovation in Volkswagen Navarra, which at the same time belongs to a bigger strategy of the brand.

In its way to Innovation, the company is very concerned with culture creation. Innovation and its systematization is not a matter of some months as the introduction of a new machine can be; it requires that managers and employees in the organization change their minds, learn to look outside the box and think in a different and innovative way. Even if the process described in section 4.3 is perfectly carried on, if it does not exist a well-designed communication strategy for steps taken and next advances; and if workers are not concerned about Innovation's importance, fewer innovative ideas will be accomplished.

Not to have an isolated view of Volkswagen Navarra in accordance to Innovation, an analysis of indicators of Innovation in Spain such as expenses (amount and cause), intensity, and barriers is needed. The car industry is a very competitive industry where companies produce in a very similar way; nowadays they are trying to differentiate, among other things through Innovation being this industry the one which spends more in this aspect, 13.4% of all the expenses in Innovation in Spain. Biggest difference found regarding Innovation is given among autonomous communities, but what it is similar of Volkswagen and the rest of the factories in this industry according to the data observed in INE and analysed is the way they innovate, the reasons to Innovate, sources of Innovation and barriers that these companies find.

Regarding objectives of the study, we can consider them as fulfilled. First of them, explanation of the background of Volkswagen Navarra has been completed through the description of the framework of the factory, its history, employees, dimensions, production, structure and strategy, and can be found in section 2.

In section 3 the basic concepts regarding Innovation used by most recognized sources and the meaning of those concepts (definition, types of Innovation, barriers and key factors for success) for Volkswagen Navarra have been described and thus second goal is attained.

Third purpose which consists of a compilation of the method in Volkswagen Navarra to Systematize Innovations has been covered in section 4, where the specific process followed by this factory is explained as well as the organization, resources used in this company and another very important aspect culture and communication of Innovation carried out through training, different ways to motivate such as rewards, and marketing of the strategy including Innovation in some events and press.

Last objective, the analysis of the actual situation of Innovation in Spain has been completed in section 5 through the comparison and study of data and indicators obtained mainly from INE, dividing the analysis in two parts activities for technological Innovation where a comparison between autonomous communities and cities in Spain is done, and second technological Innovation, focusing in this part more to the Motor Vehicle Industry.

This study also pretends to demonstrate knowledge and competences through the development of this work, the corresponding video, and the scientific poster. Generic and specific competences are required to be shown with this work and its fulfillment is confirmed for each of them in a table that can be found in Annex 4 (Table 5).

Tasks developed in Volkswagen Navarra during the internship in this company regarding Innovation have been diverse: bring up to day continuously documentation behind the times (regarding responsible, status of tasks of Innovation, activities done during last year…); collection and review to the central about Innovation measures (A3 sheet and Innovation Stairs, in annex 3 diagrams 8 and 9) carried out in Pamplona's factory through massnahmen@web software; assistance to two different courses regarding Innovation (Systematic Innovation with the Innovation's Team and Innovation and change management with managers); and preparation together with the coordinator of communication issues regarding innovation, of meetings twice a month of the Innovation Team to review current aspects, and of the Innovations Route and the computer graphics needed to inform about the measures shown in that route.

In conclusion, this report shows that even though there are several steps that have already been taken in Volkswagen Navarra to implement and Systematize Innovation, there is still a lot of work to be done. There are Innovations and they have probably been appearing

since lots of years ago, however there is still a need to set the rules and more specific systems to detect them and manage them, and also consciousness-raising of the workforce is fundamental. Nevertheless, in the beginning of this long way, Volkswagen Navarra is doing right its homework, it was finalist in the awards to best Innovative idea of the Group, and in 2014 it received the Industrial Excellence Award in Spain. The Group Volkswagen is also taking seriously this strategy, in 2014 Innovation was awarded as best actuation field in the strategy Mach18.Factory and in April 2015 it was considered as the most Innovator producer of the decade in the Automotive Innovations Awards.

7. BIBLIOGRAPHY

Asociación Española de Fabricantes de Automóviles y Camiones. (2012). Anual Report 2013. In: *ANFAC*. [Consult: February 2015] Retrieved from: http://www.anfac.com/documents/tmp/memoria2013.pdf

Cornellá, A. (2007). Pensar desde la Innovación. *Revista de contabilidad y dirección*, Vol 6, 13-35 [Consult: February 2015] Retrieved from: http://www.accid.org/revista/documents/rcd6_castellano_13.pdf

Instituto Nacional de Estadística. (2015 a). Resultados detallados. Encuesta sobre Innovación en las empresas 2013. In: *INE*. [Consult: April 2015] Retrieved from: http://www.ine.es/jaxi/menu.do?type=pcaxis&path=%2Ft14%2Fp061%2Fa2013%2F&file=pcaxis&L=0

Instituto Nacional de Estadística. (2015 b). Notas de prensa. Encuesta sobre Innovación en las Empresas Año 2011. Resultados definitivos. In: *INE*. [Consult: April 2015] Retrieved from: http://www.ine.es/prensa/np750.pdf

Instituto Nacional de Estadística. (2015 c). Notas de prensa. Encuesta sobre Innovación en las Empresas Año 2012. Resultados definitivos. In: *INE*. [Consult: April 2015] Retrieved from: http://www.ine.es/prensa/np815.pdf

Instituto Nacional de Estadística. (2015 d). Notas de prensa. Encuesta sobre Innovación en las Empresas Año 2013. Resultados definitivos. In: *INE*. [Consult: April 2015] Retrieved from: http://www.ine.es/prensa/np890.pdf

Instituto Nacional de Estadística. (2015 e). Encuesta sobre Innovación en las Empresas 2013. In: *INE*. [Consult: April 2015] Retrieved from: http://www.ine.es/daco/daco42/daco4221/ite_cues13.pdf

Instituto Nacional de Estadística. (2015 f). Metodología general 2013. In: *INE*. [Consult: April 2015] Retrieved from: http://www.ine.es/daco/daco43/metoite2013.pdf

International Organization of Motor Vehicle Manufacturers. (2015). 2014 Production Statistics. In: *OICA*. [Consult: May 2015] Retrieved from: http://www.oica.net/category/production-statistics/

OECD and EUROSTAT. (2005). *The Measurement of Scientific and Technological Activities. Oslo Manual. Guidelines for collecting and interpreting innovation data.* Third edition. [Consult: February 2015] Retrieved from: http://www.uis.unesco.org/Library/Documents/OECDOsloManual05_spa.pdf

OECD and World Bank. (2013). Statistics in the IPP. In: *The Innovation Policy Platform.* [Consult: May 2014] Retrieved from: https://www.innovationpolicyplatform.org/content/statistics-ipp

Tony Davila ,Marc Epstein ,Robert Shelton. (2013). *Making Innovation Work. How to Manage it, Measure it, and Profit from it.* Updated edition. United States. Pearson Education

Volkswagen Navarra, S.A. (2011 a). Estructura Fábrica. In *Volkswagen Navarra, S.A* [Consult: February 2015] Retrieved from: http://www.vw-navarra.es/fabrica/Estructura.aspx

Volkswagen Navarra, S.A. (2011 b). Historia Fábrica. In *Volkswagen Navarra, S.A* [Consult: February 2015] Retrieved from: http://www.vw-navarra.es/fabrica/historia.aspx

Volkswagen Navarra, S.A. (2011 c). Grupo Volkswagen Fábrica. In *Volkswagen Navarra, S.A* [Consult: February 2015] Retrieved from: http://www.vw-navarra.es/fabrica/grupo.aspx

Volkswagen Navarra, S.A. (2011 d). Innovar es la forma de asegurar el futuro. *Revista A-Punto.* Nº 105 Dic. 2014 [Consult: February 2015] Retrieved from: http://www.vw-navarra.es/images/apunto/APS_PDF_2634.pdf

Other sources:

Volkswagen Navarra, S.A. (2015). *Intranet Volkswagen Navarra, S.A.* [Consult: February 2015] Retrieved from: http://esvwnapas89307.vwnavarra.emea.vwg/

Attendance to following courses:

- Innovación Sistemática. Spaceminds. (2015). In Volkswagen Navarra, S.A. Duration: 15 hours

- Innovación y Gestión del cambio. Spaceminds. (2015). In Volkswagen Navarra, S.A. Duration: 15 hours

8. ANNEXES

ANNEX 1 – World Motor Vehicle Production (2014)

Table 2: World Motor Vehicle Production by type and country (2014)

	Country	Cars	Commercial vehicles	Total	2013-2014 % change
	Total	**67,525,346**	**22,222,084**	**89,747,430**	**2.6%**
1	China	19,919,795	3,803,095	**23,722,890**	7.3%
2	USA	4,253,098	7,407,601	**11,660,699**	5.4%
3	Japan	8,277,070	1,497,488	**9,774,558**	1.5%
4	Germany	5,604,026	303,522	**5,907,548**	3.3%
5	South Korea	4,124,116	400,816	**4,524,932**	0.1%
6	India	3,158,215	681,945	**3,840,160**	-1.5%
7	Mexico	1,915,709	1,449,597	**3,365,306**	10.2%
8	Brazil	2,314,789	831,329	**3,146,118**	-15.3%
9	Spain	1,898,342	504,636	**2,402,978**	11.1%
10	Canada	913,533	1,480,357	**2,393,890**	0.6%
11	Russia	1,683,677	202,969	**1,886,646**	-13.6%
12	Thailand	742,678	1,137,329	**1,880,007**	-23.5%
13	France	1,495,000	322	**1,817,000**	4.4%
14	UK	1,528,148	70,731	**1,598,879**	0.1%
15	Indonesia	1,011,260	287,263	**1,298,523**	7.6%
16	Czech Rep.	1,246,506	4,714	**1,251,220**	10.4%
17	Turkey	733,439	437,006	**1,170,445**	4.0%
18	Iran	925,975	164,871	**1,090,846**	46.7%
19	Slovakia	993	0	**993**	1.8%
20	Italy	401,317	296,547	**697,864**	6.0%
21	Others	554,845	107,24	**662,085**	2.9%
22	Argentina	363,711	253,618	**617,329**	-22.0%
23	Malaysia	547,15	49,45	**596,6**	-0.8%
24	Poland	473	120,904	**593,904**	0.6%
25	South Africa	277,491	288,592	**566,083**	3.7%
26	Belgium	481,637	35,195	**516,832**	2.6%
27	Romania	391,422	0	**391,422**	-4.8%
28	Taiwan	332,629	46,594	**379,223**	12.0%
29	Uzbekistan	245,66	0	**245,66**	-0.4%
30	Hungary	224,63	2,4	**227,03**	2.1%
31	Australia	145,607	34,704	**180,311**	-16.5%
32	Portugal	117,744	43,765	**161,509**	4.9%
33	Austria	136	18,34	**154,34**	-7.3%
34	Sweden	154,173	N.A.	**154,173**	-4.3%
35	Slovenia	118,533	58	**118,591**	26.5%
36	Finland	45	35	**45,035**	484.6%
37	Netherlands	0	29,807	**29,807**	2.1%
38	Ukraine	25,941	2,81	**28,751**	-43.0%
39	Egypt	17,83	9,19	**27,02**	-30.8%
40	Serbia	9,98	695	**10,675**	-2.1%

Source: International Organization of Motor Vehicle Manufacturers (2015)

ANNEX 2 - Activities for Technological Innovation (2013)

Table 3: Activities for Technological Innovation by Autonomous Communities and Cities (2013)

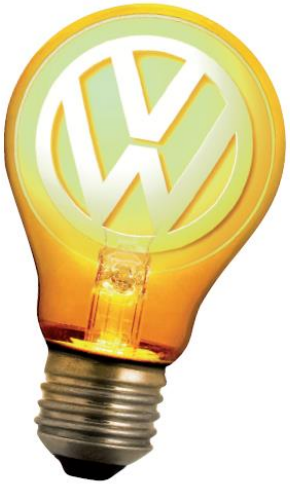
Autonomous Communities	Companies with Innovative Activities in 2013	Expenses in Innovative Activities in 2013 (in 1000 €)	% Expenses Variation (*)	Intensity in Innovation: Of all the companies
Mean	848.37	696,489		
Andalucía	1,438	873,910	0.8	0.74%
Aragón	482	255,867	-30.7	0.64%
Asturias, Principado de	299	136,739	-4.5	0.49%
Balears, Illes	233	38,091	8.1	0.23%
Canarias	384	64,117	-11.8	0.19%
Cantabria	143	52,728	-28.6	0.61%
Castilla y León	668	474,466	-15.9	1.03%
Castilla - La Mancha	428	171,002	-21.4	0.59%
Cataluña	3,396	3,095,168	-6.5	1%
Comunitat Valenciana	1,715	1,197,835	92.0	1.04%
Extremadura	246	41,572	-6.9	0.39%
Galicia	984	482,360	-20.5	0.9%
Madrid, Comunidad de	2,998	4,465,794	-0.1	0.84%
Murcia, Región de	361	134,139	-11.5	0.41%
Navarra, C.Foral de	394	274,248	-5.3	1.17%
País Vasco	1,755	1,425,666	-5.9	1.63%
Rioja, La	188	45,180	-12.3	0.78%
Ceuta	3	2,400	608.2	0.43%
Melilla	4	2,008	143.1	0.4%
Total Nacional	**16,119**	**13,233,291**	-1.3	**0,91%**

(*) Where the expenses are realized

Source: Own elaboration with data from INE (2015a) and INE (2015 d)

ANNEX 3- Volkswagen Navarra's Tools for Innovation Systematization

Diagram 7: Innovation Logo Volkswagen Navarra, S.A.



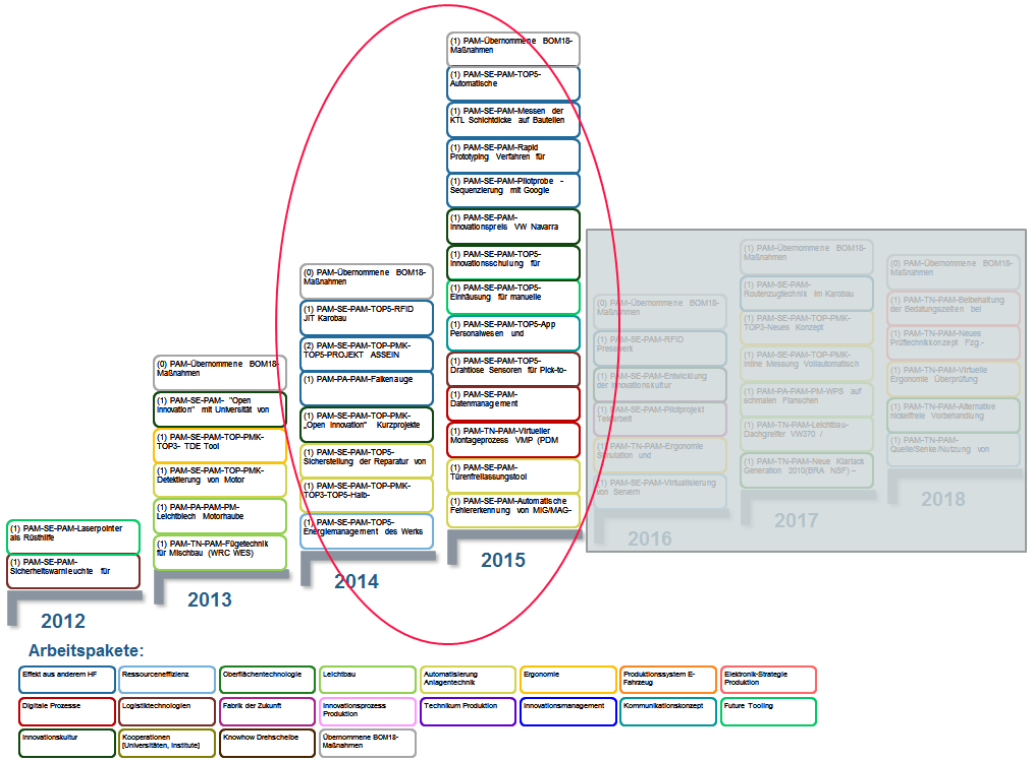
Source: Internal documentation of Volkswagen Navarra

Table 4: Innovation's Checklist Volkswagen Navarra

Checklist-Criteria	Yes / No	Comments
1. Efficiency		Contribution to value creation
2. Originality		Concept or application's novelty
3. Competitive advantage		Competitive advantage and possibility of introduction in other factories
4. Degree of substitution		Substitution with respect to previous concept or application
5. Possibility of subsidy or patent		Degree of subsidy or patent obtaining
6. Innovation's Committee		Committee decision

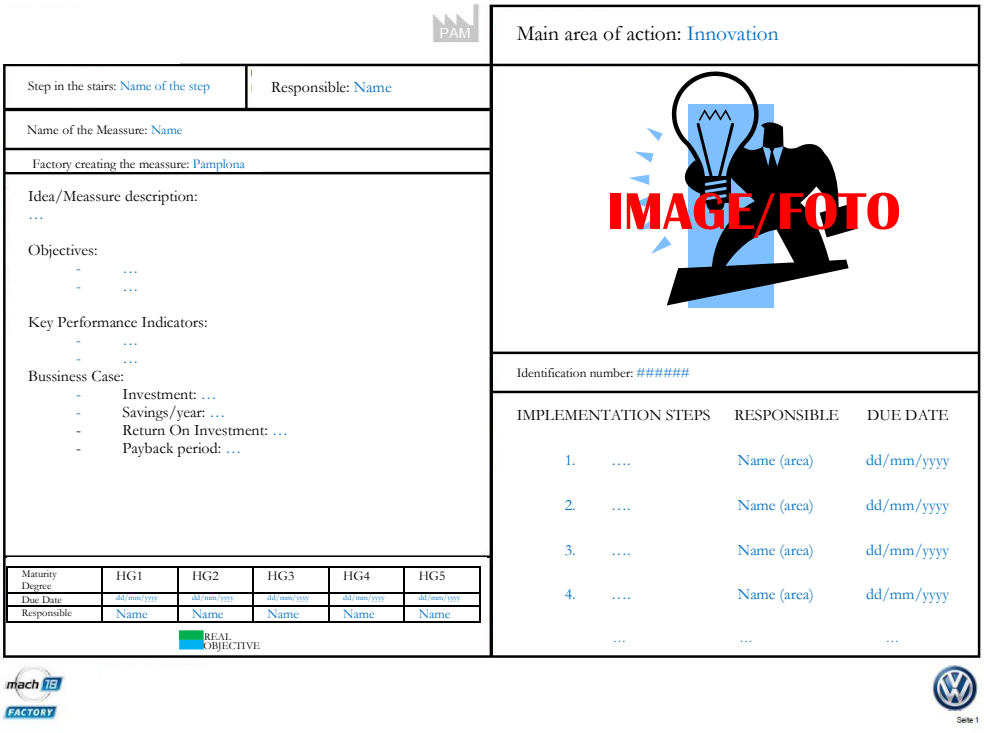
Source: Own elaboration with internal documentation of Volkswagen Navarra

Diagram 8: Innovation Stairs of Volkswagen Navarra from massnahmen@web



Source: massnahmen@web (internal software of Volkswagen)

Diagram 9: Example of empty A3 Sheet from massnahmen@web



Source: massnahmen@web (internal software of Volkswagen)

ANNEX 4- Competences fulfilment

Table 5: Generic and Specific Competences Fulfilment and Examples

GENERIC COMPETENCES	DEMONSTRATION	EXAMPLES
CB02: Students can apply their knowledge to their work or vocation in a professional manner and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study.	Study of a company process development and analysis of related indicators.	Sections 4, 5.2. and 5.3.
CB03: Students should have the ability to gather and interpret relevant data (usually within their field of study) to inform judgments that include reflection on relevant social, scientific or ethical.	Interpretation of Innovation and economic indicators.	Sections 2.1., 5.2. and 5.3.
CB04: Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.	Explanation of basic concepts and background of a company.	Sections 2.1., 2.4., 3 and 5.1.
CG01: Capacity for analysis and synthesis	Selection of relevant information and data.	Sections 2, 4 and 5
CG02: Capacity for organization and planning	Logically structured work: Introduction, background, data analysis and conclusions.	Report (Index), Video and Poster
CG03: Oral and written communication in mother tongue	---	---
CG04: Oral and written communication in a foreign language	Whole work developed in English.	Report, video and poster
CG06: Ability to analyse and search for information from various sources	References to different sources in the whole work.	Bibliography (INE, Volkswagen Navarra, OICA…)
CG14: Critical and self-critical abilities	Data elaboration, analysis and conclusions.	Sections 5.2. and 6
CG15: Ethical compromise in the work	Quotation of sources.	References, bibliography, sections 3.1., 5…
CG16: Ability to work in pressure environments	Working within deadlines, study of an unknown field.	Study of Innovation and its treatment within a company, whole report.
CG17: Ability to learn independently	Analysis of a transversal process in a company.	Section 4
CG19: Creativity	Relation of indicators and data analysis with a company process.	Sections 2 to 4 with section 5
SPECIFIC COMPETENCES	DEMONSTRATION	EXAMPLES
CE02: Identification of relevant economic sources and their contents	Quotation and selection of relevant sources, and references in the text.	Bibliography (INE, OECD, World Bank, EUROSTAT…)
CE06: Write projects about general management or about functional areas of the company.	Description of a company's objectives and process/method to implement them.	Sections 2.1., 2.3., 2.4. and 4.
CE12: Plan, organize and control projects in the different functional areas of the company.	Study and control of a process or activity related to all the areas of a company.	Sections 2.4. and 4.
CE13: Identification of the company as a system and recognition of interdependences between different functional areas.	Description of a company and its strategic goals.	Sections 2.1., 2.3., 2.4. and 4.